



K + S Salt Australia Pty Ltd

Acid Sulfate Soil and Sediment Study

EPA Assessment No. 2101

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Executive summary

K + S Salt Australia (K + S) is the Australian entity of the international resources company K + S Group. K + S (**the Proponent**) have appointed GHD Pty Ltd (GHD) to undertake hydrogeological, geotechnical and Acid Sulfate Soil and Sediment (ASSS) investigations for Phase 2 of the Ashburton Solar Salt project (**the Proposal**).

The Proponent is developing a green field solar salt project along the Western Australian coast, approximately 40 km south–west of the township of Onslow, within the Shire of Ashburton.

The Study Area consists of 67,570 hectares (ha).

The facility is planned to operate with a salt export capacity of 4.7 million tonnes per annum, harvested from the progressive evaporation of seawater in a series of Concentration and Crystalliser Ponds.

The site investigation for this Proposal commenced on 28th October 2019 and finished on 31st March 2020. The ASSS investigation occurred concurrently with the geotechnical and hydrogeological investigation works. The program of investigation comprised the following:

- Drilling 15 boreholes within the Study Area.
- Installation of groundwater monitoring bores for hydrogeological and ASS assessment.
- Excavation of test pits along the proposed road and bitterns discharge pipeline alignments and at potential borrow areas.
- Manual boring of auger holes.
- Sampling and collection of soils for ASS within select boreholes, groundwater monitoring wells, test pits and auger holes.
- Mobilisation of a vibrocore system mounted on a marine vessel to collect sediment samples at 12 locations to assess the proposed dredge pocket.

This report presents the ASSS study to assist in providing further information to inform the preparation of the Environmental Review Document (ERD), which will be assessed under Part IV of the Environmental Protection Act 1986 (EP Act).

Typically, the higher elevated areas of the Proposal site are between 5 and 10 m AHD and consist of calcareous materials such as calcarenite gravel, coral and shell fragments and present a low risk of oxidation during disturbance. Total Inorganic Carbon analysis completed on the less than 0.5 mm fraction of samples collected indicates significant natural buffering ability would be available within the natural environment in the event of a minor acidification event.

Sulfidic material was encountered within the supratidal flats, creek mudflats and lower lying regions of the Proposal site. Infrastructure requiring excavation or disturbance in these areas will require management.

In addition, testing indicates that dredged marine sediments are likely to contain acid generating material and will require management.

The table below provides a summary of the project areas which may result in excavation or spoil generation and recommended management of these areas. A separate Acid Sulphate Soil Development Strategy and Management Plan has been prepared by GHD outlining specific and detailed management measures.

Table E1: Summary of Recommended ASS Management

Infrastructure	Excavation Required	Approx. Max. Depth of Excavation	Excavation Floor Depth mAHD	Estimated Amount of Material	ASS Risk Map Rating	Treatment Required (yes, no or specific comment)
Jetty Berthing Pocket	Dredging of Berthing Pocket	2.5 m of seabed	-7.2	17,000 m ³	N/A mapping – sampling indicates Moderate to High risk	Yes – marine sediment sampling indicates likely to be acid generating. Will be contained and treated in land disposal area.
Jetty	Piles	Assume driven with no spoil	N/A	Assume driven with no spoil	Low – Moderate	No – no excavation required.
Plant Site (NPI Infrastructure)	Shallow footings	3 m	1.1	Included in Borrow Pit A	Low – Moderate	No – elevated sandy island. ASS not identified at 6.5 m via sampling.
Borrow Pit 1	Excavation of construction material	6 m from highest point of island	0.8	10.6 million m ³	Low – Moderate	
Borrow Pit 2	Excavation of construction material	6 m from highest point of island	0.8	4.9 million m ³	Low – Moderate	
Borrow Pit 3	Excavation of construction material	2 m	2.0	1.3 million m ³	Low – Moderate	Likely to be acid generating at depth, however surface soils may have completed previous oxidation and leaching cycles resulting in lower risk or net acid generating potential. Further sampling will be conducted to confirm prior to excavation.
Borrow Pit 4	Excavation of construction material	2 m	1.0	9.8 million m ³	Low – Moderate	
Drainage Diversion A	Excavation of material for drainage diversion (to be used as fill)	2 m	5.5	330,000 m ³	Low - High	Likely to be acid generating at depth, however surface soils may have completed previous oxidation and leaching cycles resulting in lower risk or net acid generating potential. Further sampling will be conducted to confirm prior to excavation.
Drainage Diversion B	Excavation of material for drainage diversion (to be used as fill)	2 m	6.0	21,000 m ³	Low - High	
Drainage Diversion C	Excavation of material for drainage diversion (to be used as fill)	2 m	8.0	104,000 m ³	Low - High	
Evaporation Ponds External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.75	N/A surface only	Moderate – High	Yes – materials will require confirmatory testing to ascertain acid generating potential prior to re-use.
Crystalliser Ponds External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.65	N/A surface only	Moderate - High	Confirmation of the extent of displacement anticipated for earthen bunds to confirm existing neutralisation prior to placement.
Bitterns Pond External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.55	N/A surface only	Moderate - High	
Seawater Intake Channel	None – assumed built on top of mudflat	N/A	N/A	N/A	Moderate – High	No – no excavation required.
Seawater Intake Inlet Well and Pump Station	Excavation of creek bank required for inlet well	3 m	-2.04	Up to 20,000 m ³	Moderate - High	Yes – creek sediment sampling indicates likely to be acid generating. Will be contained and treated within intake channel.

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Abbreviations

Abbreviation	
AGIG	Australian Gas Infrastructure Group
AHD	Australian Height Datum
ANC	Acid neutralising capacity
ANZG	Australian and New Zealand Guidelines
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soils management plan
ASSS	Acid Sulfate Soils and Sediment
AVS	Acid volatile sulfur
BoD	Basis of Design
BTEX	Benzene Toluene Ethylbenzene and Xylene
CAB	Carnarvon Artesian Basin
CP	Concentration Pond
CRS	Chromium Reducible Sulfur
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DER	Department of Environmental Regulation
DMIRS	Department of Mines, Industry Regulation and Safety
DO	Dissolved oxygen
DOW	Department of Water
DPLH	Department of Planning, Lands and Heritage
EC	Electrical conductivity
EILs	Ecological investigation levels
Enviroworks	EnviroWorks Consulting
EPA	Environmental Protection Authority
ERD	Environmental Review Document
ESD	Environmental Scoping Document
GHD	GHD Pty Ltd
GPS	Global positioning system
H	Height
HDPE	High density polyethylene
Hectares	Ha
ISQG	Interim Sediment Quality Guidelines
K+S	K + S Salt Australia
Km	Kilometre
LIDAR	Light detection and ranging
LNG	Liquefied natural gas
LOR	Limit of reporting
M	Metres
m bgl	Metres below ground level
MBO	Monosulfidic Black Oozes
mg/L	milligrams per litre

Abbreviation	
MNES	Matters of National Environmental Significance
NASS	Non Acid Sulfate Soil
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measures
NPI	Non-process infrastructure
OEPA	Office of the Environmental Protection Authority
ORP	Oxidation-reduction potential
PAH	Poly Aromatic Hydrocarbons
PCB	Polychlorinated biphenyl
PFS	Preliminary Feasibility Study
PSD	Particle Size Distribution
PVC	Polyvinyl chloride
QA/QC	Quality assurance and quality control
RIS	Reduced Inorganic Sulfur
RIWI	Rights in Water and Irrigation
RL	Relative level
RPD	Relative percentage difference
SAQP	Sampling and analysis quality plan
SPOCAS	Suspension peroxide oxidation combined acidity and sulphur
SWL	Static water level
TIC	Total Inorganic Carbon
TOC	Total Organic Carbon
TRH	Total Recoverable Hydrocarbons
V	Vertical

1. Introduction

1.1 General Overview

K + S Salt Australia (K + S) is the Australian entity of the international resources company K + S Group. K + S (**the Proponent**) have appointed GHD Pty Ltd (GHD) to undertake hydrogeological, geotechnical and Acid Sulfate Soil and Sediment (ASSS) investigations for Phase 2 of the Ashburton Solar Salt project (**the Proposal**).

This report presents the ASSS study to assist in providing information to inform the preparation of the Environmental Review Document (ERD), which will be assessed under *Part IV of the Environmental Protection Act 1986* (EP Act).

The Proposal is located within the coastal region southwest of the town of Onslow, Western Australia), as shown on Figure 1.

GHD previously completed Phase 1 investigations in 2019, which included a site walkover inspection and preparation of a report (GHD 2019). The report presented the site inspection findings and potential Acid Sulfate Soils (ASS), geological and geotechnical issues that could impact the Proposal and also provided recommendations to assist with the mobilising of Phase 2 (this investigation).

The fieldwork component of the hydrogeological, geotechnical and ASSS site investigations for the Proposal was completed in April 2020 and represents the first ground intrusive works carried out in the Study Area (Figure 1).

The investigation was undertaken in accordance with GHD's proposal provided to the Proponent dated 13th September 2019. This report presents the ASSS investigation findings obtained from the Phase 2 site investigation conducted between 28th October 2019 and 31st March 2020.

1.2 Proposal Overview

The Proponent is developing a green field solar salt farm along the Western Australian coast, approximately 40 km south-west of the township of Onslow, within the Shire of Ashburton.

The Study Area consists of 67,570 hectares (ha).

The facility is planned to operate with a salt export capacity of 4.7 million tonnes per annum, harvested from the progressive evaporation of seawater in a series of Concentration and Crystalliser Ponds. The Study Area is illustrated on Figure 1. Further details relating to the proposed development are outlined in Section 3.

1.3 Purpose of Report

The Office of the Environmental Protection Authority (OEPA) has determined that the Proposal is required to be assessed under Part IV of the EP Act. The Environmental Scoping Document (ESD) was endorsed by the Environmental Protection Authority (EPA) on 24 January 2018. The ESD has outlined the work and/or studies required to be undertaken and included within the ERD.

The purpose of this ASSS study in relation to the Proposal is to provide information regarding soil and sediment quality including the chemical, physical, biological and aesthetic characteristics, with particular regard to potential for acidification and contamination of soils.

This technical report will assist in the preparation of an overall ERD and provides information and assessment so that the EPA's objective 'to maintain quality of land and soils so that environmental values are protected' for Terrestrial Environmental Quality are maintained.

1.4 Scope of Work

The scope of work for the Phase 2 ASSS investigation includes the following components:

- Desktop review of the local geology and existing ASS information.
- A programme of fieldwork including:
 - Drilling of boreholes
 - Installation of groundwater monitoring bores
 - Excavation of test pits
 - Collection of marine sediment samples representative of the dredge pocket.
- An ASSS laboratory testing programme, with testing conducted on a selection of samples collected during the fieldwork programme at a National Association of Testing Authorities (NATA) accredited laboratory.
- A dredging (sediment) testing program offshore to inform the proposed capital dredge works.
- Preparation of an ASSS investigation report (this report) to document the investigation data and recommendations.

1.5 Contemporary Guidelines

The ASSS study was completed with reference to, and in accordance, with the following national and West Australian contemporary guidelines (where appropriate):

- Department of Environment Regulation (DER) *Acid Sulfate Soil Guideline Series: Identification and investigation of acid sulfate soils and acidic landscapes* (DER 2015a).
- Department of Environment Regulation (DER) *Acid Sulfate Soil Guideline Series: Treatment and management of soil and water in acid sulfate soil landscapes* (DER 2015b).
- Australian Government *National Assessment Guidelines for Dredging* (2009).

Additional ASS guidelines recently released by Water Quality Australia, an Australian Government initiative in partnership with state and territory governments, was also considered, particularly in the assessment of sediments and waterways:

- National Acid Sulfate Soils Guidance: *National acid sulfate soils sampling and identification methods manual* (2018).
- National Acid Sulfate Soils Guidance: *Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands* (2018).
- National Acid Sulfate Soils Guidance: *Guidelines for dredging of acid sulfate soil sediments and associated dredge spoil management* (2018).

The above national guideline documents are useful tools and endorsed by Department of Water and Environmental Regulation (DWER), Western Australia. However, jurisdictional guidance and regulations take precedence over the national guidance documents unless stated.

Due to the varied description and generalised terms regarding ASS, this assessment has been undertaken using the following terms and distinctions:

- **Non Acid Sulfate Soil (NASS)** - Material deemed by laboratory analysis to not contain Reduced Inorganic Sulfur (RIS) greater than or equal to 18.0 mol H+/ tonne.
- **Sulfidic material** - Material containing greater than or equal to 18.0 mol H+/ tonne of Reduced Inorganic Sulfur (RIS).
- **Hyposulfidic material** - Sulfidic material that would not become severely acidic, if allowed to oxidise completely due to naturally available properties.
- **Monosulfides** - Material containing greater than or equal to 0.01% acid volatile sulfur (AVS), primarily as iron monosulfides but other metal monosulfides may be present.

1.6 Scope and Limitations

This report has been prepared by GHD for K + S Salt Australia Pty Ltd and may only be used and relied on by K + S Salt Australia Pty Ltd for the purpose agreed between GHD and the K + S Salt Australia Pty Ltd as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than K + S Salt Australia Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by K + S Salt Australia Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Site Identification

2.1 Site Identification

The Proposal is located approximately 40 km south-west of the town of Onslow, Western Australia (see Figure 1). The Study Area is 67,570 ha in size (Figure 1).

This area contains various physiographic features including coastal dunes, tidal creeks lined with mangroves, intertidal/supratidal flats, undulating sand plains, clay pans and the marine environment.

2.2 Mining Tenements

A search of the Department of Mines, Industry Regulation and Safety (DMIRS) MINEDEX and Materials Titles Online systems was completed in July 2020. The search indicated that in July 2020 K + S held exploration status on five mining tenements which form the preponderance of the Study Area.

A summary of mining tenement details is presented in Table 1 and the tenements are presented on Figure 2.

Table 1 Mining Tenement Details Summary

Tenement identifier	Date received	Commencement	Expiry	Area (ha)
E 08/1395	03/06/2003	15/06/2004	14/06/2020	22231
E 08/1396	03/06/2003	15/06/2004	14/06/2020	10807
E 08/1399	03/06/2003	15/06/2004	14/06/2020	8576
E 08/1421	15/10/2003	15/06/2004	14/06/2020	7306
E 08/2840	27/04/2016	25/01/2018	24/01/2023	13985

2.3 Zoning

According to the Department of Planning Lands and Heritage, the site is located on land parcels zoned as *'Rural'*, *'Tidal inundation special control area'* and *'Conservation, recreation and nature landscape'* (DPLH 2020).

2.4 Current Land Use

2.4.1 On Site Land Use

The Proposal site is situated on a region of intertidal/supratidal flats, with remnant islands and isolated sand dunes. The Study Area is currently on pastoral land associated with the Urala and Koodarrie Stations. The Study Area is predominately absent of any development, with the exception of an area in the northeast portion of the site that is shared land between the Proposal and the Australian Gas Infrastructure Group (AGIG) Tubridigi Gas Plant. An area of approximately 1969 ha is shared by the Study Area and the AGIG Tubridigi Gas Plant site boundary. According to spatial information provided by AGIG, a single gas production well appears to be located within the Study Area, along with various access tracks and other minor gas plant support infrastructure. The AGIG and aforementioned land uses are shown on Figure 2.

2.4.2 Surrounding Land Use

The AGIG Tubridgi Gas Plant is located approximately 2.5 km north-east of the site. The Tubridgi Gas Plant facilitates gas storage and delivery to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). A further 13 km north-east of the Study Area is the Macedon Domestic Gas Plant operated by BHP Group Limited and beyond is the Wheatstone Liquefied Natural Gas (LNG) Plant operated by Chevron Australia Pty Ltd (see Figure 2).

The Study Area is also located 25 km south-west of the Onslow Salt project (see Figure 2). The Onslow Salt project is an active solar salt operation with an estimated production of 2.5 million tonnes per annum. Similar to the salt manufacturing process outlined in the Proposal's Pre-Feasibility Study (Arcadis 2018a) (see further Section 3), the Onslow Salt project pumps seawater from Beadon Creek to concentration ponds, before passing material through a variety of handling methods and infrastructure to process the salt for conveyor loading onto ships from a jetty.

A review of available aerial imagery and online data indicates that no coastal or offshore development has occurred proximal to the Study Area. The coastal boundary of the Study Area is flanked by the Pilbara Inshore Islands, including the major islands of Thevenard, Bessieres, Serurier, Peak and Murion. These larger islands are located approximately 35 km offshore and are classed as nature reserves. Thevenard Island (35 km north-east) is the site of a former gas plant originally operated by Chevron Australia Pty Ltd which ceased operation in 2014 and is currently in a decommissioning phase. Closer to shore (<10 km), smaller nature reserve classed islands exist. Aerial imagery shows no obvious developments on these islands.

3. Proposed Development

3.1 Overview

The Study Area consists of 67,570 ha.

The facility is planned to operate with a salt export capacity of 4.7 million tonnes per annum, harvested from the progressive evaporation of seawater in a series of concentration and crystalliser ponds. It is anticipated that the proposed salt facility will comprise the following infrastructure and/ or components:

- Seawater intake pump station and channel to the salt ponds.
- Salt concentration ponds (concentration ponds).
- Salt crystalliser ponds (crystalliser ponds).
- Brine pond and brine transfer structures including bitterns discharge infrastructure (dilution pond, pipeline and diffuser).
- Salt wash plant.
- Salt stockyard and reclaim conveyor system.
- Non-process infrastructure (NPI) including administration buildings, stores (including fuel stores), workshops, laydown areas and internal access road network.
- A dedicated jetty and loading platform to facilitate the transport of salt to an offshore anchorage for seagoing vessels.
- Dredging of a small berthing pocket and onshore dredge disposal area.
- Drainage diversions.
- Borrow pit areas for construction materials.

The Study Area and proposed layout is shown on Figure 3.

3.2 Proposed Infrastructure

The proposed infrastructure detailed below have been obtained from the pre-feasibility study design report and pre-feasibility study basis of design prepared by Arcadis (2018a and 2018b) and from further design work conducted by K + S since 2018.

3.2.1 Seawater Intake

The proposed location of the seawater intake infrastructure is Urala Creek South due to preferable water chemistry and a flat downstream lake profile conducive to reduced scouring of the creek.

Preliminary designs propose multiple pumps installed to abstract water from a rock armoured sump in Urala Creek South. The pumps will transfer water through a channel which will discharge to Salt Concentration Pond (CP) 1.

3.2.2 Salt Concentration Ponds

The proposed Salt Concentration Ponds are predominately sited on intertidal/supratidal flats as shown on Figure 3. The intertidal/supratidal flats are typically between approximately RL 0.6 m AHD and RL 1.3 m AHD. The surrounding remnant islands to the east are undulating with elevations rising up to approximately RL 21 m AHD.

Table 2 Concentration Ponds Summary

Parameter	Estimated import volume (m ³)
External embankments crest level of RL+3.5 m AHD and width 3.5 m 1(V):1.5(H) slope batters	2,038,000 - 2,209,300
Internal embankments crest level of RL+3.0 m AHD, crest width of 3.5 m 1(V):1.5(H) slope batters	

Table 2. Table source: Arcadis 2018a

3.2.3 Crystalliser Ponds

The Crystalliser Ponds are proposed to be located on the intertidal flats, immediately north of the concentration ponds (Figure 3). The Crystalliser Ponds consist of 12 cells separated by internal embankments and designed in order to optimise existing topography and project operational efficiency. Both the internal and external embankments are proposed to tie into the mainland and the mainland remnant islands.

Approximate disturbance volumes and imported fill volumes are presented in Table 3.

Table 3 Crystalliser Ponds Summary

Parameter	Estimated disturbance volume (m ³)
External embankments crest level of RL3.5 m AHD and 1(V):1.5(H) slope batters	-
Berm on the pond side with a crest level of RL2.4 m AHD	-
Internal embankments crest level of RL2.4 m AHD and 1(V):1.5(H) slope batters	-
Earth working of in-situ material to facilitate achievement of design levels	850,000
General fill importation to facilitate achievement of design levels	1,400,000
Rock – scour armour	190,000

Table 3. Table source: Arcadis 2018a

3.2.4 Brine Ponds and Transfer Structures

The seawater intake pump will deliver seawater (brine) into the concentration ponds where it will flow in a north to south direction through Concentration Ponds 1 to 3. From Concentration Pond 3, the brine will be lifted up by a pump station located on the embankment of Concentration Pond 3 and 4 for return south to north flow to the salt crystalliser ponds (Arcadis 2018b).

As the brine progresses through the concentration ponds it increases to a critical density at which salt begins to crystallise from the solution. At this density, the brine is referred to as 'maiden brine' and this maiden brine is transferred from concentration pond 8 to the maiden brine feed channel via the maiden brine transfer pump station. The maiden brine feed channel (brine channel), is located along the southern boundary of the crystalliser ponds and has been

designed such that the maiden brine will gravity feed the salt crystalliser pond cells. Key design details of the brine pond and transfer infrastructure are as follows (Arcadis 2018b).

Table 4 Brine Pond and Transfer Structure Summary

Parameter	Details
Maiden Brine Feed Channel	5.1 km long, 13 m wide, 1.3 m peak brine depth 1.5 (H):1 (V) side slopes, clay lined
Brine Transfer Culverts	Barrel culverts: 3.5 m levee width, HDPE piping flat on pond floor (RL 0.9 – 1.0 m AHD) Bridge structures: 3.5 m levee width
Maiden Brine Pump Station	Pump sump RL 0.168 m AHD, internal levee RL 5.0 m AHD, mudflat concentration pond 8 RL 1 m AHD

Table 4. Table source: Arcadis 2018a and 2018b

3.2.5 Bitterns Discharge

As the brine reaches the second row of the Crystalliser Ponds, it reaches a specific density at which contaminant salts cannot be readily removed by processing at the wash plant – it is at this density that the brine is referred to as ‘raw bitterns’. The bitterns dilution pond is located on the northern boundary of the Salt Crystalliser Ponds, it receives the raw bitterns from the Salt Crystalliser Ponds once the brine has deposited the salt and the specific bitterns density is reached.

Seawater will be pumped from Concentration Pond 1 into the bitterns dilution pond, prior to disposal of the bitterns. Bitterns disposal will occur via a bitterns pipeline that will run from the bitterns dilution pond to the jetty (Arcadis 2018a). The bitterns pipeline will be co-located with the conveyor, on a built-up embankment with culverts underneath the embankment to convey necessary surface water flows.

Table 5 Bitterns Channel and Discharge Structure Summary

Parameter	Details
Bitterns dilution pond	70 ha pond, with no liner, 2 m above ground level
Brine discharge channel	Co-located with the conveyor, on a built-up embankment with culverts underneath the embankment to convey necessary surface water flows

Table 5. Table source: Arcadis 2018a and 2018b

3.2.6 Salt Stockyard and Reclaim Conveyor System

The Salt Stockyard will store washed salt to allow for drying of the product prior to ship loading. A centralised rail mounted stacker and reclaim is proposed. The preferred location for the stockyard is one of the remnant islands (Figure 3). The design level for the salt wash plant was assumed to be approximately RL 6.0 m AHD and founded on shallow concrete strip footings.

3.2.7 Non-Process Infrastructure (NPI)

NPI is proposed on a remnant island close to the salt stockyard (Figure 3). The various components of the non-process infrastructure include:

- Administration building.
- Workshop and store facilities.
- Amenities and crib buildings.
- Refuelling facilities.
- Laboratory facilities.
- Sewage treatment facilities.
- Layout and parking provisions.

It is assumed that the NPI will be founded at a level determined by the detailed design and likely to take into consideration the storm surge height. For the purpose of this assessment, this infrastructure is assumed to be founded at approximately RL 6.0 m AHD.

The primary access road is proposed to extend north-east from the NPI area joining to a proposed third-party road (Figure 3). The road is proposed to be an 8 m wide unsealed roadway with 4(H):1(V) shoulder grade and a minimum of 0.9 m fill above the natural surface.

3.2.8 Marine Jetty and Loading Platform

The proposed jetty extends outwards approximately 700 m into the marine environment from the northern coastline and includes a loading platform towards the offshore portion of the jetty. The offshore structure is proposed to consist of a driven piled arrangement and the proposed location is shown on Figure 3.

3.2.9 Capital Dredging and Onshore Dredge Disposal Area

A small amount of dredging is proposed at the end of the jetty to accommodate a single berthing pocket for the transshipment barge, which will transport salt to an offshore ocean going vessel anchorage. The proposed area for dredging is approximately 200 m x 35 m and 6 m in total water depth (2.5 m seabed depth to be dredged), with dredged spoil (assumed to be 17,000 m³) proposed to be disposed onshore. The onshore disposal area will be located immediately inshore from the jetty location (Figure 3). Neutralising material will be added to the dredged material as necessary to treat any ASSS detected. Decant water will be retained for a suitable time to allow appropriate water quality standards to be met (confirmed by monitoring) prior to release to the marine environment. Solids will be tested to ensure appropriate environmental standards are met, then will be reclaimed and used in on-site embankment construction.

3.2.10 Drainage Diversions

Water Technology (2021) have determined the locations of drainage diversions required upstream of the proposed concentration ponds, to direct surface water flows around the project area (Figure 3). These drainage diversions will require excavations to re-direct surface flows. The estimated volume of material to be excavated is 455,000 m³. The majority of excavated material is unlikely to be acid generating as they are assumed to be significantly weathered and have historically been subject to oxidation and leaching cycles. However, the net acid generating potential has not been accurately determined and pockets or lenses may contain acid generating material, particularly with depth. Further sampling will be conducted

to confirm net acid generating potential prior to excavation and management implemented if necessary.

3.2.11 Borrow Pit Areas for Construction Materials

A summary of the Proposal material reuse potential is presented in Table 6. Based on geotechnical studies conducted by GHD, the locations of borrow pits for project construction have been determined as shown on Figure 3. It is estimated that these borrow pits will cover a total area of 1011 ha, be a maximum depth of 6 m and approximately 38 million m³ of material will be excavated from them.

Borrow pits 1 and 2 (Figure 3) are considered unlikely to contain acid generating material given they occur on elevated sandy islands and ASS was not identified at 6.5 m depth (excavation will cease at 6 m depth).

Borrow pits 3 and 4 (Figure 3) may contain acid generating material at depth, however, the depth of these borrow pits will be to a maximum of 2 m depth. Further sampling will be conducted to confirm net acid generating potential prior to excavation and management implemented if necessary.

Table 6 Summary of Potential Construction Materials

Domain / Material	Material Re-use Potential			
	General Fill	Select Fill	Low Permeability Fill	Rock Armour
Coastal Dune Sand (Qs)	Yes	Yes	No	No
Intertidal Flats (Qs)	No	No	No	No
Dune Field Sand (Qe)	Yes	Yes	No	No
Supratidal Flats (Qt)	Yes	No	Yes ¹	No
Claypan Terrain (Czp)	Yes	Yes ²	Yes ³	No
Outwash Plain Alluvium (Qza)	Yes	Yes	No	No
Coastal Limestone	Yes	Yes	No	No ⁴

Table 6. Table source: Arcadis (2018b)

- 1) Subject to investigation and material characteristics assessment by laboratory testing
- 2) Borrow operations to target well graded soils with durable gravel and fines content < 12%
- 3) Borrow operations to target red-brown medium plasticity sandy clay
- 4) To be confirmed, existing data indicates limestone in coastal fringes is too fractured and of variable strength to generate blocks of sufficient size for rock armour

4. Previous Studies

In order to develop a comprehensive understanding of the site's geological setting and relevant ASS materials information, the following reports were reviewed:

- *EnviroWorks Consulting (2016), Ashburton Salt Project: EPA Referral Supporting Document, October 2016.*
- *EnviroWorks Consulting (2017), Ashburton Salt Project: Environmental Scoping Document, December 2017.*
- *GHD (2018), Ashburton Salt Project, Geotechnical, Hydrogeological and Acid Sulfate Soil Desktop Assessment, February 2018.*
- *Water Technology (2018), Ashburton Salt Project: Pre-Development Surface Water and Nutrient Environmental Assessment, June 2018.*
- *North Rossa (2019), A Limestone Option for K + S Salt's Proposed Solar Salt Project, February 2019.*
- *GHD Pty Ltd (2019), Ashburton Solar Salt Early Works – Phase 1, Geotechnical and Acid Sulfate Soil Site Walkover Inspection, Report No. 6138358-REP_0, March 2020.*

Summaries of the reports are provided in the sections below, with a focus on information regarding the identification and assessment of ASS at the site. No historical or previous reports were made available for the offshore dredging component of the works.

Ashburton Salt Project: EPA Referral Supporting Document (2016)

EnviroWorks Consulting (EnviroWorks) prepared the EPA Referral Supporting Document for the Proposal. EnviroWorks identified that disturbance of ASS and/or sediments could present significant impacts to marine environmental quality and flora and fauna. Mitigation measures identified in the document included the identification and management of ASS or sediments and if these materials are found to be present, the implementation of an ASS management plan (ASSMP) to prevent contamination arising.

Ashburton Salt Project: Environmental Scoping Document (2017)

EnviroWorks was engaged to complete an ESD to define the form, content, timing and procedure of environmental review for the site, as per *Environmental Protection Act 1989* and *Environmental Protection and Biodiversity Conservation Act 1999*. The report identified effective management of ASS as a critical component for the achievement of multiple EPA objectives. EnviroWorks recognised that leaching from ASS could present significant impacts to terrestrial environmental quality, inland waters environmental quality, benthic communities and habitats, marine environmental quality and flora and fauna.

EnviroWorks identified the following in order to mitigate impacts arising from ASS disturbance:

- Identify any ASS that may be disturbed by the project and if required a Development Strategy should be implemented to reduce or eliminate disturbance impacts, and
- An ASSMP should be in place to prevent contamination of the marine environment.

Ashburton Salt Project, Geotechnical, Hydrogeological and Acid Sulfate Soil Desktop Assessment (2018)

K + S engaged GHD to complete a desktop review of client supplied data and published literature to report on anticipated ground, geotechnical, hydrogeology and ASS conditions across the proposed project footprint.

GHD identified that the project area was situated on an area of predominately *'High to moderate risk of ASS occurring within the first 3m of natural soil surface (and beyond)'*.

The report identified the supratidal flats, dredged areas and elevations below RL 5 m AHD to present the highest ASS risk, as well as identifying the potential presence of Monosulfidic Black Oozes (MBO) in waterways. It was also noted that geological units with a potential acid neutralising ability had been identified in previous investigations.

Ashburton Salt Project: Pre-Development Surface Water and Nutrient Environmental Assessment (2018)

Water Technology were commissioned by K + S to complete a hydrology and nutrient pathways study to understand potential environmental impacts associated with mobilisation of nutrients and potential mitigation measures.

The report characterised the existing conditions of the site, catchment and downstream sensitive receptor areas. Water technology provided significant assessment of nutrient sources, pathways and quantification/description of important nutrient inputs to the Exmouth Gulf Wetland.

A Limestone Option for K + S Salt's Proposed Solar Salt Project (2019)

North Rossa is developing the Onslow Sand Project 25 km east of Onslow. North Rossa and K + S agreed to undertake an investigation to locate limestone resources from within K + S's tenement holdings or its own. The limestone would be used by K + S as armour rock to protect the proposed pond levee banks and potentially assist with management of ASS.

The outcome of the investigations was the discovery of a limestone deposit adjacent to the K + S site, approximately 10 km east of the proposed jetty. The limestone deposit was estimated to be 1 million tonnes, however North Rossa were unable to confirm if the strength and durability of the limestone would be suitable for the K + S site construction activities.

Ashburton Solar Salt Early Works – Phase 1, Geotechnical and Acid Sulfate Soil Site Walkover Inspection (2020)

GHD was engaged to complete a geotechnical and ASS site walkover investigation (Phase 1) between 4 and 6 June 2019. The purpose of the investigation was to assess ground conditions, site access and potential borrow areas to enable the refinement of Phase 2 geotechnical investigations (intrusive ground investigations).

GHD identified red brown high plasticity clay with sand overlain by an authigenic salt crust between 2 and 5 mm at the surface of the eastern supratidal flats. The remnant islands were observed to consist of coastal limestone (calcareenite), indicating a naturally rich calcareous environment.

Opportunistic laboratory analysis of the exposed supratidal flat within the Study Area confirmed a net acidity value of 23 mol H⁺/tonne within the surficial soil surface. It was concluded that values may increase with depth and therefore were considered high risk within areas disturbed of that nature.

Generally, site features were found to be consistent with published ASS risk maps, however the neutralising capacity of the naturally available calcareous materials may have been underestimated within some portions of the site.

5. Environmental Setting

5.1 Background to Saline and ASS Landscapes

The site is located within an area of naturally occurring saline soils considered to be a consequence of primary salinity sources and potentially an ASS environment with the occurrence of sulfide minerals from the shallow soil surface and at depth.

Saline (or salt affected) soils contain relatively large concentrations of soluble salts such as chloride and or sulfate. Sources of salt affected soils within this environment are derived from wind-blown particles, particles transported to the area from inland during floods and cyclonic tidal surges.

The differentiation between a salt-affected landscape and an acidic landscape is often difficult due to weathering of minerals or salts by sulfuric acid produced during oxidation and the formation of new minerals, in this instance, and observed sulfate-containing salts and reactions with calcium carbonate (gypsum). Additional minerals are also likely to be present in an iron-rich landscape and are likely to include iron sulfides such as pyrite.

In this landscape generally, if the acid generating potential (oxidation of sulfides) exceeds the buffering capacity of the local landscape (alkalinity sources such as calcium carbonate), then acidification occurs. Additionally, disturbance (excavation and dewatering) of sulfidic materials may result in the leaching of sulfuric acids and further acidification of sulfides.

5.2 Acid Sulfate Soil Risk Map

A review of the ASS risk map of the Pilbara Coastline (DER-011) accessed from the Australian Government National Map (2020) was undertaken for the site during the previous desktop phase of works. The ASS risk map is presented on Figure 4.

The risk map indicated the western portion of the site is located within an area classified predominately as *'High to moderate risk of ASS occurring within 3 m of natural soil surface (and beyond)', which may be disturbed by land development activities'* and is associated with the lower lying portions of the site typically less than RL 5 m AHD and supratidal flats.

Landside structures such as the NPI (workshops/ stores, wash plant) and stockpile conveyor are typically located on remnant dune sands 'islands' and are classified as *'Moderate to low risk of ASS occurring within 3 m of natural soil surface but high to moderate risk of ASS beyond 3 m of natural soil surface'*.

Discharge infrastructure, drainage lines and pipeline infrastructure traverse multiple classification areas. The longitudinal sand dunes in the eastern portion of the site are not classified and assumed to present a negligible to low risk in regards to the presence of ASS (sulfidic material).

The available ASS risk map does not extend into the domain of the dredge pocket and therefore does not provide preliminary information regarding the presence of ASS or sediment in this area. The section of coastline immediately adjacent to the dredge pocket is classified as *'Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3 m of natural soil surface'*. However, the available ASS risk mapping data indicates a narrow offshore area of *'High to moderate ASS risk'* extending approximately 4 km north-east along the coastline, from the Urala Creek northern inlet, towards the proposed jetty location, within 1 km of the coastal boundary (see Figure 4). The ASS map indicates that the *'High to moderate risk'* area ceases approximately 3 km west of the proposed jetty location, however the potential for sediments to occur further offshore than the proposed jetty and dredging pocket cannot be discounted.

5.3 Geology

5.3.1 Regional Geology

The geology of the region is described in GHD (2019) and is derived from the Yanrey-Ningaloo and Onslow 1:250,000 geological mapping (GSWA, 1980 and GSWA 1982) as shown on Figure 5.

The basement geology of the region outcrops east of the Yannarie and Ashburton rivers, and is represented by Precambrian igneous and metamorphic rocks with three distinct lithological groups:

- Gneiss.
- Metasedimentary rocks.
- Granitoids.

The basement rocks are unconformably overlain by another Precambrian-aged group of lithologies, the Uaroo Group. The Precambrian rocks (basement and Uaroo Group) are intruded by dolerite dykes.

The superficial deposits comprise unconsolidated alluvial, colluvial and aeolian sediments of Pliocene and Quaternary age. The superficial deposits are summarised in Table 7.

Table 7 Summary of Superficial Deposits Across the Site

Map Unit	Location / Occurrence	Soil Characteristics
Qs	Beaches and coastal foredunes flanking the coastline.	Light grey, unconsolidated and poorly consolidated quartzose calcarenite.
Qw	Intertidal flats and mangrove swamps.	Calcareous clay, silt and sand.
Qe	Remnant dunes as “islands” of residual sand plain within the Supratidal flats area, and as longitudinal dunes at the eastern limit of Supratidal flats.	Red-brown to yellowish quartz sand.
Qt	Supratidal flats.	Calcareous clay, silt and sand with authigenic gypsum and superficial algal mats and salt crusts.
Qp	Minor occurrences within claypan-dominated terrain.	Poorly sorted clay, silt, sand and minor pebbles.
Cza	Localised occurrences associated with Chintay Creek and Ashburton River.	Alluvial clay, silt, sand and gravel with calcrete cementation in places.
Czp	Generally east of Supratidal flats. Longitudinal and network dunes over claypan-dominant terrain.	Red-brown Clay. Clay, silt, sand and gravel.

5.3.1 Geological Landforms and Geology

Geological landforms occurring within the Disturbance Footprint are summarised in Table 7 and shown on Figure 5. Descriptions of these units obtained during a review of published data and site observations and how they relate to key infrastructure areas is provided below.

Coastal Dune – Qs

The site contains areas of foredunes and fringing frontal dunes (Qs). The foredunes are believed to be formed from storm surge deposits, while the fringing frontal dune is developed from windblown sediments of the salt flats.

Along the coastline the foredunes are formed of unconsolidated sand and average 3 m in height, but can range to a maximum height of 6 m to 7 m. In the north of the site, near the proposed jetty, the dunes are typically 500 m wide, immobile, and are generally sparsely vegetated with spinifex. Landside of the proposed jetty (BH03) the dune is characterised as extending to 7 m AHD. Observations of the surface and shallow subsurface profile presented calcareous sand with an abundance of coral, shell fragments and calcarenite gravels ranging between fine gravels to larger cobbles and occasional boulder sized particles.

Intertidal Flats and Mangrove Swamps – Qw and Qt

The intertidal flats and mangrove swamps are primarily confined to the west and northwest of the Study Area, and cover the northwestern most area of the Concentration Ponds and the entire Crystalliser Ponds area. The extent to which the unit envelopes around to the eastern and southern sides of the remnant island hosting buildings, stockyard and conveyor belt, is unknown. However, the intertidal zone can be seen on aerial imagery to abut the north of the island and the presence of unit Qw has been confirmed north-east of the island (GHD 2020a).

In the intertidal areas, Qt₁ is also present (see Supratidal Flats below). In places Qw persists to approximately 1.5 m depth, in other places Qw can overlie Qt and vice versa.

In the western area of the salt flats (beyond the western limit of the Concentration Pond footprint but including the seawater intake location), the intertidal sediments (Qw) are found at the surface, with a halite crust grading into an algal mat as the ground elevation lowers to sea level. The zone is characterised by short sinuous tidal creeks, mud/sand flats and a discontinuous mosaic of mangrove biomes. It is anticipated that unit Qw will increase in thickness north-westwards through the salt flats.

Investigations at the fringes of the intertidal flats show the Qw material to be a cohesive, medium plasticity grey clay, with traces of fine grained sub-rounded sand composed of quartz.

The overall depth of the unit in this area was not proven as hand augers were limited to less than 2 m depth. It is anticipated that the unit will increase in thickness north-westwards through the salt flats.

Mainland Remnants – Qe

The salt flats are interrupted by elevated sandy areas (loosely termed “islands”) representing remnants of the mainland (Qe). Remnant coastal dunes (“islands”) remaining within the north eastern and central portion of the site varied in elevation (5 to 10 m AHD). The “islands” are formed through a period of marine regression and transgression, which eroded through the terrestrial sediments (Qsed and Czp) previously extending from east to west of the site into the Exmouth Gulf. Hence, the majority of the remnants contain longitudinal and network dunes over claypan-dominant terrain (Czp) overlaying basal Quaternary sediments (Qsed).

The surficial surface observed during the walkover indicated residual sand “islands” consisting of red-brown to yellow quartz sand (Pindan Sand). The distribution of coral fragments and shells was observed to be varied across the site, with a greater abundance of fragments within sheltered portions of “islands”. Fragments and shell pieces observed during the Phase 2 investigation indicate acid neutralising capacity (ANC) within soils and a potential for natural available neutralising capacity.

Supratidal Flats – Qt

The supratidal salt flats form a flat featureless plain upon which the Concentration Ponds are located. The supratidal flats are typically only inundated by marine waters under cyclone-generated surge events. At the eastern extent of the salt flats the supratidal sediments abut the terrestrial sediments (Czp) and infill between the mainland remnants (Qe). The supratidal

flat unit Qt₁ overlies the intertidal flat unit Qw across Crystalliser Pond area, Bitterns Pond and parts of the conveyor alignment, and inter-finger with Qw in the west.

The surface of the sediment is typically covered with a crust varying in thickness between 1 mm to 40 mm. The crust primarily consists of halite with trace amounts of calcite, silt, clay, and sand. Where below 3 mm thick, the crust becomes sandy and is of predominately fine grained aeolian sand. Where desiccated the crust is relatively dense.

The deposits are typically up to 0.5 m thick where they overlay intertidal flats (Qw). Where they are continuous from the surface to the underlying basal sediments (Qsed), they are up to 7.5 m thick.

Between islands of remnant mainland, the basal contact between supratidal sediments and mainland remnants is not known.

Claypan – Qp

The Study Area contains numerous claypans (Qp) of sufficient size to warrant individual classification. Smaller claypans are characterised within the longitudinal and network dunes over claypan-dominant terrain (Czp). The claypans have formed through wind driven blowout/deflation hollowing of the dunes, which exposed the soil surface to raindrop impact and erosion, leading to surface sealing/crusting.

Clay pans located within the eastern portion of the Yanrey Tidal Flats indicated red brown clayey sands and sandy clays. Shrink and swell cracks were evident at surface to 0.1 m, with an absence of visual neutralising material to neutralise acidity such as carbonates (calcium and magnesium) and organic sources. However, clay materials generally have a higher natural buffering ability and can be resistant to changes in pH due to the retention of hydrogen ions. The buffering ability will vary and is dependent on various factors including clay content and type, cation exchange capacity and presence of organic matter.

The depth of the claypan was observed at two localities during the Phase 2 investigation to vary between 1.0 m to 2.0 m, and is underlain by Qsed.

Alluvium – Cza

Alluvial deposits tend to be sheet-wash driven in response to large rainfall events. The largest alluvial landform within the proposal area is Chinty Creek, which discharges to the supratidal flats 700 m south of the proposed access road to the administration buildings island. The alluvial fan at the creek extends 1 km onto the salt flats, and historical outwash deposits are expected to interfinger with the supratidal deposits.

There is very little evidence of historical significant fluvial sediment deposition along the eastern edge of the salt flats, although this may be obscured by more recent supratidal deposits.

Drilling adjacent to where Chinty Creek discharges to the supratidal flats, confirmed a 400 mm thick clayey gravel fluvial deposition (from 2.8 m depth), overlying sandy clay (Czp) and Qsed from 6.0 m depth.

Longitudinal and Network Dunes over Claypan-dominant Terrain – Czp

The terrestrial sediments comprise a sheet sand base over which a longitudinal dune system has formed. The dunes have become largely vegetated with spinifex and samphire, and are no longer mobile, having been formed during more arid historical conditions. Within the dune network, a series of interdunal swales and claypans are present. The longitudinal dunes are generally orientated north/south, and may range in height from 4 m to 7 m. They display a

network pattern of historical transverse dunes, the length of which varies greatly. The current land surface is a function of degradation and sand mobilisation.

In some areas of the northeastern portion of the site some dunes have been denuded leaving a relatively flat landscape with sandy clay soils which are laterally stiff to very stiff for several metres.

The depth of transition to Qsed is variable, ranging in depth from 1.9 – 16.5 m or deeper.

Quaternary Sediments – Qsed

The Quaternary sediments underlay the entire site and derive from the historical Ashburton palaeo super delta. They have a characteristic red-brown coloration and are known locally as the Ashburton Red Beds.

Monosulfides

Groundwater seeps and saturated zones (anaerobic soils) were not observed during the site visit in June 2019 or within the accessible investigation areas, indicating a likely absence of monosulfides.

5.4 Hydrogeology

5.4.1 Regional Hydrogeology

Groundwater reserves are associated with the Birdrong Aquifer (Birdrong) which falls within the Carnarvon Artesian Basin (CAB) (DWER-084). The Birdrong Aquifer is the largest confined (artesian) aquifer in WA (DoW 2007). All confined or artesian groundwater in the CAB is assigned to the Birdrong groundwater resource (DoW 2007).

The Birdrong Sandstone is the primary, most extensive and productive artesian groundwater source in the CAB. The Birdrong Sandstone outcrops in small areas on the eastern margin of the CAB and becomes deeper towards the coast, where it is typically 600 m below the surface. There are also a number of other aquifers, both above and below the Birdrong Sandstone, which are considered to be in some degree of hydraulic connection (DoW 2007).

5.4.2 Local Site Hydrogeology

Local hydrogeological conditions within the site are reported in the GHD geotechnical assessment (2020).

Across the intertidal and supratidal flats (including the southern reaches of the Concentration Ponds), groundwater is approximately 0.3 - 0.7 m depth. At locations near the Crystalliser Ponds in the intertidal flats, groundwater was shallower with depth readings of 0.2 - 0.4 m recorded. In the intertidal areas, the groundwater table was observed to be influenced by the tides.

Observations from the monitoring wells installed in boreholes drilled on the mainland remnant islands indicate groundwater levels are at approximately the same elevation beneath the islands as the groundwater elevation in the adjacent supratidal flats. Groundwater elevations reported in both deep and shallow monitoring wells indicate that groundwater flows in a north-east direction towards the coast.

5.5 Hydrology

5.5.1 Overview

The site is located within the Ashburton River catchment and sub catchment, which falls within the Pilbara Surface Water Area proclaimed under the *Rights in Water and Irrigation Act 1914*.

5.5.2 Watercourses

Surface flows within the Ashburton River catchment exhibit a complex inter-relationship at a landscape scale between watercourses, floodplains, clay pans and a suite of longitudinal and network sand dunes (EnviroWorks 2016). Due to the arid climate and very high evaporation rate, the occurrence of overland flow is rare and is usually only associated with tropical cyclone events. The hydrology of the region is one of extremes, experiencing both severe droughts and major floods (EnviroWorks 2016).

Within the Ashburton River sub-catchment, creek lines discharge over the coastal flats towards the ocean, often via braided flow-paths. Creek flows in this region are mostly a direct response to rainfall, which is highly seasonal and variable. Most run-off occurs during the period from January to March, with peak flows consistently being recorded in February, usually as a result of major storms and cyclones. Catchment and sub-catchment discharge points are frequently a combination of direct ocean outlets, dispersal through salt flats and coastal mangrove systems, and infiltration to ground (EnviroWorks 2016).

A hydrological study was undertaken for the historical Yannarie Project (Parsons Brinkerhoff 2006). The assessment found that during episodic heavy rainfall events, overland surface water flows converge at the unnamed creeks and basins east of the salt flats. Some of this surface water is lost via evaporation and infiltration, with the majority flowing westward towards the coast accumulating within the salt flats (EnviroWorks 2016).

5.5.3 Coastal Wetlands

The Study Area is located within the Exmouth Gulf East Wetland (WA007) which is listed in the Directory of Important Wetlands in Australia (EnviroWorks 2016). The Directory describes the significance of the wetland as “*An outstanding example of tidal wetland systems of low coast of northwest Australia, with well-developed tidal creeks, extensive mangrove swamps and broad saline coastal flats.*”

6. Site Investigation

6.1 Site Investigation Overview

The site investigation for this proposal commenced on 28th October 2019 and finished on 31st March 2020. The ASSS investigation occurred concurrently with the geotechnical and hydrogeological intrusive investigation works. The program of investigation comprised the following:

- Drilling 15 boreholes within the Study Area.
- Installation of groundwater monitoring bores for hydrogeological modelling and ASS assessment.
- Excavation of test pits along the proposed road and bitterns discharge pipeline alignments and at potential borrow areas.
- Manual boring of auger holes.
- Sampling and collection of soils for ASS within select boreholes, groundwater monitoring wells, test pits and auger holes.
- Mobilisation of a vibracore system mounted on a marine vessel to collect sediment samples at 12 locations to assess the proposed dredge pocket.

The fieldwork programme was conducted in accordance with Australian Standard AS 1726-2017, under the technical direction of engineering geologists, geotechnical engineers and environmental scientists/engineers from GHD.

The list of investigation locations completed for this Proposal are summarised in Table 8 to Table 11. The MGA Zone 50 coordinates of each landside investigation point were recorded on site using a hand-held Garmin global positioning system (GPS) unit with an estimated accuracy of ± 5 m. The ground surface level at each investigation point was inferred using the light detection and ranging (LIDAR) Digital Elevation Model provided by K + S dated November 2017.

The sections below outline the scope of works completed that are relevant to ASSS identification and assessment. Locations were selected based on a combined approach to the investigations and subject to accessibility constraints.

6.1.1 Borehole Drilling

GHD engaged J&S Drilling Pty Ltd (J&S Drilling) to drill boreholes and install groundwater monitoring bores (see Sections 6.1.2 and Section 6.1.3). Fifteen boreholes were drilled to a maximum target depth between 15 and 20 m using a Jacro 350 drill rig mounted on a mangrove buggy. One of the boreholes (BH12A) was redrilled to 4 m depth due to poor core recovery in BH12 over the same depth interval.

The majority of the boreholes were advanced using PQ sized diamond coring techniques. Each of the boreholes was initially drilled to 5 m depth with water, then to target depth using biodegradable drilling fluids. Four of the boreholes (i.e. BH02, BH03, BH09 and BH10) were advanced from surface using hollow stem augering techniques aided with water. One of these four boreholes, BH10, switched over to PQ diamond coring techniques from 14 m depth due to hard augering conditions. All the boreholes planned for this site investigation were completed, except for one borehole, which has been omitted from the scope of work due to site access constraints.

Borehole locations are shown in Figure 6 with coordinates, inferred ground surface levels and termination depths summarised in Table 8. Borehole logs and core photos are presented in Appendix A. The borehole logs are preceded by Explanatory Notes summarising general nomenclature and symbol use.

Table 8 Summary of Boreholes

Borehole ID	Coordinates (MGA50) ⁽¹⁾		Ground Surface Level (m AHD)	Depth Achieved (m)
	Easting	Northing		
BH01	269887	7581719	+7.2	19.87
BH02	272595	7585346	+2.1	18.74
BH03	267805	7587157	+1.6	20.45
BH04	272867	7580738	+3.4	15.00
BH05	266675	7578586	+0.7	15.00
BH07	262938	7573345	+1.8	16.50
BH08	263029	7573316	+5.5	14.95
BH09	268003	7572193	+3.5	20.25
BH10	266494	7572270	+0.9	20.00
BH11	260260	7569715	+1.2	19.50
BH12	261195	7565602	+8.7	19.25
BH12A ²	261195	7565605	+8.7	4.00
BH13	271735	7563998	+6.2	16.5
BH14	259892	7565531	+1.0	19.95
BH15	265126	7565578	+1.6	20.00

Table 8. Table notes:

⁽¹⁾ MGA50: Map Grid Australia 1994, Zone 50

⁽²⁾ Borehole BH12A was drilled immediately adjacent to BH12 to recover core material that was washed away from surface to 4 m depth

6.1.2 Groundwater Monitoring Wells

Groundwater monitoring wells were installed in accordance with the guidance document ‘Minimum Construction Requirements for Water Bores in Australia’ (DoW 2012). Noting that this guidance document had recently been revised to the fourth edition (2020) and that any new requirements will not have been implemented, as part of this investigation.

A total of 26 groundwater monitoring wells were installed within or adjacent to the boreholes except for BH09. Where wells were installed in locations adjacent to most of the boreholes, these locations have been assigned a suffix e.g. BH10A represents the monitoring well adjacent to borehole BH10.

All the monitoring wells were installed to enable measurement of groundwater during and after the fieldwork period and to enable collection of groundwater samples.

The wells comprise 50 mm (ID) polyvinyl chloride (PVC) pipes installed to depths of between 3.0 m and 18.25 m. The top of the installations at all monitoring bore locations are protected with an above-ground monument cover. The installations were developed by airlifting using an air compressor until the recovered water was clear.

The monitoring wells are shown in Figure 6 with coordinates, inferred ground surface levels and screened zones summarised in Table 9. The installation details of each well are shown on the relevant borehole logs in Appendix A.

Groundwater monitoring was completed at 23 of the 26 completed groundwater well locations. The groundwater analytical results are further discussed in Sections 9 and 10.

Table 9 Summary of Groundwater Monitoring Bores

Borehole ID	Coordinates (MGA Zone 50) ⁽¹⁾		Ground Surface Level (m AHD)	Depth of Screened Zone (m)
	Easting	Northing		
BH01	269887	7581719	+7.2	2.0 – 8.0
BH02	272595	7585346	+2.1	12.25 – 18.25
BH02A	272595	7585351	+2.2	5.0 – 8.0
BH03	267805	7587157	+1.6	11.0 – 14.0
BH03A	267803	7587157	+1.5	2.0 – 5.0
BH04	272867	7580738	+3.4	3.2 -8.2
BH05	266675	7578586	+0.7	12.0 – 15.0
BH05A	266675	7578587	+0.7	1.0 – 2.0
BH05B ⁽²⁾	266676	7578588	+0.7	5.0 – 15.0
BH07	262938	7573345	+1.8	10.6 – 13.6
BH07A	262938	7573346	+1.8	1.7 – 7.7
BH07B ⁽²⁾	262938	7573347	+1.8	2.4 – 8.4
BH08	263029	7573316	+5.5	5.6 – 10.1
BH09A	268003	7572195	+3.5	6.0 – 9.0
BH09B	268003	7572197	+3.5	0.5 – 3.0
BH10	266494	7572270	+0.9	2.0 – 5.0
BH10A	266494	7572272	+0.9	2.0 – 5.0
BH10B ⁽²⁾	266494	7572273	+0.9	4.4 – 14.4
BH11	260260	7569715	+1.2	6.0 – 9.0
BH11A	260263	7569718	+1.2	1.6 – 4.6
BH12	261195	7565602	+8.7	3.0 – 10.0
BH13	271735	7563998	+6.2	3.0 – 6.0
BH14	259892	7565531	+1.0	11.0 – 12.5
BH14A	259892	7565533	+1.0	2.0 – 6.0
BH15	265126	7565578	+1.6	9.0 – 12.0
BH15A	265126	7565580	+1.6	2.0 – 5.0

Table 9. Table notes:

⁽¹⁾ MGA50 : Map Grid Australia 1994 Zone 50

⁽²⁾ Pump test bore

6.1.3 Test Pits (Auger) Locations

GHD engaged NTC Contracting Pty Ltd (NTC) to conduct 16 auger locations along the mainland using a 20 tonne tracked excavator. The test locations were drilled using a 400 mm diameter solid auger attachment in order to minimise ground disturbance.

The test locations were augered to 3 m target depth, except for TP Au-03, which terminated at 2.5 m depth due to refusal. Test locations were located in the eastern and northern portions of the Study Area, as these areas were considered most prospective for encountering materials suitable for use as construction materials.

The test locations are shown in Figure 6 with coordinates, inferred ground surface levels and achieved depths summarised in Table 10. The test pit logs are presented in Appendix B.

Table 10 Summary of Test Pits (Auger)

Test Pit ID	Coordinates (MGA50) ⁽¹⁾		Ground Surface Level (m AHD)	Depth Achieved (m)
	Easting	Northing		
TP Au-01	267714	7587874	+3.2	3.0
TP Au-02	268212	7585679	+2.1	3.0
TP Au-03	268590	7584385	+1.5	2.5

Test Pit ID	Coordinates (MGA50) ⁽¹⁾		Ground Surface Level (m AHD)	Depth Achieved (m)
	Easting	Northing		
TP Au-19	273219	7582594	+3.3	3.0
TP Au-20	273333	7583459	+3.4	3.0
TP Au-22	273715	7584924	+3.2	3.0
TP Au-30	270050	7586840	+1.8	3.0
TP Au-33	270246	7585557	+3.4	3.0
TP Au-36	273016	7583655	+3.0	3.0
TP Au-60	273350	7580769	+1.0	3.0
TP Au-66	273516	7575686	+5.0	3.0
TP Au-70	273550	7573918	+7.6	3.0
TP Au-74	271350	7571021	+4.9	3.0
TP Au-75	271703	7568714	+2.4	3.0
TP Au-101	268018	7586782	+1.4	3.0
TP Au-102	271737	7572235	+5.3	3.0

Table 10. Table notes:

(1) MGA50: Map Grid Australia 1994, Zone 50

6.1.4 Offshore (Capital Dredge) Sampling

GHD engaged Seas (Vibracore) and Bhagwan Marine (marine vessel) to conduct sampling at 12 vibracore locations within the then proposed dredge pocket on 5th and 6th February 2020. It should be noted that the location of the dredged berthing pocket has since been moved 200 m to the north-east, into deeper water to reduce the amount of material to be dredged, and also achieve better mixing of the discharged bitters at the end of the jetty. However, the samples are still considered likely to be representative of the nearby new location for the dredged berthing pocket. It is proposed that dredged material will be disposed of onshore within a bunded area and it will be sampled for ASS within this disposal area, then treated with neutralising material as necessary. Decant water will be retained for a suitable time to allow appropriate water quality standards to be met (confirmed by monitoring) prior to release to the marine environment. Solids will be tested to ensure appropriate environmental standards are met, then will be reclaimed and used in on-site embankment construction.

The vibracore locations are shown on Figure 6 with the coordinates, inferred depth of water and achieved depths summarised in Table 11. The sediment core logs are presented in Appendix D.

An additional vibracore location (SED08A) was completed proximal to SED08 due to refusal at 0.7 m depth. All vibracore locations were terminated at the 'depth achieved' as outlined in Table 11 due to refusal (hard drilling).

Table 11 Summary of Vibracore Locations

Vibracore ID	Coordinates (WGS 1984 UTM Zone 50S)		Depth of open water (m)	Depth Achieved (m)
	Easting	Northing		
SED01	266990	7588603	3.5 – 4.0	2.0
SED02	267057	7588537	3.5 – 4.0	2.5
SED03	266978	7588557	3.5 – 4.0	2.1
SED04	267000	7588580	3.5 – 4.0	2.2
SED05	267005	7588552	3.5 – 4.0	2.4
SED06	267017	7588530	3.5 – 4.0	2.0
SED07	267056	7588503	3.5 – 4.0	2.7
SED08	267061	7588474	3.5 – 4.0	0.7
SED08A	267061	7588473	3.5 – 4.0	1.3

Vibracore ID	Coordinates (WGS 1984 UTM Zone 50S)		Depth of open water (m)	Depth Achieved (m)
	Easting	Northing		
SED09	267083	7588464	3.5 – 4.0	1.7
SED10	267095	7588477	3.5 – 4.0	2.4
SED11	267117	7588466	3.5 – 4.0	1.9
SED12	267110	7588426	3.5 – 4.0	2.2

6.1.5 Hand Auger Locations

GHD completed 10 hand auger locations within the vicinity of the proposed seawater intake and channel utilising the services of Bhagwan Marine to access the location on 6th February 2020. It should be noted that the location of the proposed seawater intake pump station has been moved approximately 200 m to the north-east of the locations sampled, to take advantage of a natural inlet basin in the creek bank, however the sampling location is considered representative of the proposed revised location.

The hand auger locations are shown on Figure 6, with the coordinates and achieved depths summarised in Table 12. The sediment core logs are presented in Appendix C.

Table 12 Summary of Hand Auger Locations

Hand Auger ID	Coordinates (MGA50) ⁽¹⁾		Ground Surface Level (m AHD)	Depth Achieved (m)
	Easting	Northing		
SWI-HA01	257893	7574384	+0.1	0.2
SWI-HA02	257925	7574395	+0.1	0.2
SWI-HA03	257963	7574384	+0.1	0.2
SWI-HA04	257997	7574395	+0.1	0.2
SWI-HA05	258027	7574383	+0.1	0.2
SWI-HA06	258072	7574391	+0.1	0.5
SWI-HA07	257949	7574294	+0.1	0.5
SWI-HA08	257963	7574288	+0.1	1.0
SWI-HA09	257979	7574279	+0.1	1.0
SWI-HA10	257994	7574274	+0.1	1.0

Table 12. Table notes:

(1) MGA50: Map Grid Australia 1994, Zone 50

6.2 Sampling Methodology

6.2.1 Acid Sulfate Soil

Sampling from site investigation locations (boreholes and test locations) was extended from the surface to termination depth or 1.0 m below the assumed maximum disturbance depth based on the Pre-feasibility design report (Arcadis 2018) for the proposed infrastructure. Soil samples were obtained at 0.25 m depth intervals at test locations and additional samples were collected when observable changes in soil strata occurred.

A minimum of 200 g of soil was collected for each sample and visible shells or carbonate nodules were removed from the sample in the field. Samples were placed in laboratory supplied air-tight, plastic snap-lock bags with the air-extruded immediately to prevent the oxidation of samples as far as practically possible. Samples were immediately placed into a chilled container with ice or ice bricks while onsite. The samples were frozen overnight and freighted directly to a laboratory in chilled containers with ice bricks.

6.2.2 Capital Dredge Material

The sampling program and methodology was undertaken in accordance with *National Assessment Guidelines for Dredging* (NAGD) (Commonwealth of Australia, 2009). Due to the remote location and capital dredging proposal, typically only the upper 1 m of the sediment would be required to be sampled (for chemical analysis). However, due to the location of the proposed works and mobilisation challenges, sampling was also completed on available samples greater than 1 m.

Thirteen locations (includes one additional location due to refusal) were sampled to a maximum depth of 2.2 m based on the assumed dredge volume (17,000 m³) to assess sediment chemical composition prior to disturbance. The site investigation locations were selected randomly prior to attending site and based on the square grid analysis approach detailed in NAGD (Commonwealth of Australia, 2009).

Site investigation locations were undertaken using a 450 vibrocore, which retrieves an undisturbed core (as far as practically possible) within a de-contaminated polycarbonate liner with a nominal diameter of 50 mm.

Sub-samples were obtained from the core at discrete intervals based on the sediment conditions encountered. Composite samples were also obtained in order to preserve sufficient volumes of sample for analysis.

The sediment cores were logged in accordance with AS 1726 (Standards Australia, 2017) Geotechnical Site Investigations by a suitably qualified geotechnical engineer or environmental scientist/engineer (see Appendix D).

An ambient baseline assessment was not undertaken as part of the dredge sampling program to date due to proposed onshore re-use. The onshore disposal area will be located immediately inshore from the jetty location (Figure 3). Neutralising material will be added to the dredged material as necessary to treat any ASSS detected. Decant water will be retained for a suitable time to allow appropriate water quality standards to be met (confirmed by monitoring) prior to release to the marine environment. Solids will be tested to ensure appropriate environmental standards are met, then will be reclaimed and used in on-site embankment construction.

Sampling procedures and collection was completed in accordance with National Environmental Protection Measures (NEPC, 2013). Samples for organic compounds were placed into laboratory supplied glass jars and samples for ASS analysis were placed into bags. All samples were stored in a chilled container during the investigation works and then freighted in a chilled container to a NATA accredited laboratory for analysis.

6.2.3 Groundwater Quality Monitoring

Prior to collecting a groundwater sample, the static water level (SWL) and water column were measured using a water level meter from the top of the casing and a purge volume calculated. Purging and sampling of groundwater monitoring wells was undertaken in accordance with AS 5667.11 – 1998 (Standards Australia, 1998).

Following purging the groundwater, samples were collected using a low-flow pump. Field quality measurements for pH, temperature, oxidation-reduction potential (ORP or Eh), dissolved oxygen (DO), and electrical conductivity (EC) were recorded following each purged well volume to assess stabilisation of the groundwater.

Groundwater samples were collected into laboratory supplied bottles that contain laboratory prepared preservative chemicals. Sample bottles were then placed immediately into a chilled container and maintained chilled until being couriered to the laboratory for analysis.

6.3 Sampling Analysis and Schedule

A summary of the overview sampling and analytical testing program is provided in Table 13.

Table 13 Summary of Sampling and Analysis Program

Focus Area	Analysis	Boreholes/ Groundwater Wells		Test Pits (Auger Locations)	Hand Augers	Vibracore
Number of samples analysed						
Acid Sulfate Soil	pH screening (pH _{LAB} and pH _{FOX})	220		129	42	-
	Chromium Reducible Sulfur	43		19	16	-
	SPOCAS	43		19	16	-
	Total Inorganic Carbon (C _{IN})	17		5	3	-
	Metal and Metalloids	8		-	-	-
	Groundwater suite	-	23	-	-	-
Offshore Sediments	pH screening (pH _{LAB} and pH _{FOX})	-	-	-	-	25
	Chromium Reducible Sulfur	-	-	-	-	15
	SPOCAS	-	-	-	-	15
	Physical Properties	-	-	-	-	3
	Metal and Metalloids	-	-	-	-	15
	Organic Compounds	-	-	-	-	3

Table 13. Table notes:

Metal and metalloids: Arsenic, antimony, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc

Groundwater suite: pH (Lab), EC, TDS, alkalinity, chloride, sulfate, sodium, silica, ammonia, nitrogen, phosphate and filterable reactive phosphorous, metals: aluminium, arsenic, cadmium, chromium, iron, manganese, nickel, selenium and zinc

Physical properties: PSD, Radionuclides (NORM)

Organic compounds: PAH, BTEX, TRH, PCB and organochlorine pesticides

7. Assessment Criteria

7.1 Acid Sulfate Soil (Sulfidic Material)

The initial pH screening results were assessed against the DER (2015a) screening criteria. The criteria are presented in Table 14.

Table 14 pH Screening Criteria

Parameter	Criterion Value	Indication
pH _F	≤ 4.0	Actual ASS
pH _F	> 4.0 but ≤ 5.5	Acidic Soil
pH _{FOX}	< 4.0	Potential ASS
ΔpH (pH _F – pH _{FOX})	> 2.0	Potential ASS likely

Confirmatory analysis was assessed based on net acidity excluding ANC for the presence or absence of ASS. The acid-base accounting equation, as outlined in the DER (2015a) is:

$$\text{Net Acidity} = \text{Potential Acidity} + \text{Existing Acidity} - \text{Acid Neutralising Capacity}$$

The assessment criteria for net acidity are derived from DER (2015a) and are presented in Table 15.

Table 15 Assessment Criteria

Type of Material		Net Acidity Action Criteria			
Soil Texture Range	Approx. Clay Content (%)	< 1,000 Ton of Material Disturbed		> 1,000 Ton of Material Disturbed	
		Equivalent Sulfur % S	Equivalent Acidity mol H+/tonne	Equivalent Sulfur % S	Equivalent Acidity mol H+/tonne
Coarse Texture Sands to Loamy sands	< 5	0.03	18.0	0.03	18.0
Medium Texture Sandy Loams to Light Clays	5 – 40	0.06	36.0	0.03	18.0
Fine Texture Medium to Heavy Clays and Silty Clays	> 40	0.1	62.0	0.03	18.0

Table 15. Table notes:

Adopted from Table 10: Texture based ASS 'action criteria' (DER 2015a)

The texture of the material onsite was observed to be variable, however greater than 1,000 tonnes of material will be disturbed as part of the construction of the Proposal. Consequently, a net acidity criterion of 18.0 mol H+/t (0.03 % S) was adopted for the assessment of ASS and sediment (where applicable).

7.2 Capital Dredge Material

Characterisation of the dredge material with consideration to relevant screening levels and absence of identified historical activities within the vicinity of the dredge pocket. On this basis, the following assessment criteria were adopted:

- Assessment of presence or absence of ASS: adoption of DER (2015a) criteria to assess landside disposal or re-use option

- Toxicant default guideline values for sediment quality (ANZECC/ ARMCANZ Guidelines for Fresh and Marine Water Quality (2018))

7.3 Groundwater Chemistry

Groundwater field and laboratory results were compared to the following assessment criteria:

- Acid sulfate soil criteria, from DER (2015b)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) – Marine Water (95% protection)
- Non-potable Groundwater Use (NPUG) (DER 2014)

8. Quality Assurance and Control

8.1 Standard

Quality Assurance and Quality Control (QA/QC) requirements were undertaken in accordance with Section 8.2 of DER (2015a). The results of GHD field duplicate samples taken as part of the quality control procedures are discussed below, with QA/QC analytical data for soil duplicates presented in Table E-5, Appendix E.

8.2 Field QA/QC

8.2.1 Groundwater

No groundwater QA/QC sample was obtained during the fieldworks. This is noted to be a non-conformance with respect to the recommended collection frequency of one QA/QC sample per 20 primary samples. However, given the purpose and objective with regard to the investigation this is not considered to impact the integrity or interoperability of the laboratory results and recommendations for the Proposal.

8.2.2 Soil

A quantitative measure of the precision of the analytical results is made by calculating the Relative Percent Difference (RPD) between primary and duplicate results in accordance with the procedure described in *AS4482.1 Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds* (2005). According to AS4482.1 typical RPDs range between 30% and 50%, however AS4482.1 recognises that this may be higher for low concentrations of analytes.

GHD considers the RPD acceptable if it is less than 50% and where the concentrations are less than 10 times the limit of reporting. This acceptance criterion is based on the criteria listed in AS4482.1 (2005).

A total of 416 primary soil samples (Landside: 129 test pit, 220 borehole and 42 hand augers, Offshore: 25 vibracore) were collected and submitted for analysis by Eurofins I mgt. During the investigation program 20 duplicate samples were taken, which is noted to be within the recommended 1:20 frequency.

Of the 111 RPD results calculated, all were below the acceptance criteria of 50%, with the exception nine RPDs summarised in Table 16.

Table 16 Summary of RPD Exceedances

Sample Location [Duplicate]	Analyte	Primary Concentration	Duplicate Concentration	RPD (%)
BH03_3	>2mm fraction (%)	<0.005	2.2	199
	Extraneous material (G)	<0.1	4.7	192
BH12_4.2	Acid neutralising capacity (% CaCO ₃)	2.7	4.6	52
	Acid neutralising capacity (mol H ⁺ /t)	540	930	53
	Acid neutralising capacity (%S)	0.87	1.5	53
	>2mm fraction (%)	2.3	<0.005	199

Sample Location [Duplicate]	Analyte	Primary Concentration	Duplicate Concentration	RPD (%)
	Extraneous material (G)	3.3	<0.1	188
BH14_4.2	>2mm fraction (%)	1.4	<0.005	199
	Extraneous material (G)	2.6	<0.1	185

Although exceedances of the RPD acceptance criteria have been noted, these exceedances are not considered significant in terms of influencing the integrity or interoperability of results.

ANC RPDs reported a minor acceptability criteria exceedance for sample BH12_4.2. ANC concentrations can often be significantly dependent on laboratory sub-sample preparation procedure. If a sub-sample is collected and soil constituents such as a large grain/fragment of carbonate material is collected into the sub-sample, when the sample is pulverised and subsequently analysed, the ANC value of this sub-sample can be artificially inflated due to the addition of this material. The minor exceedances for ANC are therefore not considered significant, as all other ANC RPDs were less than 22 and the minor exceedance is likely due to subsample collection and the inherent heterogeneity of the soil sample.

Physical analytes such as the >2 mm fraction and extraneous materials are also significantly influenced by sub-sample collection and the inherent heterogeneity of soil samples. Given the volumes collected during the sample process and the volume used by the laboratory for analysis, larger soil constituents and extraneous material amounts can be significantly variable within the larger sampled amount. Therefore, the RPD acceptance criteria exceedances noted for these analytes are not considered significant.

8.3 Laboratory QA/QC

Eurofins | mgt is accredited by the NATA for the groundwater analysis performed. The internal laboratory Quality Assurance results are presented in Appendix F. A summary of laboratory QA/QC results is provided in Table 17.

Table 17 Laboratory Quality Assurance Summary

Laboratory Report	Comments
696731	Sample dates not provided on submission.
698189	252 soil analytes submitted outside of holding time.
698298	237 soil analytes submitted outside of holding time.
701587	26 soil analytes submitted outside of holding time.
701828	175 soil analytes submitted outside of holding time.
703226	No samples submitted outside of pH field testing holding time.
708420	Sample dates not provided on submission.
724405	Sample dates not provided on submission.
722027	Sample dates not provided on submission.
732827	Sample dates not provided on submission.

Laboratory Report	Comments
726720	1080 soil analytes submitted outside of holding time. 1 laboratory duplicate soil RPD exceedance for HA08_0-1
724405	Sample dates not provided on submission.
716307	40 groundwater analytes submitted outside of holding time. 1 laboratory duplicate groundwater RPD exceedance for BH11S.

8.4 Summary of QA/QC

The review of the laboratory and field QA/QC data indicates that the analytical data is of an adequate quality upon which to draw meaningful conclusions regarding the management of ASS across the site.

9. Investigation Results

9.1 Onshore Materials

9.1.1 Acid Sulfate Soils

A total of 391 primary soil samples were collected throughout the Proposal fieldworks and submitted for laboratory analysis. A summary of laboratory results is provided below, with complete analytical results tables presented in Table E-1 Appendix E and laboratory reports provided in Appendix F.

Acid Sulfate Soils: pH Screening

A total of 391 primary soil samples were submitted for pH screening (pH_{LAB} and pH_{FOX}) analysis. A summary of pH screening results is provided below.

- pH_{LAB} (pH measured at the laboratory) values displayed limited variability between the samples submitted for analysis, with a population variance of 0.64 pH units. Of the samples submitted for pH screening the following were reported: maximum pH (field) of 9.9, minimum of 4.2 and average concentration of 8.5.
- pH_{FOX} values displayed limited variability between the samples submitted for analysis, with a population variance of 1.44 pH units. Of the samples submitted for pH screening the following were reported: maximum pH_{FOX} of 10.0, minimum of 2.0 and average concentration of 8.1.

Oxidised pH values were noted to be less than pH 4.0 and therefore indicative of PASS within four locations (BH03, BH05, HA12, HA19 and HA30) at variable depths.

Chromium Reducible Sulfur Suite Analysis

The acid based accounting indicated that net acidity (utilising Chromium Reducible Sulfur (CRS) method) ranged between 670 mol H⁺ /tonne and less than the laboratory limit of reporting (i.e. 10 mol H⁺ /tonne).

Suspension Peroxide Oxidisation Combined Acidity and Sulfur (SPOCAS) suite indicated slightly increased net acidity values likely due to the presence of organic sulfur forms within the sediment profile.

Acid Neutralising Capacity (ANC) obtained during the standardised CRS and SPOCAS analysis program presented ANC values between 6.3 and 9500 mol H⁺ /tonne indicating a significant potential for neutralisation within soil and sediment fractions less than 2 mm. However, ANC calculations based on standardised methods are widely understood to significantly overestimate the buffering ability of material when subjected to laboratory procedures.

Additional ANC analysis in the form of Total Inorganic Carbon (TIC) was completed on select sandy and silt soils within a particle size less than 0.5 mm to estimate the potential for natural buffering ability within materials particularly located within potential borrow areas and areas of excavation.

Metals and Metalloid Compounds

Metal and metalloid analysis was also conducted on samples from various depths at four borehole locations proximal to the proposed infrastructure and areas of assumed disturbance including Crystalliser Pond footprint (BH05), remnant islands (BH09 and BH12) and BH13 (eastern site boundary/ potential borrow areas). A summary of the metal and metalloid results is presented below, with full analytical results presented in Table E-2 Appendix E.

- Exceedances of the NEPM 2013 EILs were reported for copper, nickel and zinc.
- No detections above LOR were reported for beryllium, cadmium and mercury.
- Detections above LOR were reported for arsenic, boron, cobalt, lead, mercury and manganese, however these analytes remained below the soil assessment criteria.

9.2 Offshore Materials

9.2.1 Acid Sulfate Soils

A total of 25 sediment samples recovered from within the originally proposed dredging area (subsequently the proposed dredged berthing pocket has been moved 200 m to the north-east) were submitted for laboratory analysis. Samples were sieved (less than 2 mm) prior to analysis for ASS qualitative analysis. A summary of the laboratory analytical results is provided below, with complete analytical results tables presented in Table E-3 Appendix E and laboratory reports provided in Appendix F. A summary of sediment laboratory analysis is presented below.

Acid Sulfate Soils: pH Screening

A total of 25 primary soil samples were submitted for pH screening (pH_{LAB} and pH_{FOX}) analysis. A summary of pH screening results is provided below.

- pH_{LAB} values presented limited variability between the samples submitted for analysis, with a population variance of 2.90 pH units. Of the samples submitted for pH screening the following were reported: maximum pH_{LAB} of 9.2, minimum of 4.6 and average concentration of 8.0.
- pH_{FOX} values presented limited variability between the samples submitted for analysis, with a population variance of 0.33 pH units. Of the samples submitted for pH screening the following were reported: maximum pH_{FOX} of 9.2, minimum of 7.7 and average concentration of 8.5.

Acid Sulfate Soils: Chromium Reducible Sulfur and SPOCAS Suite

The acid based accounting for the sediments indicated that net acidity (utilising chromium reducible sulfur method) ranged between 220 mol H⁺/tonne and less than the laboratory limit of reporting. Material analysed was dominated by potential acidity due to the sub-oxic and potentially anoxic conditions. The analysis of Acid Volatile Sulfur (AVS) including simultaneously extracted metals (SEM) was not completed due to regional location and ability to preserve and transport samples within appropriate holding times.

Suspension Peroxide Oxidation Combined Acidity and Sulphur (SPOCAS) suite indicated slightly increased net acidity values likely due to the presence of organic sulfur forms within the sediment profile.

Acid Neutralising Capacity (ANC) ranged between 140 and 3400 mol H⁺/tonne (utilising SPOCAS method) indicating a significant potential for neutralisation within sediments less than 2 mm.

9.2.2 Physical Properties

Three samples were selected for assessment of physical properties including particle size distribution (PSD), sieving and laser diffraction, percentage loss on ignition.

The results of the physical property tests are available in Appendix E and indicated that the initial surface samples (maximum 0.7 m depth) analysed were typically less than 0.63 mm.

Field logs indicate that finer sediments such as silts and clays may be present at greater depths and refusal during coring was experienced between 0.7 and 2.7 m at all vibracore locations.

9.2.3 Metals and Metalloid Compounds

The results for the sediment metal analyses are presented in Table E-3.

Results indicated all samples analysed were below the ISQG (low value) for metals and metalloids with the exception of Arsenic, which presented one sample slightly in excess of the guideline value at 23 mg/kg.

9.2.4 Organic Compounds

Select samples were analysed for the organic compounds including PAH, BTEX, TRH, PCB and organochlorine pesticides.

All samples analysed were below the laboratory limit of reporting for all analytes and presented in Table E-3.

9.2.5 Radionuclides (Naturally Occurring Radioactive Materials)

The same samples as above were also analysed for radionuclides (alpha and beta screen) and indicated naturally occurring radioactive material (NORM) was present in samples.

Gross alpha values ranged between 204 and 258 Bq. Kg⁻¹ and gross beta values ranged between 514 and 680 Bq. Kg⁻¹. The maximum sum of gross alpha and beta values was 938 Bq. Kg⁻¹ and below the ISQG (low value) for radionuclides.

Laboratory certificates for the radionuclide analyses are presented in Appendix E.

9.3 Groundwater

9.3.1 Laboratory Data

The laboratory reports are presented as Appendix E, and the collated tabulated results, including assessment criteria are presented in Table E-4 Appendix E. The following sections provide a summary of the analytical results.

Inorganics

Inorganic groundwater chemistry results are summarised below:

- pH results reported for groundwater indicate that groundwater across the site is relatively neutral. pH values ranged from 6.7 to 7.7 pH units, with the minimum pH reported at BH10S/D and maximum value reported at BH03S/D. pH values did not demonstrate significant variability between screen depths, with all shallow and deep paired wells displaying pH variance <0.2, with the exception of 0.5 difference between BH02S and BH02D. Spatially, pH values appeared to increase towards the peripheries of the site, with the lowest pH values returned for the central evaporation pond area.
- Alkalinity (total as CaCO₃) concentrations were generally consistent across the site with a minimum concentration of 77 mg/L, maximum of 690 mg/L and average of 77 mg/L. Two comparatively high results were returned at locations BH12 (690 mg/L) and BH09S (510 mg/L). Spatially, negligible variability is seen in alkalinity results, with the exception of the two high results being confined to remnant islands within the evaporation pond area.
- Sulfate concentrations demonstrated variability across the site with a minimum concentration of 1700 mg/L (BH03S), maximum of 18000 mg/L (BH07S) and average of 7978 mg/L. Comparatively high sulfate concentrations were reported for groundwater

samples within the south-western evaporation pond area, while lower concentrations were reported further inland and in the northern portion of the site.

- Silica concentrations displayed slight variability across the site with a minimum concentration of 85 mg/L (BH14S), maximum of 82 mg/L (BH15S) and average of 24 mg/L. Comparatively high silica concentrations were reported towards the southern portion of the site and generally confined to monitoring wells on or proximal to remnant islands.

Nutrients

Organic groundwater chemistry results are summarised below:

- Ammonia concentrations were generally consistent across the site with a minimum concentration of 0.02 mg/L (BH03D), maximum of 6 mg/L (BH12) and average of 0.89 mg/L. Four exceedances of the assessment criteria were reported with comparatively high results returned for BH05D (5.2 mg/L) and BH12 (6 mg/L).

Metals and Metalloids

Metals groundwater chemistry results are summarised below:

- Aluminium (total) concentrations were reported above the *ANZG Freshwater 95% Guideline* (0.055 mg/L) at all locations, with the exception of BH10 and BH15D. Limited variability was seen in aluminium (total) across the site; however a comparatively high result of 200 mg/L was reported at BH09S.
- The aluminium (filtered) results were below laboratory limits of reporting (LOR) for all locations except for five locations which reported guidelines exceedances.
- Iron (total) concentrations were reported above the *ANZG Freshwater 95% Guideline* (0.055 mg/L) at all locations, with the exception of BH10 and BH15D. Limited variability was seen in aluminium (total) across the site, however a comparatively high result of 490 mg/L was reported at BH09S.
- The iron (filtered) results were generally below laboratory limits of reporting (LOR) and only one location (BH14D) reported a guideline exceedance.

10. Discussion

10.1 Onshore Material

10.1.1 Summary of Findings

The majority of the disturbance associated with infrastructure including NPI, stockyard and majority of the reclaim conveyor system will be located within the elevated regions of the site including the longitudinal and network dunes (Qe) and beaches and coastal dunes (Qs) and founded on shallow foundations (less than 3 m depth). Typically, these higher elevated areas of the Proposal site are between 5 and 10 m AHD and consist of calcareous materials such as calcarenite gravel, coral and shell fragments and present a low risk of oxidation during disturbance. Total Inorganic Carbon (TIC) analysis completed on the less than 0.5 mm fraction of samples collected indicates significant natural buffering ability would be available within the natural environment in the event of a minor acidification event.

Sulfidic material was encountered within the supratidal flats and lower lying regions of the Proposal site. The supratidal flats located adjacent to the Salt Wash Plant (see Figure 4) presented the highest net acidity values (670 mol H⁺/tonne) and therefore the greatest risk of oxidation and acidification. Additionally, the material within the shallow soil profile (upper 1 m) presented no sufficient naturally available buffering capacity as Acid Neutralising Capacity (ANC) or the more conservative TIC. Sporadic distribution of coral fragments and shells were however observed to be varied across the site, with a greater abundance of fragments within sheltered portions of islands. However, these larger visible calcareous fragments are likely to be impacted by oxyhydroxide precipitates, which form a coating on the surface of the fragments and decrease the neutralising ability. Excavation will need to occur for shallow footings (less than 3 m depth) for the stockyard, wash plant and surrounding NPI infrastructure. These have all been located on an elevated area and therefore this excavation is considered unlikely to disturb ASS material if excavation depth does not exceed 6 m (acid generating material was not located at 6.5 m).

Construction of the salt concentration, crystalliser and bitterns ponds, will not result in excavation of the supratidal flats/low lying areas - these areas will be left intact with embankments built on top of the mudflats using imported material. The top 10 – 20 cm of material may be scraped off the salt flats to “key in” embankment walls to the underlying clay layer, and will be assessed for acid generating potential and treated, if required.

Placement of the earthen bunds for the salt concentration, crystalliser and bittern ponds may result in the displacement of natural soils typically at the extremities of the bunded areas and the expulsion of pore water within the local proximity. The extent and rate of the displacement will likely vary depending on ground conditions and pore water pressure, however soils and pore water displaced by the placement of the earthen bunds towards the eastern portion (remnant islands) of the ponds are likely to present a low risk of acid generation due to the existing calcareous conditions and mildly alkaline groundwater. Soils displaced within the western portion of the ponds pose a greater risk of acidification and acid generation, however groundwater is reflective of saline conditions particularly within the coastal peripheries and is likely to assist in buffering and neutralising acid generation.

Post construction and during operation groundwater level in the ponds will be elevated above the existing groundwater table, resulting in downward seepage and limited groundwater mounding (GHD, 2021). As a result of the site conditions, groundwater may express to the surface and cause localised water logging. Sulfidic materials are likely to form within the

potentially anoxic conditions (as currently and naturally present at the site) but provided these formations remain un-disturbed they are not anticipated to generate acidity in-situ.

The maiden brine transfer pump station will be built into the pond embankment and sit on top of the natural ground surface (no excavation is required). Therefore, the construction of the maiden brine transfer pump station is considered to be at low risk of generating acidic run-off / leachate.

The conveyor system will be constructed on a built-up embankment with culverts located underneath to convey surface water flows. The embankment will be constructed on top of the natural ground surface and composed of imported material - there will be no excavation required for the conveyor or the culverts. Therefore, the construction of the conveyor is considered to be at low risk of generating acidic run-off / leachate.

Similarly, all access roads will be constructed on built-up embankments of imported material and therefore require no excavation or present a risk of ASS disturbance.

The seawater intake presents significant acid generating potential with net acidity values of nearby samples ranging between 23 and 170 mol H⁺/ tonne and a TIC contribution between 666 and 2997 mol H⁺/ tonne indicating the material excavated from the seawater intake has the potential to provide naturally available buffering capacity. It is also anticipated that upon excavation, significant leachate with potentially high metal concentrations may be encountered. It should be noted that the intake channel will not require any excavation – it will be built on the natural ground surface using imported fill to construct embankments on either side. The seawater intake sump however, will require the excavation of an inlet well and pump station in the creek mudflat. This will result in an estimated volume of 20,000 m³ of excavated material. This material will be contained within the intake channel embankments which will act as an on-shore treatment area, tested for ASS and treated with neutralising material if necessary (to be confirmed by monitoring). All material and leachate will be contained within the embankments of the intake channel (which will form a treatment area) and liquid will be allowed to naturally evaporate. The retention of liquid will be for a sufficient length of time to allow treatment if applicable and appropriate water quality standards to be met. Solids will be tested to ensure appropriate environmental standards are met, then will be reclaimed and used in on-site construction or spread over the floor of the intake channel.

Water Technology have determined the locations of drainage diversions required upstream of the proposed concentration ponds, to direct surface water flows around the project area (Figure 3). These drainage diversions will require excavations to re-direct surface flows. The estimated volume of material to be excavated is 455,000 m³. The majority of excavated material is unlikely to be acid generating as they are assumed to be significantly weathered and have historically been subject to oxidization and leaching cycles. However, the net acid generating potential has not been accurately determined and pockets or lenses may contain acid generating material, particularly with depth. Further sampling will be conducted to confirm net acid generating potential prior to excavation and management implemented if necessary.

The locations of borrow pits for project construction have been determined as shown on Figure 3. It is estimated that these borrow pits will cover a total area of 817 ha, be a maximum depth of 6 m and approximately 27 million m³ of material will be excavated from them. Borrow pits 1 and 2 (Figure 3) are considered unlikely to contain acid generating material given they occur on elevated sandy islands and ASS was not identified at 6.5 m depth (excavation will cease at 6 m depth). No further sampling is considered necessary if excavation depth remains no deeper than 6 m. Borrow pits 3 and 4 (Figure 3) will be to a maximum of 2 m depth. Further sampling will be conducted to confirm net acid generating potential prior to excavation and management implemented if necessary.

Samples from the eastern portion of the site within the Qe and Qs units presented material with the greatest ANC and TIC contribution. Material 'borrowed' from these areas has the potential to be utilised in the treatment and management process of identified sulfidic materials provided they are deemed geotechnically suitable.

10.2 Offshore Material

10.2.1 Summary of Findings

The physical and mineralogical characteristics of sediment are likely to vary across the dredge pocket. The physical characteristics of the sediment play an important role in the sorption of contaminants and sorptive capacity of sediments. For example, sediments consisting of smaller fractions (clays and silts) are likely to provide a higher binding capacity and more favorable conditions for contaminants such as metals.

Clayey silt was encountered from commencement of cores up to 0.7 m depth within testing locations across the originally proposed dredge pocket (the investigation was carried out prior to the relocation of the proposed dredged berthing pocket which has since been moved 200 m to the north-east), this material was underlain by clayey sand to a maximum recorded depth of 2.7 m at location SED07, albeit most locations encountered clayey sand to between 0.7 m and 1.5 m (excluding SED08 which recorded core loss from 0.7 m depth). Sandy clay graded to coarse calcarenite gravel was recorded in all but one location (SED07) at depths ranging from 1.2 m to termination depth. All locations refused due to hard drilling on calcarenite gravel between 0.7 m and 2.7 m depth. Particle size distribution analysis was completed on the upper 0.7 m profile and indicated relatively homogenous conditions with at least 68.9% of sediments less than 6.7 mm.

Total organic carbon (TOC) concentrations were consistent for the samples analysed and ranged between < 0.1 % and 0.2 % and were consistent with the sediment particle size results. TOC was analysed so that the concentrations of organic contaminants in different sediments could be normalised to 1% organic carbon and then compared across sites and to the ISQG values. However, given there was no detection of organic contaminants in the analysed samples, normalisation was not required.

Metal concentrations were below the ISQG (low value) for metals and metalloids with the exception of Arsenic, which presented one sample slightly in excess of the guideline value at 23 mg/kg. Arsenic has been demonstrated to naturally occur in levels higher than the guideline in the Onslow region. Even pristine locations may contain sediment with naturally occurring trace metals due to natural geology and mineralogy, suggesting that interim sediment quality guideline for arsenic may not be suitable for use across much of the marine environment of the Pilbara region and that alternative guidelines based on local data should be derived (DEC 2006).

Organic chemicals were not detected within the samples analysed during the dredge assessment and were therefore below the ISQG (low values).

Elutriate analysis was not undertaken on the sediment samples due to all analytes with the exception of minor arsenic exceedance presenting results below the ISQG (low values).

Visual observations completed during the dredge pocket sampling did not observe any monosulfidic materials and ASS analysis indicated that sediments contained relatively low net acidity in excess of the DER ASS criteria. Sediments (< 2 mm) also presented significant acid neutralising capacity (ANC). Whilst the effective ANC of the sediment is likely to be varied due to particle size and armouring within the natural environment, the material is considered most likely to be hyposulfidic.

A small amount of dredging is proposed at the end of the jetty to accommodate a single berthing pocket for the transshipment barge, which will transport salt to an offshore ocean going vessel anchorage. The proposed area for dredging is approximately 200 m x 35 m and 6 m in total water depth (2.5 m seabed depth to be dredged), with dredged spoil (assumed to be 17,000 m³) proposed to be disposed onshore. The onshore disposal area will be located immediately inshore from the jetty location (Figure 3). Neutralising material will be added to the dredged material as necessary to treat any ASSS detected. Decant water will be retained for a suitable time to allow appropriate water quality standards to be met (confirmed by monitoring) prior to release to the marine environment. Solids will be tested to ensure appropriate environmental standards are met, then will be reclaimed and used in on-site embankment construction.

10.3 Summary of Recommended ASS Management

Table 18 below provides a summary of the project areas which may result in excavation or spoil generation and recommended management of these areas. A separate Acid Sulphate Soil Development Strategy and Management Plan has been prepared by GHD outlining specific and detailed management measures.

Table 18 Summary of Recommended ASS Management

Infrastructure	Excavation Required	Approx. Max. Depth of Excavation	Excavation Floor Depth mAHD	Estimated Amount of Material	ASS Risk Map Rating	Treatment Required (yes, no or specific comment)
Jetty Berthing Pocket	Dredging of Berthing Pocket	2.5 m of seabed	-7.2	17,000 m ³	N/A mapping – sampling indicates Moderate to High risk	Yes – marine sediment sampling indicates likely to be acid generating. Will be contained and treated in land disposal area.
Jetty	Piles	Assume driven with no spoil	N/A	Assume driven with no spoil	Low – Moderate	No – no excavation required.
Plant Site (NPI Infrastructure)	Shallow footings	3 m	1.1	Included in Borrow Pit A	Low – Moderate	No – elevated sandy island. ASS not identified at 6.5 m via sampling.
Borrow Pit 1	Excavation of construction material	6 m from highest point of island	0.8	10.6 million m ³	Low – Moderate	
Borrow Pit 2	Excavation of construction material	6 m from highest point of island	0.8	4.9 million m ³	Low – Moderate	
Borrow Pit 3	Excavation of construction material	2 m	2.0	1.3 million m ³	Low – Moderate	
Borrow Pit 4	Excavation of construction material	2 m	1.0	9.8 million m ³	Low – Moderate	Likely to be acid generating at depth, however surface soils may have completed previous oxidation and leaching cycles resulting in lower risk or net acid generating potential. Further sampling will be conducted to confirm prior to excavation.
Drainage Diversion A	Excavation of material for drainage diversion (to be used as fill)	2 m	5.5	330,000 m ³	Low - High	Likely to be acid generating at depth, however surface soils may have completed previous oxidation and leaching cycles resulting in lower risk or net acid generating potential. Further sampling will be conducted to confirm prior to excavation.
Drainage Diversion B	Excavation of material for drainage diversion (to be used as fill)	2 m	6.0	21,000 m ³	Low - High	
Drainage Diversion C	Excavation of material for drainage diversion (to be used as fill)	2 m	8.0	104,000 m ³	Low - High	
Evaporation Ponds External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.75	N/A surface only	Moderate – High	Yes – materials will require confirmatory testing to ascertain acid generating potential prior to re-use.
Crystalliser Ponds External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.65	N/A surface only	Moderate - High	Confirmation of the extent of displacement anticipated for earthen bunds to confirm existing neutralisation prior to placement.
Bitterns Pond External Walls	Excavation to “key” walls into clay layer	10 – 20 cm	0.55	N/A surface only	Moderate - High	
Seawater Intake Channel	None – assumed built on top of mudflat	N/A	N/A	N/A	Moderate – High	No – no excavation required.
Seawater Intake Inlet Well and Pump Station	Excavation of creek bank required for inlet well	3 m	-2.04	Up to 20,000 m ³	Moderate - High	Yes – creek sediment sampling indicates likely to be acid generating. Will be contained and treated within intake channel.

11. References

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Figures

Figure 1 Site Plan

Figure 2 Proposal Location and Land use

Figure 3 Proposal Layout

Figure 4 Acid Sulfate Soils Risk Map

Figure 5 Geological Setting

Figure 6 Monitoring Locations



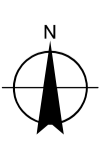
LEGEND

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- Road
- Track

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Kilometres

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Grid: GDA 1994 MGA Zone 50

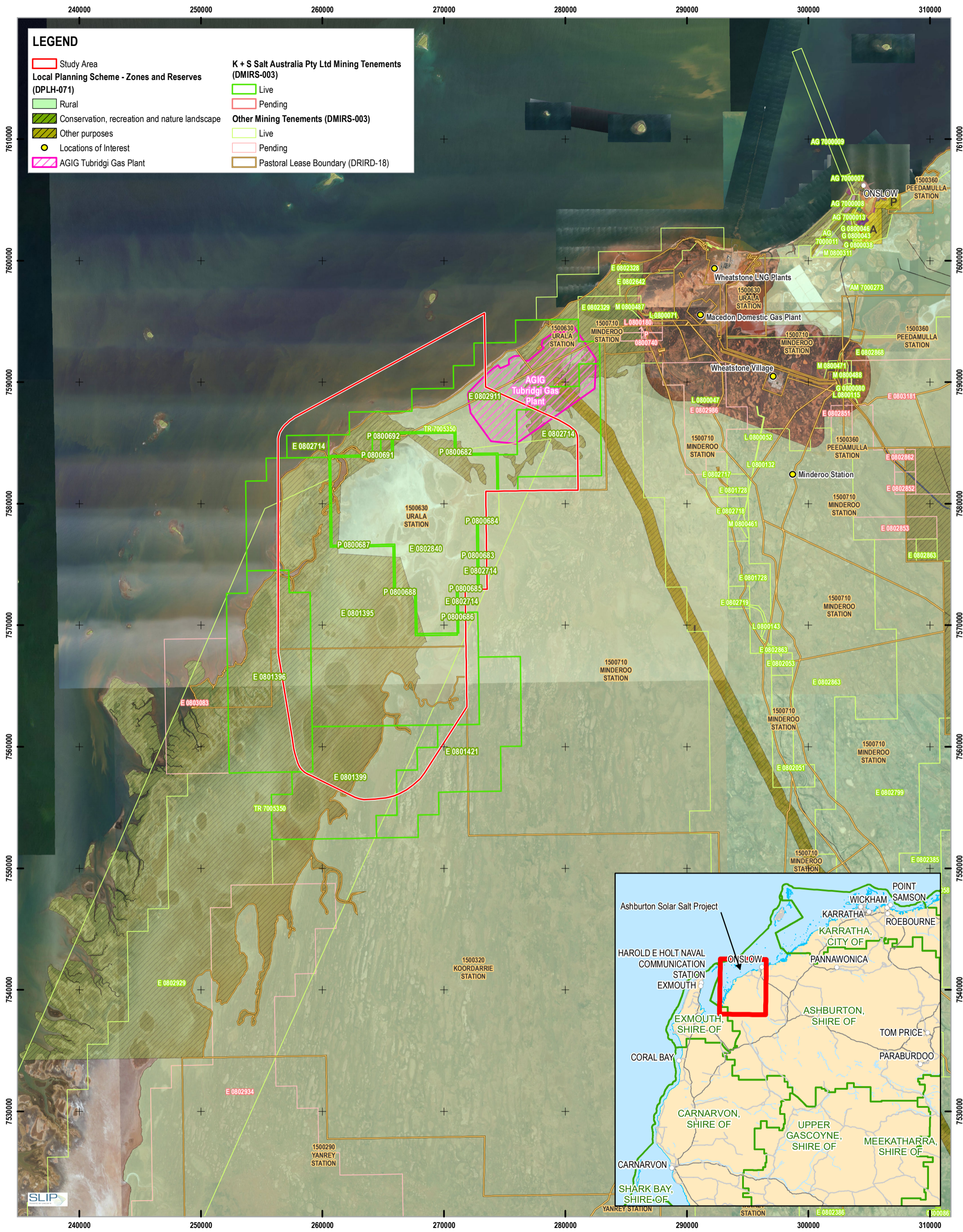


K + S Salt Australia Pty Ltd
Ashburton Solar Salt Project
Phase 2 Site Investigation

Project No. 12516706
 Revision No. 1
 Date 22 Apr 2021

Site Plan

FIGURE 1

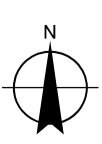


LEGEND

 Study Area	K + S Salt Australia Pty Ltd Mining Tenements (DMIRS-003)
Local Planning Scheme - Zones and Reserves (DPLH-071)	 Live
 Rural	 Pending
 Conservation, recreation and nature landscape	Other Mining Tenements (DMIRS-003)
 Other purposes	 Live
● Locations of Interest	 Pending
 AGIG Tubridgi Gas Plant	 Pastoral Lease Boundary (DRIRD-18)



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 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



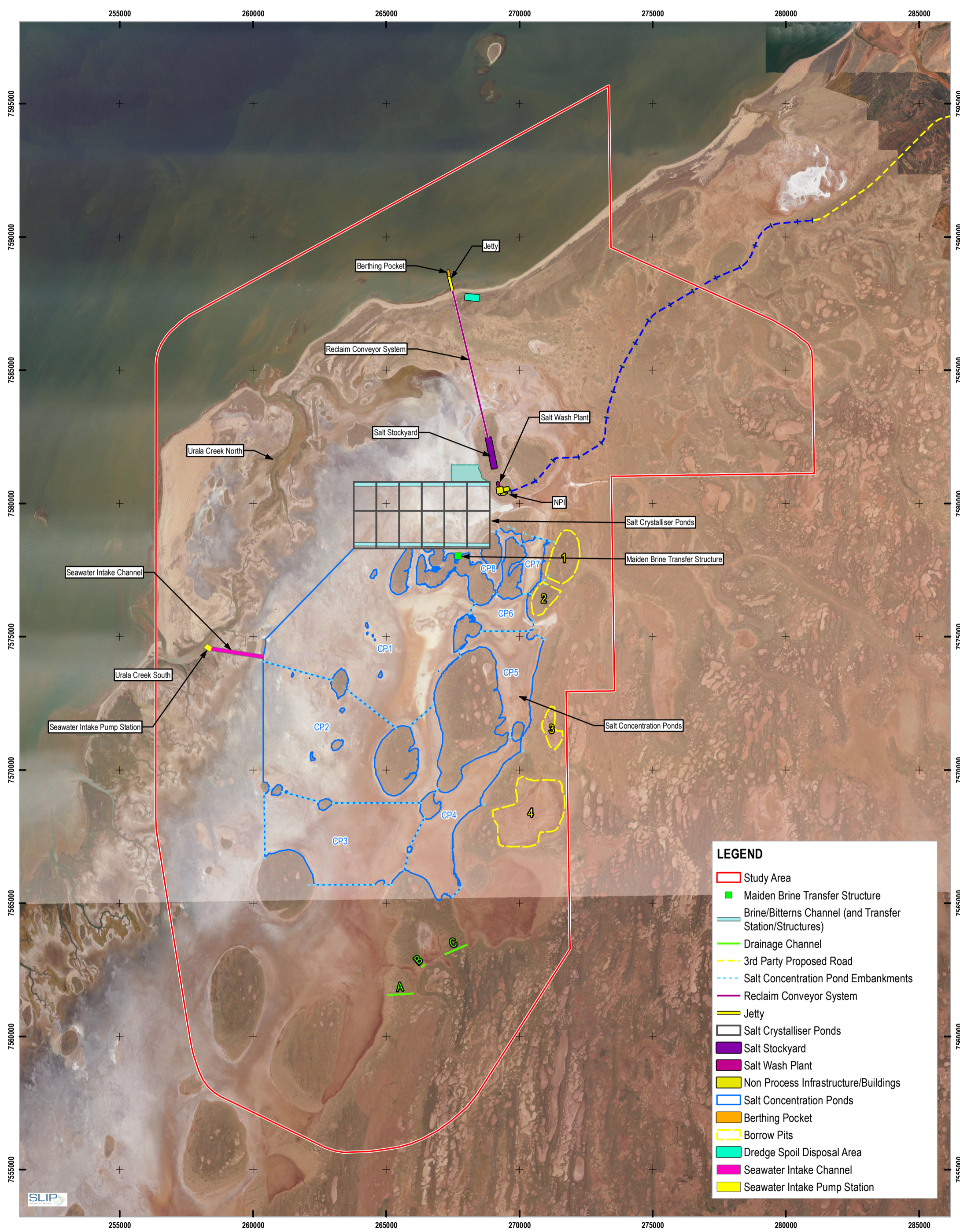
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Ashburton Solar Salt Project
Phase 2 Site Investigation

Project No. 12516706
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Proposal Location and Land Use

FIGURE 2

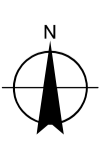
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LEGEND

- Study Area
- Maiden Brine Transfer Structure
- Brine/Bitterns Channel (and Transfer Station/Structures)
- Drainage Channel
- 3rd Party Proposed Road
- Salt Concentration Pond Embankments
- Reclaim Conveyor System
- Jetty
- Salt Crystalliser Ponds
- Salt Stockyard
- Salt Wash Plant
- Non Process Infrastructure/Buildings
- Salt Concentration Ponds
- Berthing Pocket
- Borrow Pits
- Dredge Spoil Disposal Area
- Seawater Intake Channel
- Seawater Intake Pump Station

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 Grid: GDA 1994 MGA Zone 50



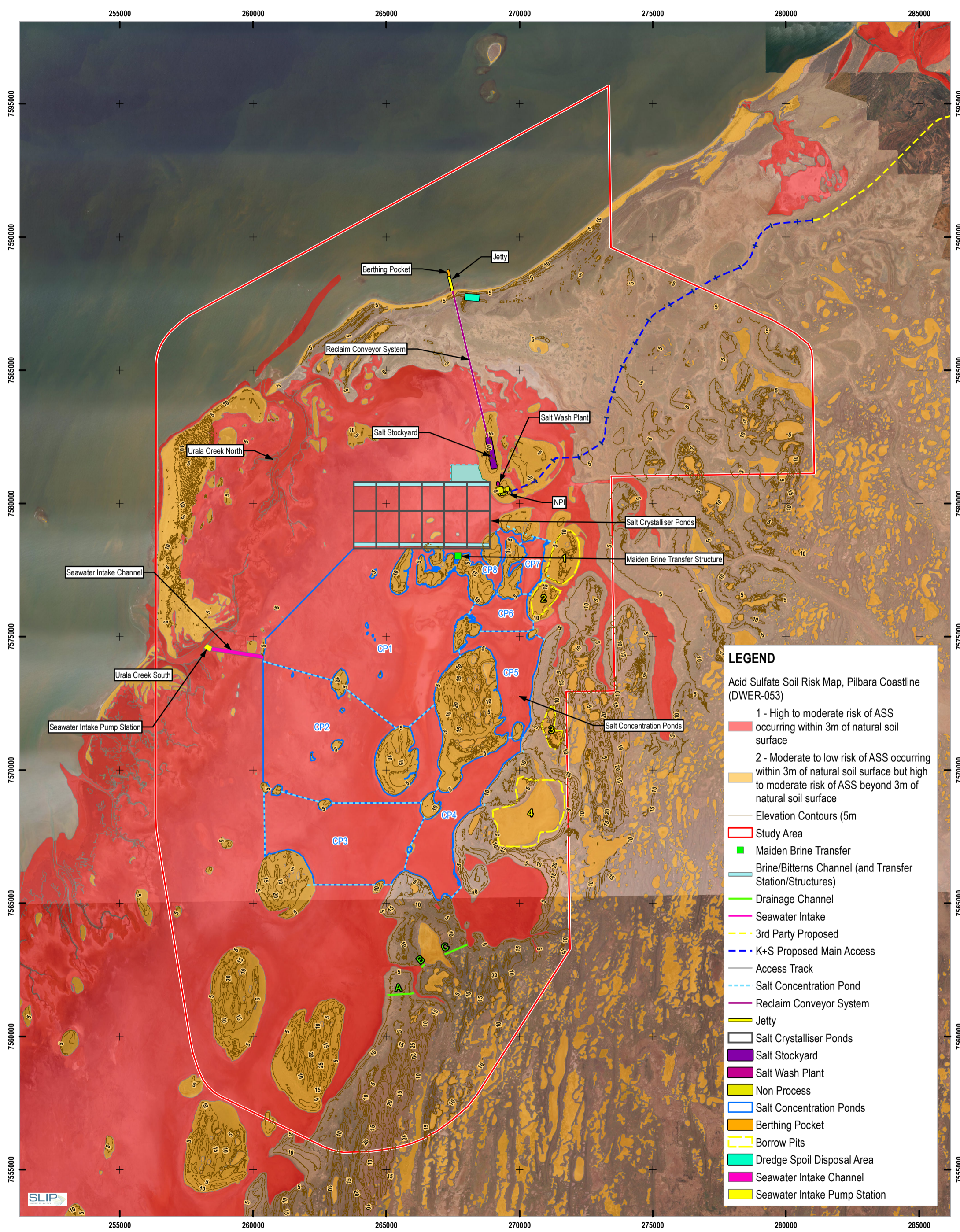
K + S Salt Australia Pty Ltd
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Phase 2 Site Investigation

Project No. 12516706
 Revision No. 2
 Date 22 Apr 2021

Proposal Layout

FIGURE 3

Data source: SLIP - accessed 20/07/2019, GHD: Access Roads, Pond Layout - 20190927, Infrastructure Layout - 20190320, GHD: Channels, Proposed Main Access Road - 20200518 Landgate: Imagery - September 2013 to Jan 2018 (accessed - 20/05/18) . Created by: hlaniza

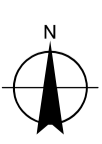


LEGEND

Acid Sulfate Soil Risk Map, Pilbara Coastline (DWER-053)

- 1 - High to moderate risk of ASS occurring within 3m of natural soil surface
- 2 - Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface
- Elevation Contours (5m)
- ▭ Study Area
- Maiden Brine Transfer
- ▬ Brine/Bitterns Channel (and Transfer Station/Structures)
- ▬ Drainage Channel
- ▬ Seawater Intake
- ▬ 3rd Party Proposed
- ▬ K+S Proposed Main Access
- ▬ Access Track
- ▬ Salt Concentration Pond
- ▬ Reclaim Conveyor System
- ▬ Jetty
- ▬ Salt Crystalliser Ponds
- ▬ Salt Stockyard
- ▬ Salt Wash Plant
- ▬ Non Process
- ▬ Salt Concentration Ponds
- ▬ Berthing Pocket
- ▬ Borrow Pits
- ▬ Dredge Spoil Disposal Area
- ▬ Seawater Intake Channel
- ▬ Seawater Intake Pump Station

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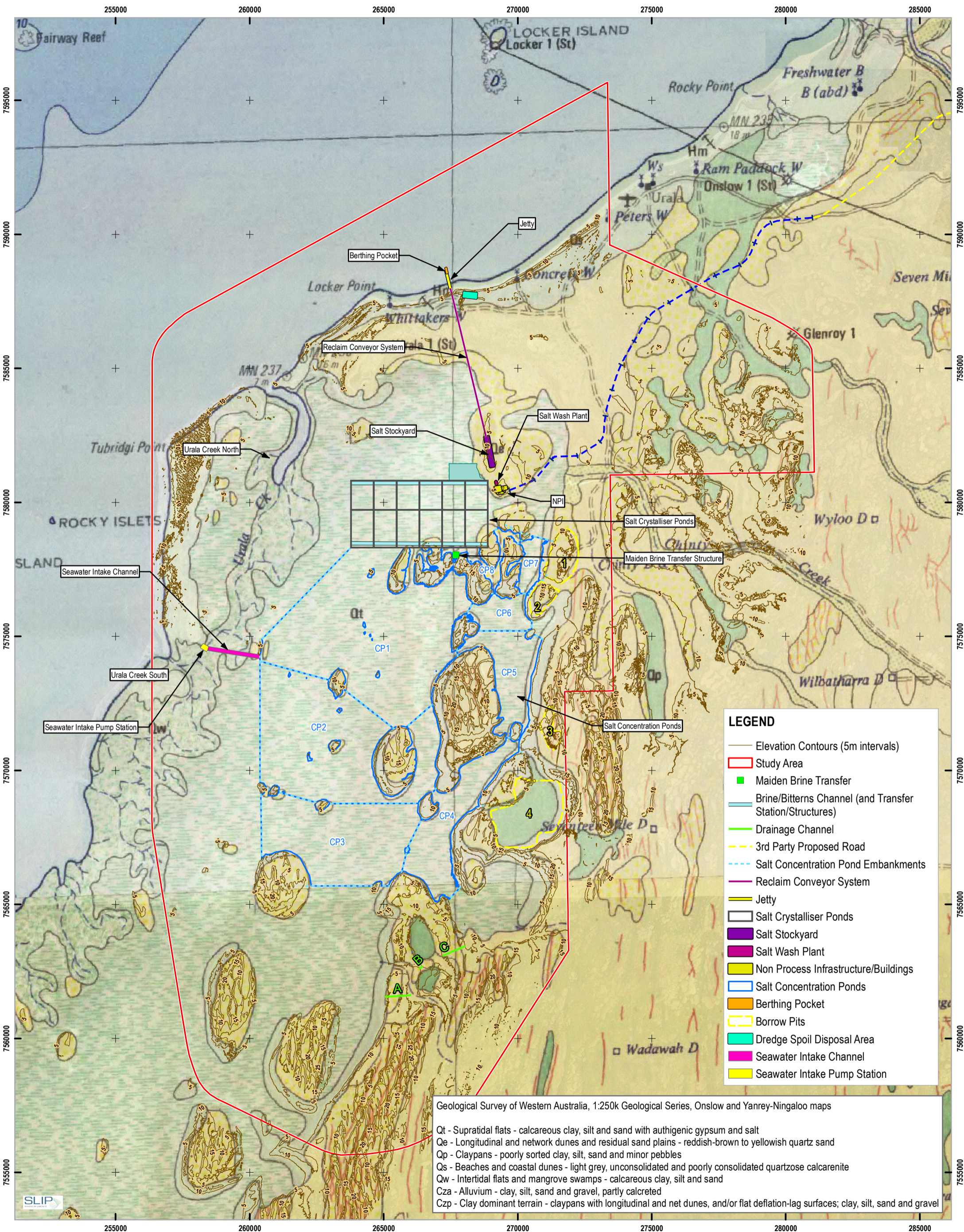
K + S Salt Australia Pty Ltd
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 Date 22 Apr 2021

Acid Sulfate Soils Risk Map

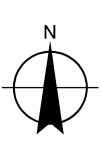
FIGURE 4

G:\6112516706\GIS\Map\Working\ASS_Study\12516706_004_ASS_Study_AcidSulfateSoilRiskMap_rev2.mxd Data source: SLIP - accessed 20200729, GHD: Access Roads, Pond Layout - 20190927, Infrastructure Layout - 20190320, GHD: Channels, Proposed Main Access Road - 20200518 Landgate: Imagery - September 2013 to Jan 2018 (accessed - 20200518) - Created by: hlaniza



LEGEND	
	Elevation Contours (5m intervals)
	Study Area
	Maiden Brine Transfer
	Brine/Bitterns Channel (and Transfer Station/Structures)
	Drainage Channel
	3rd Party Proposed Road
	Salt Concentration Pond Embankments
	Reclaim Conveyor System
	Jetty
	Salt Crystalliser Ponds
	Salt Stockyard
	Salt Wash Plant
	Non Process Infrastructure/Buildings
	Salt Concentration Ponds
	Berthing Pocket
	Borrow Pits
	Dredge Spoil Disposal Area
	Seawater Intake Channel
	Seawater Intake Pump Station

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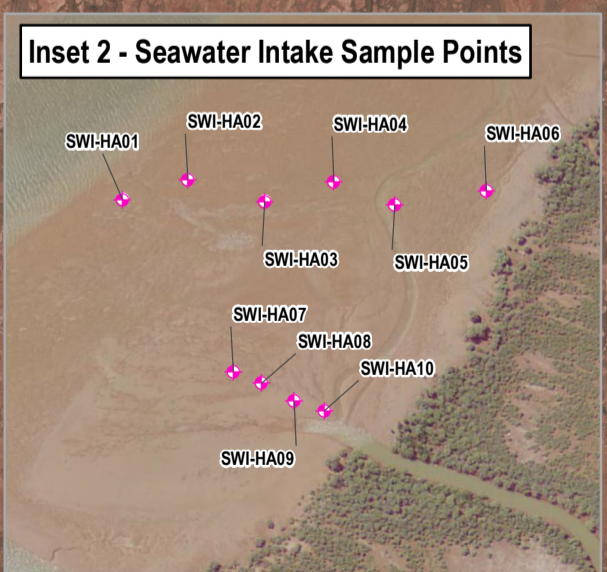
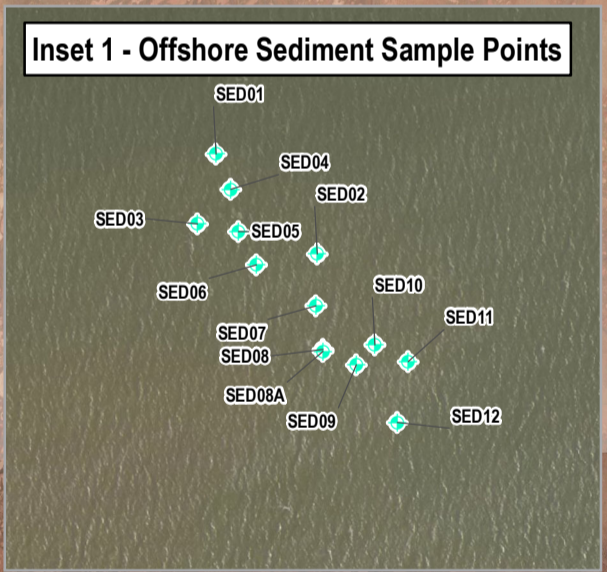
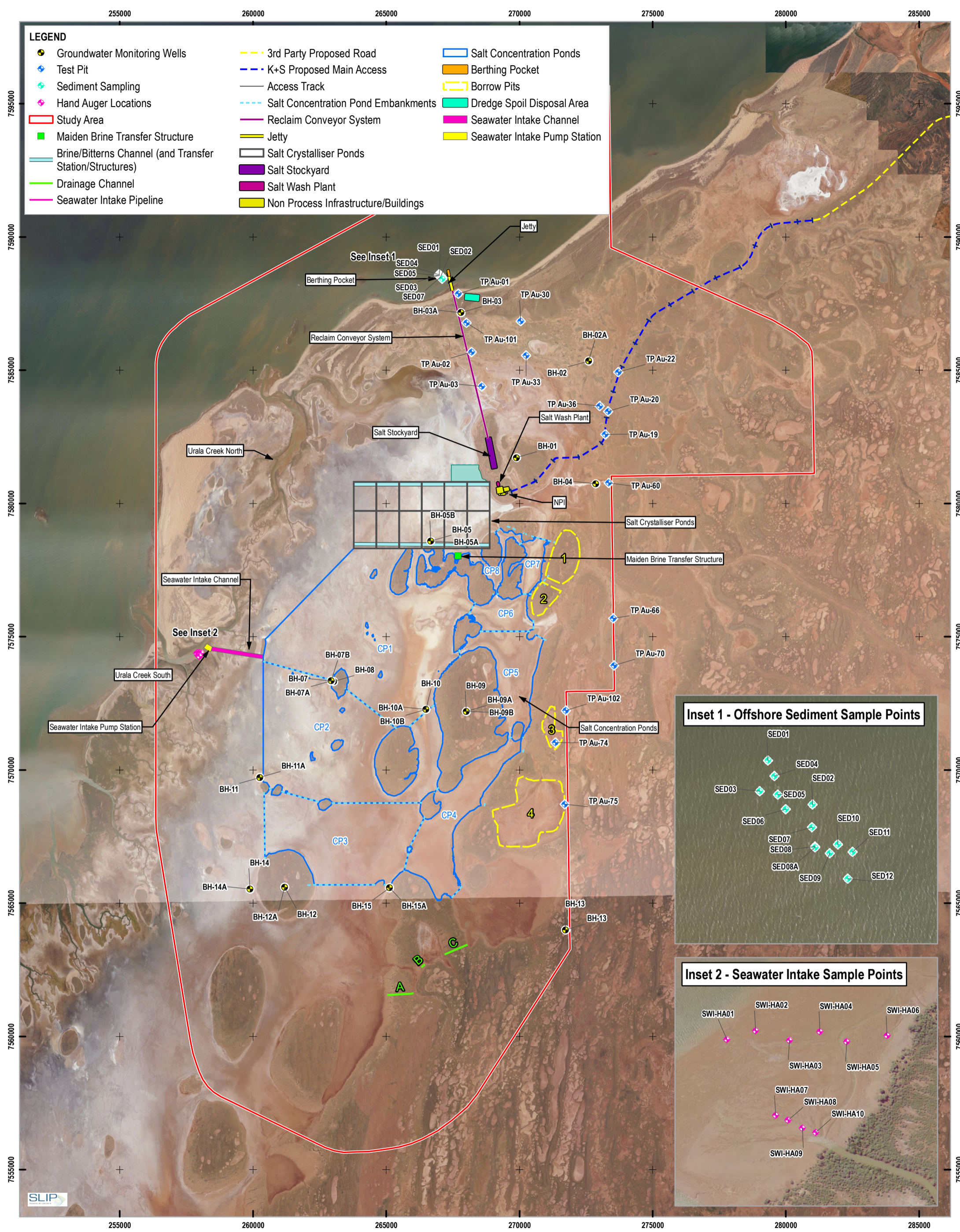
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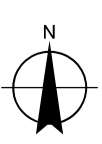
Geological Setting

FIGURE 5

Data source: SLIP - accessed 20/07/20; GHD: Access Roads, Pond Layout - 20190927; Infrastructure Layout - 20190320; GHD: Channels, Proposed Main Access Road - 20200518; Landgate: Imagery - September 2013 to Jan 2018 (accessed - 20/05/18); Created by: hlanza



Paper Size ISO A3
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 Kilometres
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 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



K + S Salt Australia Pty Ltd
 Ashburton Solar Salt Project
 Phase 2 Site Investigation

Project No. 12516706
 Revision No. 2
 Date 22 Apr 2021

Monitoring Locations

FIGURE 6

Data source: SLIP - accessed 20/07/2019, GHD: Access Roads, Pond Layout - 20190927, Infrastructure Layout - 20190320, GHD: Channels, Proposed Main Access Road - 20200518 Landgate: Imagery - September 2013 to Jan 2018 (accessed - 20/05/18) - Created by: hlaniza

Appendices

Appendix A – Onshore Borehole Logs



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH01

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 269 887, N 7581 719
Ground Surface Elevation: +7.2m AHD **Total Depth:** 19.9m
Commenced: 24-Mar-20 **Completed:** 30-Mar-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	30-Mar-20
Processed:	WX	20-Oct-20
Checked:	<i>[Signature]</i>	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					+7.10			SM	Topsoil - Carbonate Silty SAND Fine grained, sub-round to sub-angular; red-brown; non-plastic fines; with organics. Core loss: 0.1 to 1.0 m Inferred as Silty SAND	D	L				Above ground cover	
1					1.0 +6.20			SM	Carbonate Silty SAND Fine to medium grained, angular, inferred salt; red-brown; non-plastic fines, trace broken shells, fine grained sand sized.		MD				Grout	1
												1.50	S	1.5 SPT: 5, 8, 11 [N=19]		
2																
					2.5 +4.70				Core loss: 2.5 to 3.0 m Inferred as Silty Sand.							
3					3.0 +4.20			SM	Carbonate Silty SAND Fine to medium grained, sub-rounded to sub-angular, inferred quartz; red-brown; non-plastic fines, trace broken shells, fine grained sand sized.		D/M		3.00	S	3.0 SPT: 4, 5, 6 [N=11]	
									Core loss: 4.0 to 4.5 m							
4					4.0 +3.20											
					4.5 +2.70			SP	Carbonate SAND Fine to coarse grained, sub-rounded to sub-angular, inferred quartz; red-brown; trace silt.	M	MD		4.50	S	4.5 SPT: 3, 7, 11 [N=18]	
5					5.0											

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH01

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 269 887, N 7581 719
Ground Surface Elevation: +7.2m AHD **Total Depth:** 19.9m
Commenced: 24-Mar-20 **Completed:** 30-Mar-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	30-Mar-20
Processed:	WX	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					+2.10			SP	Carbonate SAND	M	MD					
					5.6 [+1.65]			SM	Fine to coarse grained, sub-rounded to sub-angular, inferred quartz; red-brown; trace silt.							
									Carbonate Silty SAND Fine to medium grained; red-brown; non-plastic fines. Core loss: 5.55 to 6.0 m							
6					6.0 [+1.20]			SM	Carbonate SAND Fine to coarse grained, sub-round to sub-angular, quartz; red-brown; trace silt; trace fine shell gravel.	W	L	6.00	S	6.0 SPT: 3, 1, 5 [N=6]	Gravel	6
					6.3 [+0.90]			SM	Carbonate Sandy CLAY Low to medium plasticity; red-brown; sand is fine to medium grained. 6.7 m: with Carbonate Silty SAND inclusions, pale orange.	W-PL	St					
					6.8 [+0.40]				Core loss: 6.8 to 7.0 m							
7					7.0 [+0.20]			GC	Carbonate Clayey Sandy GRAVEL Fine to coarse grained; sub-angular to angular; pale orange; sand is red-brown, fine to medium grained; clay is low plasticity.	M	MD	7.50	S	7.5 SPT: 6, 6, 7 [N=13]		7
					8.0 [+0.80]			SM	Carbonate Silty Gravelly SAND Fine to medium grained, sub-angular, inferred salt; red-brown; gravel is fine to coarse grained, sub-angular, of limestone; non-plastic fines. 8.3-8.5 m: increased gravel content.					From 8.0 m: strong HCL reaction.		8
					8.9 [+1.70]			SM	Silty SAND Fine to medium grained, sub-angular, inferred salt; red-brown; non-plastic fines; trace gravel of limestone. From 9.9 m: with gravel, fine to coarse grained, sub-angular of limestone; trace cobbles of limestone.		L	9.00	S	9.0 SPT: 3, 4, 4 [N=8] From 9.0 m: Minor HCL reaction.		9
10					10.0											10

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH01

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 269 887, N 7581 719
Ground Surface Elevation: +7.2m AHD **Total Depth:** 19.9m
Commenced: 24-Mar-20 **Completed:** 30-Mar-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	30-Mar-20
Processed:	WX	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
11				PQ Coring	9.90 [-2.90]	Qe	SM	Silty SAND Fine to medium grained, sub-angular, inferred salt; red-brown; non-plastic fines; trace gravel of limestone.	M	MD						11
					10.5 [-3.30]		GM	From 9.9 m: with gravel, fine to coarse grained, sub-angular of limestone; trace cobbles of limestone.				10.50	S	10.5 SPT: 10, 13, 16 [N=29]		
							SM	Silty Sandy GRAVEL Fine to medium grained, sub-angular to angular, limestone; pale orange gravel; red-brown sand fines; fine to medium grained angular salt sand; non-plastic fines.								
								Carbonate Silty Gravelly SAND Fine to medium grained, angular, salt; red-brown; gravel is pale orange, fine to coarse grained, sub-angular of limestone; non-plastic fines.								
12					12.4 [-5.20]		CL	Sandy CLAY Low plasticity fines; red-brown; sand is fine to medium grained; angular, salt.	W-PL	VSt		12.00	S	12.0 SPT: 11, 16, 15 [N=31]		
					12.8 [-5.60]			Core loss: 12.8 to 13.5 m						From 12.45 m: No HCL reaction 12.4 to 12.8 m: Almost Clayey Sand.		
13					13.5 [-6.30]		CL	Sandy CLAY Low plasticity fines; red-brown; sand is fine to medium grained; angular, salt; trace gravel, fine grained, sub-angular of limestone.	W<PL	H		13.50	S	13.5 SPT: 15, 21, 33 [N=54]		
14						Qsed								13.5 to 15.0 m: Almost Clayey SAND		
15					15.0											15

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20

← Backfill



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH01

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 269 887, N 7581 719
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +7.2m AHD Total Depth: 19.9m
Job No.: 12516706	Commenced: 24-Mar-20 Completed: 30-Mar-20
	Contractor: J&S Drilling Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	30-Mar-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: WX	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					[7.80]			CI	Sandy CLAY Medium plasticity; red-brown; sand is fine to medium grained, angular, salt.	W<PL	H	15.00	S	15.0 SPT: 14, 20, 31 [N=51]		
					15.5 [-8.30]			CL	Carbonate Sandy CLAY Low plasticity; red-brown; sand is fine to medium grained, angular.							
16														15.5 to 17.0 m: Almost Clayey SAND		
												16.50	S	16.5 SPT: 15, 24, 38 [N=62]		
17					17.0 [-9.80]			SM	16.95 to 17.0 m: with gravel, fine grained, sub-rounded of haematite. Silty SAND Fine to medium grained, angular, salt; red-brown; non-plastic fines; trace gravel, fine to medium grained, sub-rounded of haematite.	D/M	VD			17.0 to 17.7 m: No HCl reaction		
					17.8 [-10.60]			CL	Sandy CLAY Low plasticity; red-brown; sand is fine to medium grained, angular, salt.	W<PL	H			17.7 to 18.0 m: Almost Clayey SAND		
18					18.3 [-11.10]			CI	From 18.0 m: clay is medium plasticity.			18.00	S	18.0 SPT: 20, 48, * [R]		
					18.7 [-11.50]			CL	From 18.3 m: clay is low plasticity; almost Clayey SAND.							
19								CI	Sandy CLAY Medium plasticity fines; red-brown, mottled pale grey; sand is fine to medium grained, angular, salt; with gravel, fine to medium grained, angular, cemented.			19.50	S	19.5 SPT: 20, 44, 30/70 mm []		
20					19.9 [-12.67]				Termination Depth = 19.87m (Target Depth)							

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH02

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 272 595, N 7585 346
Ground Surface Elevation: +2.1m AHD **Total Depth:** 18.7m
Commenced: 30-Oct-19 **Completed:** 01-Nov-19
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	DO	01-Nov-19
Processed:	DO	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/ Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
30-10							CH	Sandy CLAY High plasticity; brown; sand is fine grained sub-rounded; trace gravel, fine to medium grained, sub-angular (iron cemented?).	W<PL	VSt	0.00	S	0.0 SPT: 5, 7, 9 [N=16] 89% recovery	Above ground cover		
					0.5 [+1.60]			Core loss: 0.5 to 0.85m Inferred as above								
					0.9 [+1.25]		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-rounded; high dry strength.	W-PL							
1					1.7 [+0.40]		CH	Carbonate Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-rounded of carbonate; with gravel, fine to coarse-grained, sub-angular to sub-rounded calcrete.								
2					2.6 [+0.45]	CZP	SC	Carbonate Clayey SAND Fine to medium grained; sub-rounded to sub-angular; pale brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete; uncemented.	W	L-MD	2.75	S	2.8 SPT: 7, 5, 5 [N=10] 100% recovery	Solid pipe		
3	01-11	2.8			3.5 [+1.40]		SC-SW	Clayey Gravelly SAND Fine to medium grained, sub-rounded to sub-angular; pale brown; low plasticity fines; gravel, fine to coarse grained, sub-rounded to rounded of calcrete; uncemented.						Run 3.5 to 4.25m: Groundwater strike during drilling		
4					4.1 [+2.00]		SC	Clayey SAND Fine to medium grained, sub-rounded to sub-angular; brown; low plasticity fines; trace gravel, (locally with) fine to medium, sub-rounded of calcrete; uncemented.							Bentonite & grout mix	
					4.7 [+2.60]			Core loss: 4.7 to 5.0m Inferred as below		L						
5					5.0											

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH02

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 595, N 7585 346
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +2.1m AHD Total Depth: 18.7m
Job No.: 12516706	Commenced: 30-Oct-19 Completed: 01-Nov-19
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	01-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6	30-10 31-10					[+2.90]	CZP	SC	Clayey SAND Fine to medium grained, sub-rounded to sub-angular sand; brown; medium plasticity clay; trace gravel, fine grained, sub-rounded to rounded of calcrete; uncemented.	W	L	5.00	S	5.0 SPT: 1, 2, 5 [N=7] 100% recovery		6	
7									From 6.5m, gravel becomed sub-angular to sub-rounded.	M-W	MD	6.50	S	6.5 SPT: 7, 9, 14 [N=23] 100% recovery		7	
8									From 8.0m, gravel becomes sub-rounded.		D	8.00	S	7.25 to 8.0m: Sample material fell out of inner rod during extraction. Retrieved this material by pulling the outer rod to 7.25m and redrilling to 8.0m. Run 7.25 to 8.0m: 100% recovery		8	
9									Between 8.65 and 8.75m: brown, mottled white (CaCO3 mottling); low to medium plasticity fines.								9
10						9.3 [+7.20]		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-rounded to sub-angular; trace gravel, fine to medium grained, sub-angular of calcrete.	W<PL	H	9.50	S	9.5 SPT: 16, 28, 43 [N=71] 73% recovery Clay becomes soft when saturated (tactile observation)	Bentonite	10	

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH02

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 595, N 7585 346
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +2.1m AHD Total Depth: 18.7m
Job No.: 12516706	Commenced: 30-Oct-19 Completed: 01-Nov-19
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	01-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					[7.90]			CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-rounded to sub-angular.	W<PL	H					
					10.7 [-8.55]				Core loss: 10.65 to 11.0m							
11					11.0 [-8.90]			CH	Sandy CLAY High plasticity; brown; sand is fine grained, sub-rounded to sub-angular; trace gravel, white, fine to medium grained, sub-angular of calcrete.			11.00	S	11.0 SPT: 16, 23, 41 [N=64] 82% recovery 11.45 to 11.75m: PASS material characterisation samples taken 11.75 to 12.5m: Sample material fell out of inner rod during inner rod extraction. Retrieved this material by using a fingers catcher in the inner rod. Run 11.75 to 12.5m: 33% recovery		
					11.8 [-9.65]			SC	Clayey SAND Fine to medium grained; brown; low plasticity.	W	VD					
12	31-10 01-11				12.0 [-9.90]				Core loss: 12.0 to 12.5m Inferred as above							
					12.5 [-10.40]	CZP		CH	Sandy CLAY High plasticity; brown; sand is fine grained, sub-angular to sub-rounded.	W~PL	H	12.50	S	12.5 SPT: 15, 22, 39 [N=61] 100% recovery		
					13.2 [-11.10]			SC	Clayey SAND Fine to medium grained, sub-angular to rounded; brown, stained pale grey; trace gravel, (locally with) fine to medium grained, sub-angular of calcrete; uncemented.	W	VD					
13					14.0 [-11.90]			CH-CH	Sandy CLAY Medium to high plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded; trace gravel, (locally with) fine to medium grained, sub-angular of calcrete.	W~PL	H	14.00	S	14.0 SPT: 18, 41, 30/70 mm [N=] 78% recovery		
					14.5 [-12.40]				Core loss: 14.5 to 14.75m: Inferred as below.	W						
					14.8 [-12.65]			SC								
15																

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH02

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 595, N 7585 346
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +2.1m AHD Total Depth: 18.7m
Job No.: 12516706	Commenced: 30-Oct-19 Completed: 01-Nov-19
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	01-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)	
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
16				Hollow Stem Auger	15.3 [-13.15]	Cz4		SC	Clayey SAND Fine to medium grained, sub-angular to rounded; brown; medium plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete; uncemented.	VD	VD						
					15.5			SC	Core loss: 15.25 to 15.5m Inferred as above								W>PL H
						15.8 [-13.70]	Qs4d		GC	Sandy CLAY High plasticity; brown; sand is fine grained, sub-rounded; trace gravel, fine grained, sub-angular of calcrete and sandstone.	M-W	VD					
					16.0 [-13.90]	SC			Clayey SAND. As above.								
						16.3 [-14.20]	Qs4d		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete and sandstone; uncemented.	W<PL H	VD					
					16.5 [-14.40]	SC			Clayey SAND (locally SAND in parts) Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; uncemented.								
						16.8 [-14.70]	Qs4d		CI-CH	Clayey SANDY GRAVEL Fine to coarse grained, sub-rounded of sandstone; brown; sand is fine to medium grained, sub-rounded; low plasticity fines; uncemented.	W<PL H	VD					
					17.0 [-14.90]	CI-CH			Clayey SAND (locally SAND in parts) Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; uncemented.								
						17.3	Qs4d		SC	Clayey SAND (locally SAND in parts) Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; uncemented.	W<PL H	VD					
					17.45	SC			Core loss: 16.3 to 16.5m Inferred as above								
				17.8	Qs4d		SC	Clayey SAND (locally SAND in parts) Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; uncemented.	W<PL H	VD							
			18.0	SC			Core loss: 16.8 to 17.0m Inferred as above										
				18.5	Qs4d		SC	Sandy CLAY / CLAY Medium to high plasticity; brown, mottled grey; sand is fine to medium grained, sub-rounded. From 17.3m, grading to CLAY From 17.45m, trace gravel (locally with) fine, to medium grained, sub-angular to sub-rounded of calcrete and sandstone.	W<PL H	VD							
			18.7	SC			Core loss: 16.3 to 16.5m Inferred as above										
				18.74	Qs4d		SC	Termination Depth = 18.74m (Target Depth)									

GENERAL LOG: 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH02A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 595, N 7585 351
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +2.2m AHD Total Depth: 8.0m
Job No.: 12516706	Commenced: 02-Nov-19 Completed: 02-Nov-19
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	02-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
1															Above ground cover	1
2															Solid pipe	2
3															Backfill	3
4				Solid Augering											Bentonite	4
5															Gravel	5
6																6
7															Slotted pipe	7
8					8.0 [-5.80]											8
9																9
10																10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 267 805, N 7587 157
Ground Surface Elevation: +1.6m AHD **Total Depth:** 20.5m
Commenced: 03-Nov-19 **Completed:** 04-Nov-19
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	DO	04-Nov-19
Processed:	DO	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components		Depth Scale (m)	
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method											Water			
03-11					0.4 [+1.20]		SP-SC	SAND Fine to medium grained, sub-angular to sub-rounded; brown; with fines; with plant root fibres to 0.1m depth; uncemented.	D	VL								
					1.3 [+0.30]		SM	Carbonate Silty SAND Fine grained, sub-angular to sub-rounded of carbonate and quartz; brown; non-plastic fines; trace gravel, angular of claystone (?); uncemented.			0.50	S	0.5 SPT: 3, 1, 1 [N=2] 61% recovery					
					1.6 [+0.00]		SM	Silty SAND Fine to medium grained, sub-rounded to sub-angular of quartz; grey mottled orange; low plasticity fines; uncemented.	M	MD				Run 1.25 to 2.0m: Groundwater strike during drilling				
04-11	1.6				1.8 [-0.20]		SP-SM	SAND Fine to medium grained, sub-rounded of quartz; grey; with fines.		W								
					2.0 [-0.40]		SM	Core loss: 1.8 to 2.0m Inferred as above Silty SAND Fine to medium grained, sub-angular to sub-rounded; grey; low plasticity fines; trace coral and shell fragments (up to 25mm).			2.00	S	2.0 SPT: 4, 5, 6 [N=11] 100% recovery					
					2.8 [-1.15]		SP	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey; trace coral and shell fragments (up to 10mm); trace fines; uncemented.						3.0 to 3.4m: Material characterisation samples taken From 3.5m, added water into inner tube to balance water pressures				
					3.4 [-1.90]		SP	Core loss: 3.4 to 3.5 m Inferred as above Inferred as SAND below.			3.50	S	3.5 SPT: 1, 3, 4 [N=7] 0% recovery					
					3.8 [-2.20]		SP	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey; trace fines; trace coral and shell fragments (up to 20mm). From 4.1m, becoming with coral and shell fragments. Core loss: 4.25 to 5.0 m						ASS samples recovered at 0.25m, 0.5m, 0.75m, 1.0m, 1.25m, 1.5m, 1.75m, 2.0m, 2.25m, 2.5m, 2.75m, 3.0m, 3.25m, 3.4m, 3.8m and 4.25m QA01=BH03-3.0m				
					4.3 [-2.65]													
5					5.0													

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20

Hollow Stem Auger

Qs

Solid pipe

Bentonite & grout mix



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 267 805, N 7587 157
Ground Surface Elevation: +1.6m AHD **Total Depth:** 20.5m
Commenced: 03-Nov-19 **Completed:** 04-Nov-19
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	DO	04-Nov-19
Processed:	DO	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					[3.40]			SP	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey; with shell and coral fragments (up to 10mm); uncemented.	W	VL	5.00	S	5.0 SPT: 1, 1, 2 [N=3] 29% recovery SPT sampler with finger catcher hammered to 5.7m to improve SPT sample recovery		
					5.5 [-3.90]				Core loss: 5.5 to 5.75 m Inferred as above							
					5.8 [-4.15]	Qs		SP	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey; with shell and coral fragments (up to 10mm); uncemented.							
					6.1 [-4.50]				Core loss: 6.1 to 6.5 m Inferred as above							
					6.5 [-4.90]			SP	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey; trace fines; trace shell fragments (up to 10mm); uncemented.		L	6.50	S	6.5 SPT: 3, 3, 4 [N=7] 51% recovery		
					6.8 [-5.20]			SC	Carbonate Clayey SAND Fine to medium grained, sub-angular to sub-rounded of carbonate and quartz; brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete.							
					7.3 [-5.65]			SP-SC	Carbonate SAND Fine to medium grained, sub-angular to sub-rounded of carbonate and quartz; brown; with fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete.		MD					
					7.4 [-5.80]			GC	Carbonate SAND Fine to medium grained, sub-angular to sub-rounded of carbonate and quartz; brown; with fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete.							
					7.8 [-6.20]				Core loss: 7.8 to 8.0 m							
					8.0 [-6.50]			GC SC	Carbonate Clayey Sandy GRAVEL Fine to coarse grained, sub-angular to sub-rounded of calcrete, claystone and shell fragments; brown; sand is fine to medium grained, sub-angular to sub-rounded of carbonate; low plasticity fines.		M-W	8.00	S	8.0 SPT: 12, 13, 13 [N=26] 89% recovery		
					8.5 [-6.85]	Czp			From 7.5 to 7.6 m: Silty SAND							
					8.8 [-7.15]			SC	Carbonate Clayey Sandy GRAVEL As above							
									Core loss: 8.45 to 8.75m Inferred as above							
									Carbonate Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete and claystone.			9.50	S	9.5 SPT: 9, 12, 12 [N=24] 93% recovery		
10					10.0											10

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 267 805, N 7587 157
Ground Surface Elevation: +1.6m AHD **Total Depth:** 20.5m
Commenced: 03-Nov-19 **Completed:** 04-Nov-19
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	DO	04-Nov-19
Processed:	DO	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
11						[9.40]	C7p	SC	From 9.0 m: Clayey SAND Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; trace gravel, fine grained, sub-rounded to sub-angular of calcrete.	M-W	MD						11
12						12.4 [-10.80]		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-angular to sub-rounded; trace gravel, fine, sub-angular to sub-rounded of calcrete.	W-PL	H						12
13						13.3 [-11.65]	Qsed	SP-SC	SAND Fine to coarse grained, sub-angular to sub-rounded of quartz (and some carbonate); brown; with fines non-plastic; trace gravel, fine to medium grained of quartz; uncemented.	W	VD						13
14						14.5 [-12.85] 14.6 [-12.95]		SP	14.3 m: With gravel, sub-rounded to rounded of quartz and claystone.								14
15						15.0		CI	Core loss Inferred as above	W-PL	H						15

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03

Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 267 805, N 7587 157
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.6m AHD Total Depth: 20.5m
Job No.: 12516706	Commenced: 03-Nov-19 Completed: 04-Nov-19
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	04-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					[13.40]			CI-CH	Sandy CLAY Medium plasticity; brown; sand is fine to coarse grained, sub-angular to sub-rounded (some carbonate); trace gravel, fine to coarse grained, sub-rounded to rounded of quartz and calcrete. From 14.6 to 15.0m, moderately CaCO3 cemented.	W~PL				From 15.0m, hard drilling conditions (~40 min per m)		
					15.7 [14.14]				Sandy CLAY Medium to high plasticity; brown; sand is fine grained, sub-angular to sub-rounded (some carbonate); trace gravel, fine to medium grained, sub-angular to rounded of calcrete, quartz and claystone. Core loss: 15.74 to 16.0m	W<PL			15.50	15.5 SPT: 26, 30/90 mm, * [30/90 mm] 100% recovery Run 15.25 to 15.5m: Sample material fell out of the inner rod during extraction. This material was retrieved using the SPT sampler. Runs 16.0 to 16.25m and 16.25 to 16.5m: Sample material fell out of the inner rod during extraction. This material was recovered after drilling to 16.75m.		
16					16.0 [14.40]			CI-CH		W>PL						
					16.8 [15.19]			CH	Sandy CLAY Medium to high plasticity; brown; sand is fine grained, sub-angular to sub-rounded of quartz (some carbonate); trace gravel, fine to medium grained, sub-angular to rounded of calcrete, quartz and claystone.	W<PL			17.00	17.0 SPT: 15, 23, 33 [N=56] 71% recovery		
17									CLAY High plasticity; brown; with sand, fine grained, sub-angular to sub-rounded; trace gravel, fine grained, sub-rounded of calcrete.							
									From 18.5m, trace gravel, fine to medium grained, sub-rounded to sub-angular of calcrete.				18.50	18.5 SPT: 19, 28, 35 [N=63] 71% recovery		
18																
					19.3 [17.65]			CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-angular to sub-rounded; trace gravel, fine to medium grained, sub-rounded to sub-angular of calcrete.	W~PL						
19					19.8 [18.20]				Core loss: 19.8 to 20.0m							
20					20.0											

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 267 805, N 7587 157	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.6m AHD	Total Depth: 20.5m
Job No.: 12516706	Commenced: 03-Nov-19	Completed: 04-Nov-19
	Contractor: J&S Drilling	Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	04-Nov-19
Flushing Fluid: Water		Processed: DO	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
04-11			SPT		[-18.40] 20.5 [-18.85]	Qsed		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-angular to sub-rounded.	W~PL H	H	20.00	S	20.0 SPT: 15, 22, 30 [N=52] 100% recovery			21
21									Termination Depth = 20.45m (Target Depth)								21
22																	22
23																	23
24																	24
25																	25



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03A

Sheet 1 of 2

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 267 803, N 7587 157
Ground Surface Elevation: +1.5m AHD **Total Depth:** 5.0m
Commenced: 04-Nov-19 **Completed:** 05-Nov-19
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	DO	05-Nov-19
Processed:	DO	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/ Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
0				Solid Augering											Above ground cover Bentonite & grout mix Solid pipe Bentonite Gravel Slotted pipe	0
1																1
2																2
3																3
4																4
5					5.0											5



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH03A

Sheet 2 of 2

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 267 803, N 7587 157
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+1.5m AHD
	Phase 2 Site Investigation	Total Depth:	5.0m
Job No.:	12516706	Commenced:	04-Nov-19
		Completed:	05-Nov-19
		Contractor:	J&S Drilling
		Driller:	Brian

Rig Type :	Jacro 350 drill rig on Mangrove Buggy	Inclination:	Vertical
Flushing Fluid:	Water	Logged:	DO
Hole Diameter (mm):	180	Processed:	DO
		Checked:	
			05-Nov-19
			20-Oct-20

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6						[3.50]											6
7																	7
8																	8
9																	9
10																	10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH04

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 272 867, N 7580 738
Ground Surface Elevation: +3.4m AHD **Total Depth:** 15.0m
Commenced: 30-Mar-20 **Completed:** 31-Mar-20
Contractor: J&S Drilling **Driller:** Adrian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Seawater
Hole Diameter (mm): 123

Logged:	SD	31-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
0	30-03							CI	Silty CLAY Medium plasticity; brown; with sand, fine to coarse grained; calcerous.	W>PL	S			From surface, 'Prickly Pear' drill bit used. MC=Material Characterisation	Above ground cover Concrete	0	
1								CH	1.0 to 1.5 m, locally becoming Sandy Silty CLAY.	W<PL	Fr			0.5-1.0m, MC: 2 x jar samples, 2 x disturbed bags	Bentonite	1	
2								CH	From 1.5 m, loss of silt, clay is high plasticity.			1.50	SD01	1.5 SPT: 4, 4, 4 [N=8] 250/450 mm recovery, D01		2	
3						2.8 [+0.65]		GC	Clayey GRAVEL Fine grained; sub-rounded; of gypsum; brown; clay is high plasticity; with sand, fine to medium grained gypsum; calcerous.	M	MD			3.0 SPT: 7, 8, 8 [N=16] 420/450 mm recovery, D02	Gravel	3	
4	30-03 31-03					3.2 [+0.20]		CH	Sandy CLAY High plasticity; brown; sand, fine to medium grained, sub-angular to sub-rounded, of gypsum and quartz; trace gravel, sub-rounded of gypsum; calcerous. From 3.5 m, becoming non-calcareous.	W>PL	F-St		SD02	Drilling rods pulled and drill bit changed to 'Surface Set' PQ bit.		4	
5						5.0		CH	From 4.5 m, loss of gravel.		VSt	4.50	SD03	4.5 SPT: 9, 11, 17 [N=28] 400/450 mm recovery, D03		5	

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH04

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 867, N 7580 738
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.4m AHD Total Depth: 15.0m
Job No.: 12516706	Commenced: 30-Mar-20 Completed: 31-Mar-20
	Contractor: J&S Drilling Driller: Adrian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD	31-Mar-20
Flushing Fluid: Seawater		Processed: WR	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
6					[1.60] 6.0	Czp		CH	Sandy CLAY High plasticity; brown; sand, fine to medium grained, sub-angular to sub-rounded, of quartz; trace gravel, sub-rounded of gypsum; trace gravel, fine grained, sub-rounded; calcerous.	W~PL VSt						
7					[2.60] 6.0			CH	CLAY High plasticity; brown; with sand, fine grained; with local calcerous cementation as nodules up to 30 mm. From 7.0 m, trace local cemented nodules up to 150 mm.	H	6.00	SD04	6.0 SPT: 13, 24, 39 [N=63] 300/450 mm recovery, D04 7.5 m, crystalline gypsum occurs in horizontal platy concentrations up to 2 mm thick.			
8						Qsed			From 7.5 m, addition of trace gravel, fine grained, black, sub-rounded, of claystone, and crystalline of gypsum.	W<PL	7.50	SD05	7.5 SPT: 16, 30, 12/50 mm [42/200 mm] 300/450 mm recovery, D05			
9					9.2						9.00	SD06	9.0 SPT: 16, 20/95 mm, * [20/95 mm] 230/245 mm recovery, D06			
10									Start of coring at 9.245m. Continued next sheet in Rock Core format.							

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH04

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 272 867, N 7580 738 Ground Surface Elevation: +3.4m AHD Total Depth: 15.0m Commenced: 30-Mar-20 Completed: 31-Mar-20 Contractor: J&S Drilling Driller: Adrian
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical	Logged:	SD	31-Mar-20
Drilling Fluid: Seawater	Processed:	WR	20-Oct-20
Core Diameter (mm): 85	Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)		
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VEH	TCR (%)	RQD (%)	F (fractures/m)	Defect Log						
6																						6		
7																						7		
8																						8		
9						9.2 [-9.85]			<i>Resuming in Core Log format 9.245m.</i>													9		
10				PQ Coring		10.0	Qsed		Calcareous CLAYSTONE High plasticity; W-PL; brown; massive; with sand, fine to coarse grained, sub-angular to sub- rounded, of quartz and claystone, and coarse grained crystalline of gypsum; trace chart gravel (as below); local calcareous cementation nodules (as below); moist.	Fr						100	100	1		38	9.52 m, 45°, joint, medium scale, rough, planar, gypsum coating, 2 mm. 9.71 m, DB 9.78 m, DB			10
10															100	100	0		14			10		

COREHOLE: 12516706 GINT.GPJ GHD\LIB.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH04

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 272 867, N 7580 738
Ground Surface Elevation: +3.4m AHD **Total Depth:** 15.0m
Commenced: 30-Mar-20 **Completed:** 31-Mar-20
Contractor: J&S Drilling **Driller:** Adrian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Drilling Fluid: Seawater
Core Diameter (mm): 85

Logged:	SD	31-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Defect Description & Comments	Piezometer Components	Depth Scale (m)		
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VH	EH	TCR (%)	RQD (%)	F (fractures/m)				Defect Log	Drill Rate (min/m)
11						[8.60]			From 9.8 m, becoming dry. Calcareous CLAYSTONE High plasticity; W-PL; brown; massive; with sand, fine to coarse grained, sub-angular to sub-rounded, of quartz and claystone, and coarse grained crystalline of gypsum; trace gravel, medium grained (20 mm), rounded of chert; local ca From 10.1 m, sand is fine to medium grained.	Fr						100	100			14	Change in drill bit. 9.85 m, DB 10.13 m, DB 10.44 m, DB 10.54 m, DB		11
12						11.8 [8.38]		X	CORE LOSS 11.78 to 12.0 m Inferred as above														12
13						12.0 [8.60]	Qsed		Calcareous CLAYSTONE High plasticity; W-PL; brown; massive; with sand, fine to coarse grained, sub-angular to sub-rounded, of quartz and claystone, and coarse grained crystalline of gypsum; local calcareous cementation as angular nodules, up to 15 mm; dry. From 12.57 m, Increase in sand content to Sandy CLAYSTONE.							85	100			20	11.23 m, DB 11.64 m, DB		13
						13.1 [8.73]		X	CORE LOSS 13.13 to 13.5 m Inferred as above														13
14						13.5 [10.10]			Calcareous Sandy CLAYSTONE High plasticity; W-PL; brown; massive; with sand, fine to coarse grained, sub-angular to sub-rounded, of quartz and claystone, and coarse grained crystalline of gypsum; local calcareous cementation as angular nodules, up to 15 mm; dry.							75	58			9	12.07 m, DB 12.56 m, DB 12.62 m, DB 12.69 m, DB 12.85 m, DB 12.94 m, DB	Backfill	14
15	31-03					15.0			Termination Depth = 15.00m							100	100			17	13.57 m, DB 13.72 m, DB 14.04 m, DB 14.06 m, DB 14.08 m, DB 14.21 m, DB 14.38 m, DB 14.70 m, DB 14.93 m, DB		15

COREHOLE: 12516706 GINT.GPJ GHD\B.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 266 675, N 7578 586
Ground Surface Elevation: +0.7m AHD **Total Depth:** 15.0m
Commenced: 14-Jan-20 **Completed:** 17-Jan-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 10 m, then Polymer
Hole Diameter (mm): 180 Auger / 123 PQ

Logged: SD 17-Jan-20
Processed: DCH 20-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
14-01						[+0.66]		CH	Crust Halite crystals up to 40 mm; white mottled brown; trace fines, non-plastic.	D W>PL	S	0.20	D	0.2 m: J01, J02, D05			
						[+0.48]			CLAY High plasticity; pale grey; trace sand is fine to medium grained, sub-angular, of quartz; non-calcareous.								
						[+0.20]		GC	0.22-0.28 m: becoming grey-brown; with sand, fine to coarse-grained; with gravel, fine to medium; of angular gypsum crystals; uncemented.	W	L	0.60	D	0.6 m: J03, J04, D06			
						[+0.07]			0.28-0.5 m: CORE LOSS								
1						[+0.30]	Qt	GC	Clayey GRAVEL Fine to medium grained, angular, of quartz; brown; clay is high plasticity, W>PL; with sand, fine to coarse-grained, angular, of gypsum and calcite; uncemented.								
						[+0.30]			0.77-1.0 m: CORE LOSS								
						[+1.30]		CH	Clayey GRAVEL As above.	W>PL	F		S	1.5 SPT: 1, 2, 3 [N=5] 1.5-2.05 m: disturbed sample D01 122% Recovery			
2						[+1.30]		CH	Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-rounded, of quartz; calcareous.	W>PL	F						
						[+3.00]		CH	At 3.0 m: loss of sand.	W~PL	F - St	3.00	S	At 2.8 m: switch to saw-tooth head on sampler 3.0 SPT: 10, 16, 18 [N=34] 3.0-3.46 m: disturbed sample D02 102 % Recovery 3.5 m: J05, J06, D09 At 3.75 m: ASS quality assurance sample QA02			
3						[+3.42]			At 4.0 m: becoming slightly calcareous.								
						[+3.80]	Qsed		4.12-4.5 m: CORE LOSS. Inferred as above.	W>PL							
4						[+3.80]		CH	Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-rounded, of quartz; calcareous.		St - VSt	4.50	S	At 4.25 m: no ASS sample taken due to core loss 4.5 SPT: 10, 12, 16 [N=28] 4.5-4.85 m: disturbed sample D03 78% Recovery			
5						[+3.80]											
6										W<PL							

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 675, N 7578 586
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.7m AHD Total Depth: 15.0m
Job No.: 12516706	Commenced: 14-Jan-20 Completed: 17-Jan-20
	Contractor: J&S Drilling Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD	17-Jan-20
Flushing Fluid: Water to 10 m, then Polymer		Processed: DCH	20-Oct-20
Hole Diameter (mm): 180 Auger / 123 PQ		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
7	14-01 16-01							CH	<p>Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-rounded, of quartz; calcareous.</p> <p>From 6.1 m: with trace amounts of gravel, fine grained, angular, platy, of gypsum.</p> <p>From 6.5 m: with trace amounts of sand; coarse-grained, angular, platy, of gypsum.</p> <p>6.8-7.0 m: bivalve shells, non-intact, up to 41x55 mm in size.</p> <p>At 7.0 m: non-calcareous.</p> <p>At 7.5 m: loss of gravel. Sand is fine to medium-grained.</p> <p>At 8.7 m: gain of trace local cementation of calcite, ~30% area, moderately cemented.</p>	W~PL	St-VSt VSt	6.00	S	<p>6.0 SPT: 24, 43, 17/50 mm []</p> <p>6.0-6.3 m: disturbed sample D04</p> <p>86% Recovery</p> <p>At 6.45 m: switch to PQ coring</p> <p>At 6.8 m, pause in run due to flush pipe blockage</p>		7	
8																	8
9																	9
10						10.0											10
11																	11
12																	12

GENERAL LOG: 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH05

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 266 675, N 7578 586 Ground Surface Elevation: +0.7m AHD Total Depth: 15.0m Commenced: 14-Jan-20 Completed: 17-Jan-20 Contractor: J&S Drilling Driller: Alan
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical Drilling Fluid: Various Core Diameter (mm): 85	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Logged:</td> <td style="width: 30%;">SD</td> <td style="width: 50%;">17-Jan-20</td> </tr> <tr> <td>Processed:</td> <td>DCH</td> <td>20-Oct-20</td> </tr> <tr> <td>Checked:</td> <td></td> <td></td> </tr> </table>	Logged:	SD	17-Jan-20	Processed:	DCH	20-Oct-20	Checked:		
Logged:	SD	17-Jan-20								
Processed:	DCH	20-Oct-20								
Checked:										

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VH	EH	TCR (%)	RQD (%)	F (fractures/m)				
7																					7	
8																					8	
9																					9	
10						10.0 [9.30]			<i>Resuming in Core Log format 10m.</i>												10	
11				PQ Coring			Qsed		Calcareous CLAYSTONE Brown; massively bedded; with 40% fine to medium grained sand, of quartz and salt (?); moderately well cemented; calcite veins, typically vertical, 20-30mm long, 5-20mm wide, <20% of area; moist.	Fr				0		11	10.09 m: DB 10.19 m: DB		Bentonite		11	
12														0		19	10.46 m: DB 10.65 m: DB 11.0 m: DB 11.35 m: DB		Gravel		12	

COREHOLE: 12516706 GINT.GPJ GHD\B.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH05

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 266 675, N 7578 586
Ground Surface Elevation: +0.7m AHD **Total Depth:** 15.0m
Commenced: 14-Jan-20 **Completed:** 17-Jan-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Drilling Fluid: Various
Core Diameter (mm): 85

Logged: SD 17-Jan-20
Processed: DCH 20-Oct-20
Checked:

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							TCR (%)	RQD (%)	F (fractures/m)	Defect Log	TCR (%)	RQD (%)	F (fractures/m)	Defect Log				
13	16-01 17-01			PQ Coring			Qsed		At 11.95 m: 3 mm thick lamination, undulating, of crystalline gypsum. Calcareous CLAYSTONE Brown; massively bedded; with 40% fine to medium grained sand, of quartz and salt (?); moderately well cemented; calcite veins, typically vertical, 20-30mm long, 5-20mm wide, <20% of area; moist. At 12.21, 12.28, 12.42, 12.45, 12.69, 12.77, 13.25, 13.61, 14.28, 14.45 and 14.55 m: 1 mm thick laminations of gypsum, undulating, discontinuous, subhorizontal.	Fr	V L M H VH EH	100	100	0	19	12.37 m: DB 12.56 m: DB 12.6 m: DB 13.0 m: DB 13.28 m: DB 13.4 m: DB 13.77 m: DB	13	13				
14												100	100	0	11	14.43 m: DB	14	14				
15	17-01					15.0 [-14.25] [-14.30]			SANDSTONE Fine to medium grained, angular, of quartz and iron oxides, brown; massively bedded; non-calcareous; moist. Termination Depth = 15.00m							14.85 m: DB 14.96 m: DB	15	15				
16																	16	16				
17																	17	17				
18																	18	18				

COREHOLE: 12516706 GINT.GPJ GHD\LB.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05A

Sheet 1 of 2

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 675, N 7578 587
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.7m AHD Total Depth: 5.0m
Job No.: 12516706	Commenced: 14-Jan-20 Completed: 17-Jan-20
	Contractor: J&S Drilling Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD	17-Jan-20
Flushing Fluid: Polymer		Processed: DCH	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1															<p>Above ground cover Bentonite Gravel Slotted pipe Bentonite</p>	1	
2																2	
3				PQ Coring												3	
4																4	
5						5.0										5	

Standpipe
piezometer
installed ~1 m
away from BH05.



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05A

Sheet 2 of 2

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 266 675, N 7578 587
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+0.7m AHD
	Phase 2 Site Investigation	Total Depth:	5.0m
Job No.:	12516706	Commenced:	14-Jan-20
		Completed:	17-Jan-20
		Contractor:	J&S Drilling
		Driller:	Alan

Rig Type :	Jacro 350 drill rig on Mangrove Buggy	Inclination:	Vertical
Flushing Fluid:	Polymer	Logged:	SD
Hole Diameter (mm):	123	Processed:	DCH
		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6						[4.30]											6
7																	7
8																	8
9																	9
10																	10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05B

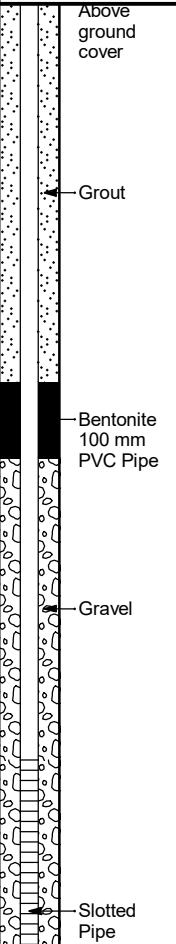
Sheet 1 of 2

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 676, N 7578 588	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.7m AHD	Total Depth: 16.0m
Job No.: 12516706	Commenced: 22-Mar-20	Completed: 22-Mar-20
	Contractor: J&S Drilling	Driller: Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD	22-Mar-20
Flushing Fluid: Bentonite		Processed: WR	20-Oct-20
Hole Diameter (mm): 150		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1																1	
2																2	
3																3	
4																4	
5				Wash Boring												5	
6																6	
7																7	
8																8	
9																9	
10																10	

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20





STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH05B

Sheet 2 of 2

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 266 676, N 7578 588 Ground Surface Elevation: +0.7m AHD Total Depth: 16.0m Commenced: 22-Mar-20 Completed: 22-Mar-20 Contractor: J&S Drilling Driller: Trevor
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical Flushing Fluid: Bentonite Hole Diameter (mm): 150	Logged: SD Processed: WR Checked:	22-Mar-20 20-Oct-20
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Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
11																	11
12																	12
13				Wash Boring													13
14																	14
15																	15
16						16.0 [-15.30]										Backfill	16
17																	17
18																	18
19																	19
20																	20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 262 938, N 7573 345	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.8m AHD	Total Depth: 16.5m
Job No.: 12516706	Commenced: 11-Mar-20	Completed: 14-Mar-20
	Contractor: J&S Drilling	Driller: Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	14-Mar-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: WR	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
11-03							SM	Carbonate Silty SAND Fine to coarse grained, sub-rounded to sub-angular, of quartz; pale brown; silt is non-plastic; trace clay; trace gravel, fine grained, angular of gypsum and shells. From 0.5 m: With medium grained gravel sized shell fragments.	D	L	0.00	S	0.0 SPT: 2, 3, 4 [N=7] 82% Recovery, D01 Strong HCl reaction MC: Material Characterisation			
1					1.0 [+0.80]		SC	Carbonate Clayey SAND Fine to coarse grained, sub-rounded to sub-angular, of quartz; pale brown; non-plastic to low plasticity fines; with gravel and sand sized shell fragments.	M	MD-L			1.0 m: MC sample			
2					1.5 [+0.30]		SM	Carbonate Silty Gravelly SAND Fine to coarse grained, sub-rounded to sub-angular, of quartz; pale brown; gravel is fine to medium grained, angular, of calcarenite (weakly cemented); silt is non-plastic; with gravel sized shells.	W	MD	1.50	S	1.5 SPT: 6, 4, 5 [N=9] 100% Recovery, D02 ASS samples recovered at 0.25m, 0.5m, 0.75m, 1.0m, 1.25m, 1.5m, 1.75m, 2.0m, 2.25m, 2.5m, 2.75m, 3.0m, 3.25m, 3.5m, 3.75m, 4.0m, 4.25m, 4.5m, 4.75m, 5.0m.			
3					2.6 [+0.90]		SC/SM	Carbonate Clayey/Silty SAND Fine to medium grained, of carbonate; pale brown; clay/silt is low plasticity, red/brown; trace sand, coarse grained, of shell fragments; with gravel, of calcarenite (weakly cemented).	M				3.0 SPT: 4, 9, 10 [N=19] 93% Recovery, D03			
					3.0 [+1.20]		SC	Clayey SAND Fine to medium grained; red-brown; clay is low plastic; calcareous.			3.00	S	Slight HCl reaction, almost sandy clay 3.5-4.0 m. 3.5 m: ASS QA sample			
					3.5 [+1.70]		SM	Carbonate Silty SAND Fine to medium grained; red-brown; silt is non-plastic; with gravel, fine to medium grained, of calcarenite (weakly to moderately cemented).			4.50	S	4.5 SPT: 7, 10, 14 [N=24] 89% Recovery, D04			
5					5.0											

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 262 938, N 7573 345
Ground Surface Elevation: +1.8m AHD **Total Depth:** 16.5m
Commenced: 11-Mar-20 **Completed:** 14-Mar-20
Contractor: J&S Drilling **Driller:** Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	14-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6				PQ		[3.20]	Qt	SM	Carbonate Silty SAND Fine to medium grained; red-brown; silt is non-plastic; with gravel, fine to medium grained, of calcarenite (weakly to moderately cemented); trace gravel, fine grained of non-intact shells.	M	MD			6.00 S 6.0 SPT: 6, 8, 8 [N=16] 100% Recovery, D05 From 6.5 m: Strong HCl reaction		6	
7																	7
8						7.7 [5.90]		Cl	Carbonate Sandy CLAY Medium plasticity; red-brown; sand is fine to medium grained. At 7.7m: 2mm thick layer of shells	W>PL	VSt-H			7.50 S 7.5 SPT: 9, 11, 19 [N=30] 93% Recovery, D06	Solid Pipe	8	
9	11-03 12-03					9.0 [7.20]	Qsed	CH	Sandy CLAY High plasticity; red-brown; sand is fine to medium grained; calcareous.		VSt			9.00 S 9.0 m: MC sample 9.0 SPT: 8, 11, 16 [N=27] 87% Recovery, D07	Grout	9	
10						9.5 [7.70]		CL-Cl	Sandy CLAY Low to medium plasticity; red-brown; sand is fine to medium grained; with gravel; fine to medium grained, sub-rounded to sub-angular, weakly cemented gravel; calcareous.	W~PL	H				Bentonite	10	

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 262 938, N 7573 345
Ground Surface Elevation: +1.8m AHD **Total Depth:** 16.5m
Commenced: 11-Mar-20 **Completed:** 14-Mar-20
Contractor: J&S Drilling **Driller:** Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	14-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
11					[9.20]		CL-CL	Sandy CLAY Low to medium plasticity; red-brown; sand is fine to medium grained; with gravel; fine to medium grained, sub-rounded to sub-angular, weakly cemented gravel; calcareous.	W~PL H					From 10.0 m: Slight HCl reaction	Solid Pipe	11
12					11.4 [9.60]		CL	Sandy Gravelly CLAY Low plasticity; red-brown; sand is fine to medium grained, sub-angular, gravel is fine grained, sub-angular, black.	W<PL					10.5 SPT: 16, 30, 47 [N=77] 58% recovery, D08	Gravel	11
13								12.5 to 13.0 m: Gravel is fine to medium grained, sub-rounded of quartz.						12.0 SPT: 20, 48, 14/30 mm [N=R] 67% Recovery, D09 30 blows for >100mm penetration.	Slotted Pipe	12
14					13.3 [11.45]			Coreloss: 13.25 to 13.5 m.	-							
14	12-03 14-03				13.5 [11.70]		CL	Sandy Gravelly CLAY Low plasticity; red-brown; sand is fine to medium grained, sub-angular, gravel is fine grained, black, weakly cemented.	W<PL					13.5 SPT: 33, 30/90 mm, * [N=R] 104% Recovery 30 blows for >100mm penetration	Bentonite	14
15					15.0										Gravel	15

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 262 938, N 7573 345
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.8m AHD Total Depth: 16.5m
Job No.: 12516706	Commenced: 11-Mar-20 Completed: 14-Mar-20
	Contractor: J&S Drilling Driller: Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	14-Mar-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: WR	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
16				PQ	16.4 [14.60] 16.5 [14.70]	Qsed		CL	Sandy Gravelly CLAY Low plasticity; red-brown; sand is fine to medium grained, sub-angular; gravel is fine grained, sub-angular, black, weakly cemented. From 15.5 m: Becoming red-brown with minor pale grey mottling.			15.00	S	15.0 SPT: 23, 44, 61 [N=105] 67% Recovery At 15.0 m: No HCl reaction		16
	14-03								Coreloss: 16.4 to 16.5 m.	-						
17									Termination Depth = 16.50m (Target Depth)							17
18																18
19																19
20																20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 262 938, N 7573 346
Ground Surface Elevation: +1.8m AHD **Total Depth:** 7.7m
Commenced: 14-Mar-20 **Completed:** 14-Mar-20
Contractor: J&S Drilling **Driller:** Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Polymer
Hole Diameter (mm): 123

Logged:	SG	14-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
14-03				PQ Coring		7.7 [5.90]										14-03	
1																	1
2																	2
3																	3
4																	4
5																	5
6																	6
7																	7
8																	8
9																	9
10																	10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH07B

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 262 938, N 7573 347
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.8m AHD Total Depth: 9.4m
Job No.: 12516706	Commenced: 15-Mar-20 Completed: 15-Mar-20
	Contractor: J&S Drilling Driller: Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	15-Mar-20
Flushing Fluid: Bentonite		Processed: WR	20-Oct-20
Hole Diameter (mm): 150		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
15-03				Wash Boring										Above ground cover Grout Solid Pipe Bentonite Slotted Pipe Solid Pipe	15-03	
9.4					9.4 [-7.60]											

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH08

Sheet 1 of 3

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 263 029, N 7573 316
Ground Surface Elevation: +5.5m AHD **Total Depth:** 15.0m
Commenced: 15-Mar-20 **Completed:** 17-Mar-20
Contractor: J&S Drilling **Driller:** Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	17-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
0.0	15-03						SM	Carbonate Silty SAND Fine to medium grained, of carbonate; pale orange-brown; silt is non-plastic.	M	VL	0.00		0.0 SPT: 0, 2, 4 [N=6] SPT sunk under weight of hammers	Above ground cover Concrete	0.0	
0.2									D	L			0.0-0.2 m: With organics; strong HCl reaction		0.2	
0.9													0.2-0.9 m: Trace organics.		0.9	
1.5									M		1.50		1.5 SPT: 14, 19, 17 [N=36]	Grout	1.5	
2.1													ASS samples recovered at 0.25m, 0.5m, 0.75m, 1.0m, 1.25m, 1.5m, 1.75m, 2.0m, 2.25m, 2.5m, 2.75m, 3.0m, 3.25m, 3.5m, 3.75m, 4.0m, 4.25m, 4.5m, 4.75m, 5.0m.	Solid Pipe	2.1	
2.8					2.8 [+2.70]			Core loss: 2.8 to 3.0 m.	-							2.8
3.0					3.0 [+2.50]		SM	Carbonate Silty SAND Fine to medium grained, of carbonate; pale orange-brown; silt is non-plastic.	M	L- MD	3.00		3.0 SPT: 4, 4, 6 [N=10]		3.0	
4.0	15-03 16-03							From 4.0 m: With fine to medium gravel sized shells.						Bentonite	4.0	
4.5									MD		4.50		4.5 SPT: 7, 10, 8 [N=18]	Gravel	4.5	
5.0															5.0	

GENERAL LOG: 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH08

Sheet 3 of 3

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 263 029, N 7573 316
Ground Surface Elevation: +5.5m AHD **Total Depth:** 15.0m
Commenced: 15-Mar-20 **Completed:** 17-Mar-20
Contractor: J&S Drilling **Driller:** Trevor

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	SG	17-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
11						[4.50]	Qe	SC	Carbonate Clayey SAND Fine to medium grained, of carbonate; red-brown; clay has low plasticity.								
						10.4 [4.90]		CL	Sandy CLAY Low plasticity; red-brown; sand is fine to medium grained, of carbonate.	W<PL	H	10.50	S	10.5 SPT: 16, 27, 33 [N=60] Swapped drill bit.	Bentonite		
12						11.3 [5.80]		SC	Carbonate Clayey SAND Fine to medium grained, of carbonate; red-brown; clay is non-plastic; weakly cemented.	D-M	D						
						11.8 [6.30]		GC	Clayey Sandy GRAVEL Fine to coarse grained, rounded, mixed lithology of quartz, Banded Iron Formation & chert; sand is fine to medium grained; clay has low plasticity.		M	12.00	S	12.0 SPT: 14, 20, 23 [N=43]	Gravel		
13															12.45-13.25 m: Fines grained sand washing out, returning as gravel. Inferred Clayey Sandy GRAVEL		
						13.3 [7.75]			Core loss: 13.25 to 13.5 m	-							
14						13.5 [8.00]		GP	Sandy GRAVEL Fine to medium grained, rounded mixed lithology, sand is medium to coarse grained (red-brown-black to white gravel) with fines.	M	VD	13.50	S	13.5 SPT: 10, 45, 22 [N=67]			
						13.8 [8.30]		CL-Cl	Sandy CLAY Low to medium plasticity; red-brown; sand is fine to medium grained.	W<PL	H						
15						14.0 [8.50]			Core loss: 14.0 to 14.5 m Inferred as Sandy CLAY.								
						14.5 [9.00]		Cl	Sandy CLAY Medium plasticity; red/brown; sand is fine to medium grained; with gravel, fine grained, sub-rounded.	W~PL		14.50	S	14.5 SPT: 10, 30, 43 [N=73]			
15						15.0 [9.45]			Termination Depth = 14.95m (Target Depth)								

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



BOREHOLE LOG

Borehole No.:

BH09

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd **Coordinates:** E 268 003, N 7572 193
Project: Ashburton Solar Salt Project **Ground Surface Elevation:** +3.5m AHD **Total Depth:** 20.3m
Phase 2 Site Investigation **Commenced:** 20-Jan-20 **Completed:** 23-Jan-20
Job No.: 12516706 **Contractor:** J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water **Logged:** SD/DO 23-Jan-20
Hole Diameter (mm): 180 **Processed:** DCH 20-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method											
20-01															
0.8					0.8 [+2.70]	Oe		SP-SC	SAND Fine to medium grained, sub-angular to sub-rounded, of quartz; red-brown; with clay, non-plastic; calcareous; very weakly cemented.	D	L			Monitoring well BH09A installed approximately 4 m north of BH09 location.	
1.0					1.0 [+2.50]			CH	At 0.75 m, nodules up to 10 mm, moderately cemented. Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded, of quartz; trace gravel, fine grained, sub-angular of calcrete; Calcareous.	W>PL	S-F			1.25 m: quality assurance sample (QA03).	
1.5					1.5 [+2.00]			CH	1.0-1.5 m: CORE LOSS Inferred as above. Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded, of quartz; trace gravel, fine grained, sub-angular of calcrete; moderately cemented Calcareous.	VS		1.50	S	1.5 SPT: 1, 0, 2 [N=2] D01 100% Recovery	
2.0									2.0 m, becoming CLAY with sand.	S-F				Calcrete is of calcareously moderately cemented mudstone.	
2.25									2.25 m, loss of gravel, only slight calcareous reaction.						
3.0						CZP			3.0 m, becoming Sandy CLAY.	F				3.0 SPT: 3, 5, 6 [N=11] D02 100% Recovery	
4.0					4.0 [-0.50]				4.0-4.5 m: CORE LOSS Inferred as above.						
4.5					4.5 [-1.00]			CH	Sandy CLAY, as above.					4.5 SPT: 6, 5, 8 [N=13] D03 100% Recovery At 4.5 m: water added to auger drilling method.	
5.0					5.0										

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



BOREHOLE LOG

Borehole No.:

BH09

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 268 003, N 7572 193
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.5m AHD Total Depth: 20.3m
Job No.: 12516706	Commenced: 20-Jan-20 Completed: 23-Jan-20
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD/DO	23-Jan-20
Flushing Fluid: Water		Processed: DCH	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
6						[1.50]			CH	Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded, of quartz; trace gravel, fine grained, sub-angular of calcrete; moderately cemented; calcareous.	W>PL					6
						6.5 [-2.95]				6.45-6.75 m: CORE LOSS Inferred as above.						
7						6.8 [-3.25]	Czp		CH	Sandy CLAY High plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded, of quartz; trace gravel, fine grained, sub-angular of calcrete; moderately cemented; calcareous. 7.0 m, non-calcareous.	W~PL W>PL					7
										7.4-7.5 m, trace gravel, medium grained, rounded, of quartz. 7.5 m, becoming CLAY with Sand.	W<PL St W>PL F					
8										8.0-8.1 m, calcareous, trace gravel, fine grained of calcrete; moderately cemented.	W~PL F-St W>PL					
											W~PL					
9									CH	8.9 m, becoming CLAY; trace sand.	W<PL St					
						9.5 [-5.95]					W<PL					
10	20-01 21-01						Qsed		CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded.		H				

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



BOREHOLE LOG

Borehole No.:

BH09

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 268 003, N 7572 193
Ground Surface Elevation: +3.5m AHD **Total Depth:** 20.3m
Commenced: 20-Jan-20 **Completed:** 23-Jan-20
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged:	SD/DO	23-Jan-20
Processed:	DCH	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
11						11.0 [-7.60]		CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium-grained, sub-angular to sub-rounded.	W<PL	H	9.75	S	9.8 SPT: 14, 17, 27 [N=44] 91% Recovery, D07	11	
								CI-CH	10.5 m: fines becoming medium to high plasticity.							
						12.2 [-8.65]		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; non-calcareous; uncemented.	M-W	D	11.00	S	11.0 SPT: 14, 19, 22 [N=41] 100% Recovery, D08	12	
12						12.5 [-9.00]	Qsed		12.15-12.5 m: CORE LOSS Inferred as above.							12
						13.3 [-9.75]		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; non-calcareous; uncemented.			12.50	S	12.5 SPT: 8, 13, 21 [N=34] 100% Recovery, D09	13	
						13.8 [-10.30]		SP-SC	13.0 m: fines becoming medium plasticity. 13.2 m: with gravel, coarse grained, sub-rounded of calcrete. SAND Fine to medium grained, sub-angular to sub-rounded; brown; with clay, non-plastic; non-calcareous; uncemented.					13.25-14.5 m: PASS material characterisation samples taken (2 jars and 2 bags)	13	
						14.0 [-10.50]		SP-SC	13.8-14.0 m: CORE LOSS Inferred as above.			14.00	S	14.0 SPT: 8, 50/125 mm, * [] 100% Recovery, D10	14	
14						14.6 [-11.05]			14.55-14.75 m: CORE LOSS							14
						14.8 [-11.25]		SP-SC	SAND, as above.						At 14.75 m, core jammed in the rods. All rods were extracted from the ground to remove the core.	15
15						15.0										15

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



BOREHOLE LOG

Borehole No.:

BH09

Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 268 003, N 7572 193
Ground Surface Elevation: +3.5m AHD **Total Depth:** 20.3m
Commenced: 20-Jan-20 **Completed:** 23-Jan-20
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water
Hole Diameter (mm): 180

Logged: SD/DO 23-Jan-20
Processed: DCH 20-Oct-20
Checked:

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
						[11.50]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; trace gravel, fine to coarse grained, sub-angular of calcrete.	W	VD				
						15.4 [11.85]				15.35-15.5 m: CORE LOSS						
						15.5 [12.00]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; trace gravel, fine to coarse grained, sub-angular of calcrete; locally calcium carbonate stained white.	W>PL	H	15.50	S	15.5 SPT: 22, 30/110 mm + 15/10 mm, * □ 100% Recovery, D11	
16						15.8 [12.27]			CI	Sandy CLAY Medium plasticity; brown; sand is fine grained; trace gravel, fine to medium grained, sub-angular of calcrete; locally calcium carbonate stained pale grey.	W<PL				15.5-16.25 m: core sample fell out of the tube during extraction. Retrieved again by re-drilling over. 15.77-16.7 m: PASS material characterisation samples taken (2 jars and 2 bags)	16
						16.7 [13.20]				16.7-17.0 m: CORE LOSS					16.7-17.0 m, material was washed away due to core plugging the tube sampler.	
17						17.0 [13.50]			CI	Sandy CLAY Medium plasticity; brown; sand is fine grained; trace gravel, fine to medium grained, sub-angular of calcrete; locally calcium carbonate stained pale grey.			17.00	S	17.0 SPT: 26, 39/90 mm, * □ 100% Recovery, D12	17
						17.4 [13.90]				17.4-18.2 m: CORE LOSS Inferred as below.					17.4-17.75 and 17.75-18.2 m, core fell out of catcher and was washed away in the next run.	
						18.2 [14.70]			CI-CH	Sandy CLAY Medium to high plasticity; brown; sand is fine grained, locally calcium carbonate stained pale grey.	W~PL		18.50	S	18.5 SPT: 36, 30/60 mm, * □ 100% Recovery, D13	
18																18
19																19
20						20.0										20

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



BOREHOLE LOG

Borehole No.:

BH09

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 268 003, N 7572 193 Ground Surface Elevation: +3.5m AHD Total Depth: 20.3m Commenced: 20-Jan-20 Completed: 23-Jan-20 Contractor: J&S Drilling Driller: Brian
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical Flushing Fluid: Water Hole Diameter (mm): 180	Logged: SD/DO Processed: DCH Checked:	23-Jan-20 20-Oct-20
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Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
21	21-01					[-16.50] 20.3 [-16.75]	Qsed		CH	Sandy CLAY, as above.	W~PL	H	20.00	S	20.0 SPT: 29, 30/100 mm, * □	21
22										Termination Depth = 20.25m (Target Depth)						22
23																23
24																24
25																25



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH09A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 268 003, N 7572 195
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.5m AHD Total Depth: 9.0m
Job No.: 12516706	Commenced: 23-Jan-20 Completed: 23-Jan-20
	Contractor: J&S Drilling Driller: Brian

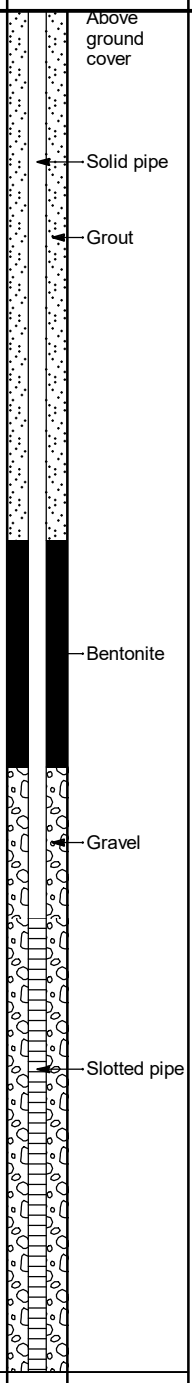
Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	23-Jan-20
Flushing Fluid: Water		Processed: DCH	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
1																1
2																2
3																3
4																4
5				Solid Augering												5
6																6
7																7
8																8
9					9.0 [-5.50]											9
10																10

1.5-2.5 m: material characterisation samples taken (2 jars and 2 bags).

ASS samples recovered at 0.25m, 0.5m, 0.75m, 1.25m, 1.5m, 1.75m, 2.0m, 2.25m, 2.5m, 2.75m, 3m, 3.5m, 3.75m, 4.0m, 4.25m, 4.5m, 4.75m, 5.0m.

ASS samples missed due to no core recovery at 1.0 m and 3.25 m.





STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH09B

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 268 003, N 7572 197
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.5m AHD Total Depth: 3.0m
Job No.: 12516706	Commenced: 23-Jan-20 Completed: 23-Jan-20
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	23-Jan-20
Flushing Fluid: Water		Processed: ZW	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
0				Solid Augering												Above ground cover Solid Pipe Bentonite	0
1																Gravel	1
2																Slotted Pipe	2
3						3.0 [+0.50]											3
4																	4
5																	5



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 266 494, N 7572 270
Ground Surface Elevation: +0.9m AHD **Total Depth:** 20.0m
Commenced: 25-Jan-20 **Completed:** 29-Jan-20
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 14 m, then Polymer
Hole Diameter (mm): 180 Auger / 123 PQ

Logged:	DO	29-Jan-20
Processed:	AT	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
0.0	25-01				0.9 [+0.05]	Qt		CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded of quartz and some carbonate; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete; moderately well cemented; Calcareous. From 0.5 m, Sandy CLAY.	W~PL	St	0.00	S	0.0 SPT: 1, 3, 6 [N=9] 73% Recovery U60 tube pushed from 0.0-0.5 m at a location approximately 2 m north of BH10. 62% Recovery.	Above ground cover Concrete	0.0
0.85-1.25									0.85-1.25 m: CORE LOSS							
1.3					1.3 [-0.35]			CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded; trace gravel pale brown, fine to medium grained, sub-angular to sub-rounded of calcrete.	W>PL				Shallow well BH10A installed ~2 m north of BH10 location.		1.3
1.6					1.6 [-0.70]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; clay has low plasticity; non-calcareous; uncemented.	M-W	MD					
1.9					1.9 [-1.00]			CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded of quartz; trace gravel, pale brown, fine to medium grained, sub-angular to sub-rounded of calcrete.	W>PL	VSt	2.00	S	2.0 SPT: 7, 8, 10 [N=18] 91% Recovery 2.5 m: pass quality assurance sample (QA05).		1.9
3.4						Qsed			From 3.4 m, trace gravel, becoming grey, fine to coarse grained, angular, tabular of quartz (?).			3.50	S	3.5 SPT: 9, 10, 11 [N=21] 100% Recovery 4.1-5.0 m: PASS material characterisation sample taken (2 jars and 2 bags)	Bentonite & grout mix	3.4
4.1-5.0															Solid Pipe	4.1-5.0
5.0					5.0					W<PL						5.0

GENERAL LOG: 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 266 494, N 7572 270
Ground Surface Elevation: +0.9m AHD **Total Depth:** 20.0m
Commenced: 25-Jan-20 **Completed:** 29-Jan-20
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 14 m, then Polymer
Hole Diameter (mm): 180 Auger / 123 PQ

Logged:	DO	29-Jan-20
Processed:	AT	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
						[4.10]		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-angular to sub-rounded; trace gravel, pale brown, fine to medium grained, sub-angular to sub-rounded of calcrete.		H	5.00	S	5.0 SPT: 10, 18, 29 [N=47] 80% Recovery			
						5.5 [4.60]		CH	CLAY High plasticity; brown; with sand, fine to medium grained; trace gravel, fine to coarse grained, sub-angular to sub-rounded of calcrete.	W~PL							
6	25-01 27-01					6.4 [5.45]			6.35-6.5 m: CORE LOSS								
						6.5 [5.60]		CH	CLAY High plasticity; brown; with sand, fine to medium grained; trace gravel, fine to coarse grained, sub-angular to sub-rounded of calcrete.			6.50	S	6.5 SPT: 10, 17, 31 [N=48] 73% Recovery			
7						7.0			From 7.0 m, trace fine to medium grained sand.	W>PL							
						7.4			From 7.4 to 7.6 m: Sandy CLAY bed.								
						7.7 [6.80]			7.7-8.0 m: CORE LOSS	W~PL							
8						8.0 [7.10]		CH	CLAY High plasticity; brown; with sand, fine grained; trace gravel, pale grey and pale brown, fine to coarse grained, sub-angular to sub-rounded of calcrete.	W>PL		8.00	S	8.0 SPT: 22, 38, 30/80 mm [] 42% Recovery			
						8.75			From 8.75 m, grading to Sandy CLAY.	W~PL							
						8.9 [8.00]			8.9-9.5 m: CORE LOSS	M	VD						
9						9.5 [8.60]		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete.			9.50	S	9.5 SPT: 19, 41, 30/65 mm [] 100% Recovery			
10						10.0											

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 266 494, N 7572 270
Ground Surface Elevation: +0.9m AHD **Total Depth:** 20.0m
Commenced: 25-Jan-20 **Completed:** 29-Jan-20
Contractor: J&S Drilling **Driller:** Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 14 m, then Polymer
Hole Diameter (mm): 180 Auger / 123 PQ

Logged:	DO	29-Jan-20
Processed:	AT	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)	
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
11					[9.10]		SC	Clayey SAND Fine to medium-grained, sub-angular to sub-rounded; brown; low to medium plasticity fines; trace gravel, fine to medium grained, sub-angular to sub-rounded of calcrete, well-cemented.	M-W	VD							
					10.4 [9.50]		CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained; trace gravel, pale brown, fine to medium grained, sub-angular to sub-rounded of calcrete, well-cemented.	W>PL	H							
					10.7 [9.80]				M	VD							
					11.0 [10.10]		SC	10.7-11.0 m: CORE LOSS Clayey SAND Fine to medium grained; brown; sub-angular to sub-rounded; clay has low to medium plasticity; with gravel, pale brown and pale grey, fine to coarse grained, sub-angular to sub-rounded of calcrete.				11.00	S	11.0 SPT: 36, 30/100 mm, * [] 100% Recovery	Slotted Pipe		
					11.5 [10.60]		CI-CH	From 11.25 to 11.4 m, Sandy CLAY Sandy CLAY Medium to high plasticity; brown; sand is fine to medium grained; trace gravel, pale grey, fine to medium grained, sub-angular to sub-rounded of quartz and calcrete.	W>PL	H					Gravel		
					12.2 [11.30]			12.2-12.5 m: CORE LOSS. Inferred as below	M-W	VD							
					12.5 [11.60]	Qsed	SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown, locally mottled pale grey; clay has low plasticity; trace gravel, fine to medium grained, sub-rounded of quartz.				12.50	S	12.5 SPT: 18, 31, 30/70 mm [] 100% Recovery	Bentonite		
					13.0 [12.10]		CI	Sandy CLAY (locally Clayey SAND) Medium plasticity; brown; sand is fine to medium grained; trace fine to medium grained, sub-rounded of quartz and calcrete.	W>PL	H							
					13.9 [13.10]		SC	13.9-14.0 m: CORE LOSS. Inferred as below. Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; clay has low plasticity; trace gravel, fine to medium grained of calcrete and rounded, black claystone gravel.	M-W	VD		14.00	S	14.0 SPT: 11, 25, 40 [N=65] 96% Recovery	Gravel		
					14.8 [13.85]			From 14.6 m, with sandstone cobbles.									
15					15.0		14.75-15.0 m: CORE LOSS. Inferred as above.										

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10

Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 494, N 7572 270
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.9m AHD Total Depth: 20.0m
Job No.: 12516706	Commenced: 25-Jan-20 Completed: 29-Jan-20
	Contractor: J&S Drilling Driller: Brian

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	29-Jan-20
Flushing Fluid: Water to 14 m, then Polymer		Processed: AT	20-Oct-20
Hole Diameter (mm): 180 Auger / 123 PQ		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
16				PQ Coring		14.75-15.0 m: CORE LOSS. Inferred as below.				M-W	VD			14.0-15.5m, 50% recovery due to cobbles plugging the core catcher during drilling.			
						15.5 [14.60]	Qsed	SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown, locally mottled pale grey; low plasticity fines; trace gravel, fine to medium grained, sub-angular of carbonate, well cemented. 15.9 m: Sandstone cobble intersected.			15.50	S	15.5 SPT: 16, 41, 19/50 mm [14/50 mm + 5 HB] 100% Recovery			
						16.0 [16.10]			16.0-17.0 m: CORE LOSS. Inferred as above.					15.5-17.0 m, 33% recovery due to plugging of the core catcher during drilling.			
17						17.0 [16.10]		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; low plasticity fines; with sandstone cobbles; trace gravel, fine to medium grained, sub-rounded of quartz, claystone and carbonate.			17.00	S	17.0 SPT: 17, 29, 38 [N=67] 100% Recovery			
18						17.9			Start of coring at 17.9m. Continued next sheet in Rock Core format.								
19																	
20																	

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20

Hole collapse



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole No.: **BH10**

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 266 494, N 7572 270 Ground Surface Elevation: +0.9m AHD Total Depth: 20.0m Commenced: 25-Jan-20 Completed: 29-Jan-20 Contractor: J&S Drilling Driller: Brian
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical Drilling Fluid: Polymer Core Diameter (mm): 85	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Logged:</td> <td style="width: 20%;">DO</td> <td style="width: 60%;">29-Jan-20</td> </tr> <tr> <td>Processed:</td> <td>AT</td> <td>20-Oct-20</td> </tr> <tr> <td>Checked:</td> <td></td> <td></td> </tr> </table>	Logged:	DO	29-Jan-20	Processed:	AT	20-Oct-20	Checked:		
Logged:	DO	29-Jan-20								
Processed:	AT	20-Oct-20								
Checked:										

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VH	EH	TCR (%)	RQD (%)	F (fractures/m)				
16																						16
17																						17
18						17.9 [-17.00]			<i>Resuming in Core Log format 17.9m.</i> SILTSTONE Grey, stained brown, predominantly fine-grained, with some medium grains; non-calcareous. From 18.5 m, brown, stained grey.	We					100	100			18.0 m: DB 18.08 m: DB 18.22 m: DB 18.27 m: DB 18.31 m: DB 18.41 m: DB 18.5 m: DB 18.57 m: JT, 45°, irregular, smooth. 18.59 m: DB 18.73 m: DB			18
19				PQ Coring			Qsed		From 19.35 to 19.40, weakly cemented Sandy CLAY.	Wk-We					100	83	0		19 m: DB			19
20	29-01					20.0			From 19.8 m, weakly cemented Sandy CLAY. Termination Depth = 20.00m	Wk									19.8 m: DB			20

COREHOLE: 12516706 GINT.GPJ GHD\LB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10A

Sheet 1 of 2

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 494, N 7572 272
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.9m AHD Total Depth: 5.0m
Job No.: 12516706	Commenced: 25-Jan-20 Completed: 29-Jan-20
	Contractor: J&S Drilling Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	29-Jan-20
Flushing Fluid: Water		Processed: ZW	20-Oct-20
Hole Diameter (mm): 180		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1				Solid Augering												1	
2																	2
3																	3
4																	4
5						5.0											5

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10A

Sheet 2 of 2

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 266 494, N 7572 272
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+0.9m AHD
	Phase 2 Site Investigation	Total Depth:	5.0m
Job No.:	12516706	Commenced:	25-Jan-20
		Completed:	29-Jan-20
		Contractor:	J&S Drilling
		Driller:	Alan

Rig Type :	Jacro 350 drill rig on Mangrove Buggy	Inclination:	Vertical
Flushing Fluid:	Water	Logged:	DO
Hole Diameter (mm):	180	Processed:	ZW
		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6						[4.10]											6
7																	7
8																	8
9																	9
10																	10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10B

Sheet 1 of 2

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

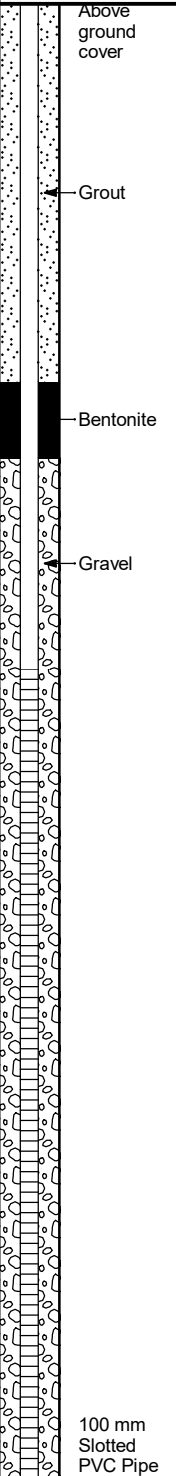
Coordinates: E 266 494, N 7572 273
Ground Surface Elevation: +0.9m AHD **Total Depth:** 17.0m
Commenced: 19-Mar-20 **Completed:** 20-Mar-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Bentonite
Hole Diameter (mm): 150

Logged:	SD	20-Mar-20
Processed:	WR	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1																	1
2																	2
3																	3
4																	4
5				Wash Boring													5
6																	6
7																	7
8																	8
9																	9
10																	10

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20





STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH10B

Sheet 2 of 2

Client: K + S Salt Australia Pty Ltd	Coordinates: E 266 494, N 7572 273	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.9m AHD	Total Depth: 17.0m
Job No.: 12516706	Commenced: 19-Mar-20	Completed: 20-Mar-20
	Contractor: J&S Drilling Driller: Alan	

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SD	20-Mar-20
Flushing Fluid: Bentonite		Processed: WR	20-Oct-20
Hole Diameter (mm): 150		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
11																11
12																12
13				Wash Boring												13
14																14
15																15
16															Backfill	16
17					17.0 [-16.10]											17
18																18
19																19
20																20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH11

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 260 260, N 7569 715
Ground Surface Elevation: +1.2m AHD **Total Depth:** 19.5m
Commenced: 07-Mar-20 **Completed:** 08-Mar-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	DO	08-Mar-20
Processed:	ZW	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
07-03																
1					[+1.10]		SP-SM-CI	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; pale brown; with silt. Sandy CLAY (borderline Clayey SAND) Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded of quartz; trace fine to medium grained, sub-rounded of calcrete (moderately to well CaCO ₃ cemented sandstone).	M	L	0.00	S	0.0 SPT: 2, 3, 3 [N=6] Recovery= 350/450 mm MC: Material Characterisation From 0.0 m, drilled using "prickly pear" drill bit.			
2					1.6 [-0.40]	Qt	SC	Clayey Gravelly SAND Fine to coarse grained, sub-angular to sub-rounded of carbonate and quartz; pale brown; gravel is fine to coarse grained, sub-angular to sub-rounded of calcrete (well CaCO ₃ cemented sandstone); trace fines; trace shell fragments (gravel sized).	W	MD	1.50	S	1.5 SPT: 9, 12, 8 [N=20] Recovery= 260/450 mm			
3											2.00	D	MC Sample: 2 x Jar Samples, 2 x Sample Bags	Grout		
4											3.00	S	3.0 SPT: 4, 8, 6 [N=14] 100% Recovery	50 mm Solid PVC Pipe		
5					3.8 [-2.60]	Qsed	CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded of quartz; trace gravel, fine to coarse grained, sub-rounded to rounded of calcrete (well CaCO ₃ cemented sandstone).	W-PL	H	3.80	D	MC Sample: 2 x Jar Samples, 2 x Sample Bags			
5					5.0						4.50	S	4.5 SPT: 9, 15, 19 [N=34] Recovery= 310/450 mm	Bentonite		

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH11

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 260 260, N 7569 715
Ground Surface Elevation: +1.2m AHD **Total Depth:** 19.5m
Commenced: 07-Mar-20 **Completed:** 08-Mar-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	DO	08-Mar-20
Processed:	ZW	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
						[3.80]			Cl-CH	Sandy CLAY Medium to high plasticity; brown, locally mottled grey; sand is fine grained of quartz; trace gravel, fine to medium grained, sub-angular to sub-rounded, of black iron cemented claystone and calcrete.	W<PL	H			From 5.0m, switched drill bit to "surface set"		
6						6.5 [-5.30]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded of quartz; brown; low plasticity fines; trace gravel, fine to medium grained, sub-angular to rounded of gypsum, iron cemented and calcrete.	M-W	MD-D	6.00	S	6.0 SPT: 8, 11, 16 [N=27] Recovery= 270/450 mm 6.5-7.3m, assumed medium dense to dense.	Gravel	6
7						7.3 [-6.10] 7.4			Cl-CH	Sandy CLAY as below.	W~PL	H	7.50				
						[6.30]	Qsed		Cl-CH	7.4 m to 7.5 m: CORE LOSS. Inferred as below.							
									Cl-CH	Sandy CLAY Medium to high plasticity; brown; sand is fine grained of quartz; trace gravel, fine to medium grained, of gypsum, black iron cemented claystone and calcrete.	W<PL	H		S	7.5 SPT: 10, 19, 31 [N=50] Recovery= 380/450 mm	Slotted PVC Pipe	
8									CH	From 8.0 m, clay, with fine grained sand; trace gravel, fine to medium grained, sub-angular to sub-rounded of gypsum claystone, iron cemented and calcrete.							
9														S	9.0 SPT: 15, 25, 32 [N=57] Recovery= 250/450 mm	Bentonite	9
10	07-03 08-03					10.0											10

GENERAL LOG 12516706 GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole No.: **BH11**
Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 260 260, N 7569 715 Ground Surface Elevation: +1.2m AHD Total Depth: 19.5m Commenced: 07-Mar-20 Completed: 08-Mar-20 Contractor: J&S Drilling Driller: Daniel
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical	Logged: DO	08-Mar-20
Drilling Fluid: Polymer	Processed: ZW	20-Oct-20
Core Diameter (mm): 85	Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)	
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VEH	TCR (%)	RQD (%)	F (fractures/m)	Defect Log					
11																						11	
12																						12	
13						13.0 [-11.80]			<i>Resuming in Core Log format 13m.</i>													13	
14				PQ Coring			Cased	[Horizontal Line Pattern]	MUDSTONE Fine grained; Brown, locally mottled grey; trace fine to coarse grained, sub-angular to sub-rounded of calcrete and iron cemented nodules. Borderline soil strength.	Mo-We					100	100				0	13.45 m: DB 13.5 SPT: 18, 36, 17/55 [N=R] [12/55mm + 5 HB] Recovery= 290mm 13.86-14.0 m: DB	[Gravel Pattern]	14
15						15.0		[Horizontal Line Pattern]							100	100					14.1 m: DB 14.2 m: DB	[Gravel Pattern]	15

COREHOLE 12516706 GINT.GPJ GHD\LB.GDT 20-10-20

Gravel Backfill



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole No.: **BH11**

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 260 260, N 7569 715	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.2m AHD	Total Depth: 19.5m
Job No.: 12516706	Commenced: 07-Mar-20	Completed: 08-Mar-20
	Contractor: J&S Drilling	Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	08-Mar-20
Drilling Fluid: Polymer		Processed: ZW	20-Oct-20
Core Diameter (mm): 85		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation	Estimated Rock Strength				Rock Core Quality				Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VEH	TCR (%)	RQD (%)	F (fractures/m)	Defect Log			
						[13.80]			Sandy CLAY Medium to high plasticity; brown, locally mottled grey; sand is fine to medium grained of quartz, W>PL.	Mo								15.0 m: DB 15.0 SPT: 17, 30, 32/125mm [N=R] [27/125mm + 5 HB] Recovery= 400mm 15.45 m: DB			
16						15.5 [14.30]			SANDSTONE Fine to medium grained; brown, locally mottled grey. From 16.0 m, locally stained white.	Mo-We			100	100				15.95 m: DB 16.14 m: DB 16.24 m: DB 16.36-16.4 m: DB 16.82 m: DB 17.0 m: DB 17.14 m: DB 17.24 m: DB 17.28 m: DB 17.46 m: DB 17.69 m: DB 18.0 m: DB			
17													100	100	0						
18									From 18.0 m, with white/pale grey (non-CaCO ₃) cemented clay veins / localised mottling. From 18.5 m, trace gravel, fine grained, rounded, dark brown.												
19																					
19.5	08-03					19.5 [18.30]			Termination Depth = 19.50m												
20																					

COREHOLE: 12516706 GINT.GPJ GHD\B.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

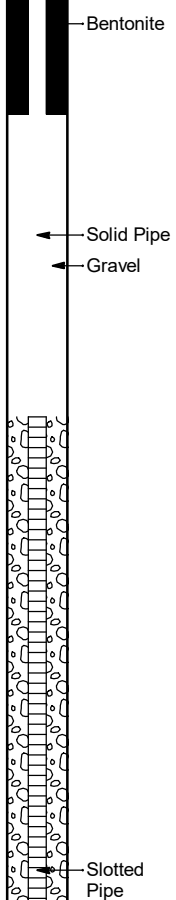
BH11A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 260 263, N 7569 718
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.2m AHD Total Depth: 4.6m
Job No.: 12516706	Commenced: 09-Mar-20 Completed: 10-Mar-20
	Contractor: J&S Drilling Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	10-Mar-20
Flushing Fluid: Polymer		Processed: WR	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
0																	
1																	
2				PQ Coring													
3																	
4																	
4.6						4.6 [-3.40]											
5																	



GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH12

Sheet 1 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 260 263, N 7569 718
Ground Surface Elevation: +8.7m AHD **Total Depth:** 19.3m
Commenced: 14-Feb-20 **Completed:** 28-Feb-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	DO	28-Feb-20
Processed:	ZW	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
14-02					+8.60		SM	Topsoil - Silty SAND Fine to medium grained; red-brown; silt is non-plastic; non-calcareous.	D	MD	0.00		SP 0.0-0.1m	Above ground cover Concrete		
					0.5 +8.25		SM	Silty SAND Fine to medium grained; red-brown; silt is non-plastic; non-calcareous; uncemented. 0.45 m to 1.2 m: CORE LOSS. Inferred as above.				U(63)	U63 tube pushed from 0.0-0.5m ASS samples recovered at 0.25m, 0.5m, 1.35m, 1.5m, 1.75m, 3.0m, 3.25m, 4.0m, 4.25m, 4.5m, 4.75m, 5.0m MC: Material Characterisation			
					1.2 +7.50		SM	Silty SAND Fine to medium grained; red-brown; silt is non-plastic; non-calcareous; uncemented.	M		1.20		D	1.2-1.5m: MC sample	Backfill	
					2.0 +6.75			1.95 m to 3.0 m: CORE LOSS. Inferred as below.			1.50		S	1.5 SPT: 2, 11, 21 [N=32] 93% Recovery		
					3.0 +6.70		SM	Silty SAND Fine to medium grained; red-brown; silt is non-plastic; non-calcareous; uncemented.			3.00		S	3.0 SPT: 2, 5, 15 [N=20] 89% Recovery	Solid Pipe	
					3.5 +5.25			3.45 m to 4.0 m: CORELOSS. Inferred as below.	W	L						
14-02 25-02					4.0 +4.60		SM	Silty SAND. As above.						4.0m, Drilling suspended for 10 days due to weather. Sample QA12 at 4.25 m	Bentonite	
							SP- SM	Carbonate SAND (borderline Silty SAND) Fine to medium grained, sub-angular to sub-rounded of carbonate; brown; with silt; trace gravel, fine to medium grained, sub-rounded to rounded calcrete (weakly to moderately, CaCO ₃ cemented sandstone).	W	L	4.50		S	4.5 SPT: 2, 4, 5 [N=9] 80% Recovery		

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH12

Sheet 2 of 4

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 260 263, N 7569 718
Ground Surface Elevation: +8.7m AHD **Total Depth:** 19.3m
Commenced: 14-Feb-20 **Completed:** 28-Feb-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged:	DO	28-Feb-20
Processed:	ZW	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
					5.3 [+3.40]		SP-SM			W	L					
					5.9 [+2.70]		SP-SM	Carbonate Gravelly SAND Fine to medium grained, sub-angular to sub-rounded of carbonate; brown; gravel is fine to medium grained, sub-angular to sub-rounded of calcrete (weakly to strongly CaCO ₃ cemented sandstone); with silt, non-plastic.	W	L						
6								5.9 m to 6.0 m: CORE LOSS.								
	25-02 27-02			PQ Coring			SM	Carbonate Silty SAND (borderline SAND) Fine to medium grained, sub-angular to sub-rounded of carbonate; brown; non-plastic fines; with gravel, fine to medium grained, sub-angular to sub-rounded of concrete (moderately to strongly CaCO ₃ cemented sandstone) 6.45 m to 6.75 m: Gravelly Silty SAND.			6.00 6.50	S D	6.0 SPT: 2, 3, 4 [N=7] 93% Recovery MC Sample: 2 x Jar Samples, 2 x Sample Bags	Gravel Slotted Pipe	6	
7					7.2 [+1.50]		SM	Silty SAND Fine to medium grained, sub-angular to sub-rounded of quartz and carbonate; brown; silt is non-plastic to low plasticity; trace shell fragments, gravel sized, fine grained; calcareous.	MD		7.50	S	7.5 SPT: 4, 6, 7 [N=13] 73% Recovery		7	
8								From 8.1 m, trace gravel, fine to medium grained, sub-angular to sub-rounded of sandstone and calcrete (moderately to strongly CaCO ₃ cemented sandstone).								
9											9.00	S	9.0 SPT: 8, 8, 8 [N=16] 76% Recovery		9	
10					10.0											10



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH12

Sheet 3 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 260 263, N 7569 718
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +8.7m AHD Total Depth: 19.3m
Job No.: 12516706	Commenced: 14-Feb-20 Completed: 28-Feb-20
	Contractor: J&S Drilling Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	28-Feb-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: ZW	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
11				PQ Coring		[+1.30]		SM	Silty SAND Fine to medium grained, sub-angular to sub-rounded of quartz; brown; silt has low plasticity.	M-W	MD			10.50 S	10.5 SPT: 7, 8, 10 [N=18] 93% Recovery	Gravel Bentonite	11
12							Oe		From 11.8 m, trace gravel, black, fine to coarse grained, sub-rounded of claystone; and trace gravel, fine to medium grained, sub-rounded to rounded of quartz and gypsum.	M	D			12.00 S	12.0 SPT: 7, 14, 20 [N=34] 91% Recovery		12
13														12.50 D	12.5-13.0m: MC Sample : 2 x Jar Samples, 2 x Sample Bags)		13
14	27-02 28-02					13.4 [-4.70]		CI	Sandy CLAY Medium plasticity; brown; sand is fine grained, sub-angular to sub-rounded of quartz; trace gravel, black, fine to medium grained, sub-rounded of claystone.	W-PL	VSt			13.50 S	13.5 SPT: 8, 10, 10 [N=20] 91% Recovery		14
15						15.0		SP-SM CH	Between 14.15 m and 14.3 m, bed of sand, with silt. From 14.3 m, increasing clay content.							Gravel	15

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH12

Sheet 4 of 4

Client: K + S Salt Australia Pty Ltd	Coordinates: E 260 263, N 7569 718
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +8.7m AHD Total Depth: 19.3m
Job No.: 12516706	Commenced: 14-Feb-20 Completed: 28-Feb-20
	Contractor: J&S Drilling Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	28-Feb-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: ZW	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
16						[6.30]	Qe	CH	Sandy CLAY High plasticity; brown; sand is fine grained, sub-angular to sub-rounded of quartz; trace gravel, black, fine to medium grained, sub-rounded of claystone; with dry clasts of sandy clay.	W-PL	VSt	15.00	S	15.0 SPT: 6, 9, 12 [N=21] 98% Recovery		16	
17				PQ Coring		16.5 [-7.80] 16.7 [-8.04]	Qsed	SM	Silty Gravelly SAND Fine to medium grained, sub-angular to sub-rounded of quartz; brown; silt has low to medium plasticity; gravel is fine to coarse grained, sub-rounded to rounded of claystone and quartz. 16.74 m to 18.0 m: CORE LOSS. Recovered as gravel, medium to coarse grained, sub-rounded to rounded of quartz and claystone. Inferred as above.	W	VD	16.50	S	16.5 SPT: 42, 30/90 mm, * [N=R] 96% Recovery		17	
18						18.0 [-9.30] 18.2 [-9.50]		SM	Silty Gravelly SAND. As above.			18.00	S	18.0 SPT: 29, 38, 20/50 mm [N=R] [15/50 mm + 5 HB] 86% Recovery	Hole collapse	18	
19						18.4 [-9.70]		CI-CH	Gravelly CLAY Medium plasticity; brown; gravel is fine to medium grained, sub-angular to sub-rounded of quartz and calcrete (strongly CaCO ₃ cemented Sandstone). Sandy CLAY Medium to high plasticity; brown mottled black (iron); sand is fine grained; trace gravel, white, fine to medium grained, sub-angular of calcrete.	W-PL	H	19.00	S	19.0 SPT: 29, 30/100mm, * [] Recovery= 100%		19	
20	28-02					19.3 [-10.55]			Termination Depth = 19.25m (Target Depth)								20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH13

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 735, N 7563 998
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +6.2m AHD Total Depth: 16.5m
Job No.: 12516706	Commenced: 10-Feb-20 Completed: 11-Feb-20
	Contractor: J&S Drilling Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	11-Feb-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: WR	20-Oct-20
Hole Diameter (mm): 123		Checked: <i>[Signature]</i>	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
10-02									0.0 to 0.65 m: CORE LOSS. Inferred as SILT.	-	-			Water return lost from 0.0 to 0.7 m	Above ground cover Backfill Clay 0.0-0.5m	
1					0.7 [+5.55]		ML	Sandy SILT Low plasticity; red-brown with minor black mottling; sand is fine to medium grained; weakly cemented.	W<PL VSt					Water return gained at ~0.7 m, and drilling becomes harder		1
2														1.3 to 1.5m: Material characterisation samples taken	Bentonite 0.5-2.0m	
														1.5 SPT: 7, 11, 15 [N=26] 100% recovery		
3							CL	Sandy CLAY Low plasticity; red-brown; sand is fine to medium grained; non-calcareous.						3.0 SPT: 5, 11, 16 [N=27] 100% recovery	Top of Gravel 2m	
														3.3 to 3.5m: Material characterisation samples taken		
4							SM	Silty SAND Fine to medium grained; red-brown; silt is non-plastic; calcareous.	M MD					From 3.8 m: Weak HCl reaction		
														4.0 to 4.2m: Material characterisation samples taken		
5							SM	Silty SAND Fine to medium grained; red-brown; silt is non-plastic; calcareous.						4.5 SPT: 4, 9, 12 [N=21] 89% recovery	Screen 3-6m	

GENERAL LOG 12516706.GINT.GPJ_GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH13

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 271 735, N 7563 998 Ground Surface Elevation: +6.2m AHD Total Depth: 16.5m Commenced: 10-Feb-20 Completed: 11-Feb-20 Contractor: J&S Drilling Driller: Alan
---	--

Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical	Logged:	SG	11-Feb-20
Drilling Fluid: Polymer	Processed:	WR	20-Oct-20
Core Diameter (mm): 85	Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VH	EH	TCR (%)	RQD (%)	F (fractures/m)				
6																						6
7																						7
8						8.1 [-1.90]			<i>Resuming in Core Log format 8.1m.</i>	Wk-Mo										HCl does not react on silty sandstone, but does on calcarenite.		8
9			PQ				Qsed	[Pattern]	Calcareous Silty SANDSTONE Fine grained; red-brown mottled white; locally calcarenite.	Wk-VWk			100	100	0				8.8 m, DB		[Pattern]	9
10						10.0		[Pattern]	9.5 to 10.15 m: Zones of very weakly cemented material with no rock strength.	Wk-Mo			77	33				20	8.95 m, DB 9.0 SPT: 22, 35, 29 [N=64] Recovery= 100%	Material is readily peeled with knife and can be broken by hand.	[Pattern]	10

COREHOLE: 12516706 GINT.GPJ GHD\LB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH13

Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 735, N 7563 998	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +6.2m AHD	Total Depth: 16.5m
Job No.: 12516706	Commenced: 10-Feb-20	Completed: 11-Feb-20
	Contractor: J&S Drilling	Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: SG	11-Feb-20
Drilling Fluid: Polymer		Processed: WR	20-Oct-20
Core Diameter (mm): 85		Checked:	

Depth Scale (m)	Daily Progress/Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation <small>V L M H V H EH</small>	Estimated Rock Strength <small>L M H V H EH</small>	Rock Core Quality			Defect Log	Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							Water	TCR (%)	RQD (%)					
					[3.80]													
					10.2 [-3.95]		X	Calcareous Silty SANDSTONE Fine grained; red-brown mottled white; locally calcarenite. 10.15 to 10.5 m: CORE LOSS.				77	83			Broken zone 10.0-10.15m.		
11					10.5 [-4.30]			Calcareous Silty SANDSTONE Fine grained; red-brown mottled white; locally calcarenite; with mica sand.	Wk-Mo					0		10.5 SPT: 10, 23, 30/70mm [N=53/220mm] Recovery= 82%		
					12.0 [-5.80]			From 11.8 m: Trace gravel, coarse grained, rounded, of quartz.	Wk			100	75					
12					12.2 [-6.00]			Sandy Clayey GRAVEL Fine to coarse grained; rounded; of mixed lithology including quartz and Banded Iron Formation; clay has low plasticity; sand is fine to medium grained.	Mo							12.0 SPT: 23/80mm Recovery= 4% with 5 consecutive blows with no penetration.		
			PQ					Carbonate Sandy CLAY Medium to high plasticity; red-brown mottled pale grey; sand is fine to coarse grained; trace gravel and cobbles of calcrete (with CaCO ₃ cemented of claystone); moist; with calcareous veins, 1 mm thick.								12.0m: Lost water return. 12.5m: Water returned and is salty.		
																13.5 SPT: 27, 30/100mm [N=30/100mm] Recovery= 51%		
13																		
14																		
15																		

Gravel Backfill
6.7-16.5m

COREHOLE: 12516706.GINT.GPJ GHD\LIB.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole No.: **BH13**
Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 271 735, N 7563 998 Ground Surface Elevation: +6.2m AHD Total Depth: 16.5m Commenced: 10-Feb-20 Completed: 11-Feb-20 Contractor: J&S Drilling Driller: Alan
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Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical	Logged:	SG	11-Feb-20
Drilling Fluid: Polymer	Processed:	WR	20-Oct-20
Core Diameter (mm): 85	Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VEH	TCR (%)	RQD (%)	F (fractures/m)	Defect Log				
16				PQ		Qsed		Carbonate Sandy CLAY Medium to high plasticity; red-brown mottled pale grey; sand is fine to coarse grained; trace gravel and cobbles of calcrete (with CaCO ₃ cemented of claystone); moist; with calcareous veins, 1 mm thick. From 15.0 m: Increasing sand content.	Mo									15.0 SPT: 29, 50/150mm [N=50/150mm] Recovery= 67% (ie 30 blows for less than 100mm penetration)		16		
16.5					16.5 [-10.30]			Termination Depth = 16.50m											Base of Hole 16.5m	17		
17																				17		
18																				18		
19																				19		
20																				20		



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH14

Sheet 1 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 259 892, N 7565 531
Ground Surface Elevation: +1.0m AHD **Total Depth:** 20.0m
Commenced: 01-Mar-20 **Completed:** 03-Mar-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged: DO 03-Mar-20
Processed: ZW 20-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
01-03								SC	Clayey SAND (borderline Sandy CLAY) Fine to medium grained, sub-angular to sub-rounded of quartz; brown; clay has low to medium plasticity.	M-W	VL/S	0.00	S	MC: Material Characterisation 0.0 SPT: 1, 2, 1 [N=3] 80% Recovery From surface, hole drilled using a prickly pear drill bit.		Above ground cover	
					0.7 [+0.30]			SP-SM	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; brown; with silt.	W	VL						
1					1.0 [+0.00]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey-brown; clay has low to medium plasticity.		L-MD	1.00	D	Run 1 to 1.25 m: push rods into ground. MC Sample : 2 x Jar Samples and 2 x Sample Bags			
2												1.50	S	1.5 SPT: 4, 4, 6 [N=10] 89% Recovery		Grout	
3					2.9 [-1.90]			SM	Silty SAND Fine to medium grained, sub-angular to sub-rounded of quartz; grey-brown; silt has low plasticity; trace gravel, pale brown, fine to medium grained, sub-angular to sub-rounded of calcrete (weakly to strongly CaCO ₃ cemented sandstone).		MD	3.00	S	3.0 SPT: 3, 5, 7 [N=12] 82% Recovery		Solid Pipe	
4								SP/SM	From 4.0 m, sand/silty sand, of quartz and some carbonate sand.					Pass sample QA14 at 4.25 m			
5	01-03				4.6 [-3.60]			SC	Gravelly Clayey SAND Fine to medium grained, sub-angular to sub-rounded of quartz; brown; clay and gravel as below.			4.50	S	4.5 SPT: 7, 12, 16 [N=28] 87% Recovery			

GENERAL LOG 12516706 GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH14

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 259 892, N 7565 531
Ground Surface Elevation: +1.0m AHD **Total Depth:** 20.0m
Commenced: 01-Mar-20 **Completed:** 03-Mar-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 123

Logged: DO 03-Mar-20
Processed: ZW 20-Oct-20
Checked:

Depth Scale (m)	Daily Progress/ Observations				Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method												
02-03					[-4.00]	Qt	SC	Gravelly Clayey SAND Fine to medium grained, sub-angular to sub-rounded quartz; brown; clay has low plasticity; gravel is fine to medium grained, sub-angular (clasts of clayey sand/sandy clay and trace calcrete).	W	MD	5.00	D	5.0-5.5 m, MC Sample : 2 x Jar Samples and 2 x Sample Bags			
6					6.0 [-6.00]		CH	CLAY High plasticity; brown; trace fine grained sand; trace gravel, fine to medium grained, sub-angular of calcrete (strongly CaCO ₃ cemented sandstone).	W<PL	H	6.00	S	6.0 SPT: 11, 21, 39 [N=60] 60% Recovery			
7					7.3 [-6.30]		Cl-CH	Sandy CLAY Medium to high plasticity; brown, locally stained pale grey; sand is fine grained; with gravel, fine to medium grained, sub-angular to sub-rounded of calcrete and sandstone (strongly CaCO ₃ cemented sandstone).		VSt	7.50	S	7.5 SPT: 10, 11, 16 [N=27] 96% Recovery			
8						Qsed		From 8.0 m, brown, locally stained pale grey and locally spotted black (iron).			8.00	D	8.0-8.5m, MC Sample : 2 x Jar Samples and 2 x Sample Bags			
9										H	9.00	S	9.0 SPT: 9, 14, 21 [N=35] 91% Recovery	Bentonite		
10					10.0											



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH14

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 259 892, N 7565 531	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.0m AHD	Total Depth: 20.0m
Job No.: 12516706	Commenced: 01-Mar-20	Completed: 03-Mar-20
	Contractor: J&S Drilling	Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	03-Mar-20
Flushing Fluid: Water to 5 m, then Polymer		Processed: ZW	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)	
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method														
11					[9.00]			Cl-CH	Sandy CLAY Medium to high plasticity; brown, locally stained pale grey and locally spotted black (iron); sand is fine grained; with gravel, fine to medium grained, sub-angular to sub-rounded of calcrete and sandstone (strongly CaCO ₃ cemented sandstone).	W<PL H		10.50	S	10.5 SPT: 12, 21, 32 [N=53] 80% Recovery		Gravel	11	
12					11.1				<i>Start of coring at 11.1m. Continued next sheet in Rock Core format.</i>									12
13																	13	
14																	14	
15																	15	



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH14

Sheet 4 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 259 892, N 7565 531	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.0m AHD	Total Depth: 20.0m
Job No.: 12516706	Commenced: 01-Mar-20	Completed: 03-Mar-20
	Contractor: J&S Drilling	Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	DO	03-Mar-20
Drilling Fluid: Polymer		Processed: ZW	ZW	20-Oct-20
Core Diameter (mm): 85		Checked:		

Depth Scale (m)	Daily Progress/Observations				Depth (m) [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation <small>VL M H VEH</small>	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)		
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method						Water	TCR (%)	RQD (%)	F (fractures/m)	Defect Log	J	L	M					H	VEH
11					11.1 [-10.10]			Resuming in Core Log format 11.1m.												11			
12							SANDSTONE Fine to medium grained; brown, stained pale grey, locally stained white (CaCO ₃) and black (iron); locally CaCO ₃ cemented. From 11.5 m to 11.55 m, well iron cemented band.	Mo-We				100	100					11.18 m: DB 11.33 m: DB 11.58 m: DB 11.67 m: DB 11.78 m: DB 11.88 m: DB 11.93-12.0 m: DB 12.0 SPT: 20, 45/140mm, * [N=R] 100% Recovery	Slotted Pipe	12			
13							From 12.25 m, brown, loss of CaCO ₃ cementation; addition of trace gravel, fine grained, black, rounded, of claystone.					100	100	0				From 12.35-12.5m, void infilled with pale grey sandy clay, 10mm thick. 12.45 m: DB 12.65 m: DB 12.76 m: DB			13		
14					13.5 [-12.50]		CLAY Medium to high plasticity; brown, stained pale grey; with fine grained sand; with gravel, fine to medium grained, sub-angular to sub-rounded, of white gypsum, black iron cemented and pale grey mudstone.	Mo										13.27 m: DB 13.39 m: DB 13.47 m: DB 13.5 m: DB	Hole collapse	14			
15					15.0				Mo-We Mo Mo-We Mo								13.8-13.85 m: DB 13.95 m: DB 14.2-14.5 m: DB			15			

COREHOLE: 12516706 GINT.GPJ GHD\LB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH14

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 259 892, N 7565 531
Ground Surface Elevation: +1.0m AHD **Total Depth:** 20.0m
Commenced: 01-Mar-20 **Completed:** 03-Mar-20
Contractor: J&S Drilling **Driller:** Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged:	DO	03-Mar-20
Drilling Fluid: Polymer		Processed:	ZW	20-Oct-20
Core Diameter (mm): 85		Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/Cementation	Estimated Rock Strength				Rock Core Quality			Defect Log	Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							TCR (%)	RQD (%)	F (fractures/m)	Defect Log	TCR (%)	RQD (%)	F (fractures/m)					
16	02-03 03-03			PQ Coring		16.0 [-14.00]			CLAY Medium to high plasticity; brown, stained pale grey; with fine grained sand; with gravel, fine to medium grained, sub-angular to sub-rounded, of white gypsum, black iron cemented and pale grey mudstone.	Mo								15.0 SPT: 12, 18, 32 [N=50] 80% Recovery			16	
17									MUDSTONE Fine grained; brown, stained pale grey, locally iron stained orange and red; trace gravel, fine to coarse grained, black iron cemented and white gypsum.	Mo-We								16.0-16.05 m: DB 16.25 m: DB 16.35 m: DB 16.5 SPT: 14, 42, 30/90mm [N=R] 67% Recovery 16.5 m: DB 17 m: DB	Gravel and hole collapse		17	
18										We								17.45 m: DB 17.67 m: DB 17.87 m: DB 17.91 m: DB 17.96 m: DB 18.0 m: DB 18.21 m: DB			18	
19										Mo-We								18.65 m: DB 18.78 m: DB			19	
19						19.0 [-18.00]			CLAY Medium to high plasticity; brown, stained grey; with fine grained sand; with gravel, fine to medium grained, sub-angular to sub-rounded, of mudstone and some black iron cemented and white calcrete.	Mo								19.5 SPT: 9, 21, 28 [N=49] 76% Recovery			19	
20	03-03					20.0 [-18.95]			Termination Depth = 19.95m												20	

COREHOLE: 12516706.GINT.GPJ GHD\B.GDT. 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH14A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 259 892, N 7565 533
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.0m AHD Total Depth: 6.0m
Job No.: 12516706	Commenced: 04-Mar-20 Completed: 04-Mar-20
	Contractor: J&S Drilling Driller: Daniel

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	04-Mar-20
Flushing Fluid: Polymer		Processed: ZW	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1																	
2																	
3				PQ Coring													
4																	
5																	
6						6.0 [-5.00]							U(63)	U63 tube pushed from 0.0-0.5m and recovered 400mm.			
7																	
8																	
9																	
10																	

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT_20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

BH15

Sheet 2 of 5

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 265 126, N 7565 578
Ground Surface Elevation: +1.6m AHD **Total Depth:** 20.0m
Commenced: 31-Jan-20 **Completed:** 02-Feb-20
Contractor: J&S Drilling **Driller:** Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy **Inclination:** Vertical
Flushing Fluid: Water to 5 m, then Polymer
Hole Diameter (mm): 180 Auger / 123 PQ

Logged:	DO	02-Feb-20
Processed:	AT	20-Oct-20
Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
6						[3.40]	Czp	CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded; trace gravel, black, fine to medium grained, angular, gypsum and claystone.	W>PL H		5.00	S	5.0 SPT: 8, 13, 19 [N=32] 71% Recovery			
								CH	Between 5.5 and 5.8 m, becoming high plasticity CLAY; with sand.	W<PL							
								CI							5.9 m, change in drill bit.		
7								CI-CH	From 7.0 m, becoming medium to high plasticity; brown stained pale grey-brown, spotted black; with gravel, fine to coarse grained, angular to sub-angular of calcrete and laminated gypsum; locally weakly CaCO ₃ cemented.				6.50	S	6.5 SPT: 11, 16, 28 [N=44] 78% Recovery	Bentonite	
8	31-01 01-02			PQ Coring		8.4						8.00	S	8.0 SPT: 21, 45/145 mm, * □ 51% Recovery			
9									Start of coring at 8.4m. Continued next sheet in Rock Core format.								
10																	

GENERAL LOG 12516706.GINT.GPJ_GHDLB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH15

Sheet 3 of 5

Client: K + S Salt Australia Pty Ltd Project: Ashburton Solar Salt Project Phase 2 Site Investigation Job No.: 12516706	Coordinates: E 265 126, N 7565 578 Ground Surface Elevation: +1.6m AHD Total Depth: 20.0m Commenced: 31-Jan-20 Completed: 02-Feb-20 Contractor: J&S Drilling Driller: Alan
---	--

Rig Type : Jacro 350 drill rig on Mangrove Buggy Inclination: Vertical	Logged:	DO	02-Feb-20
Drilling Fluid: Polymer	Processed:	AT	20-Oct-20
Core Diameter (mm): 85	Checked:		

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)		
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							V	L	M	H	VH	EH	TCR (%)	RQD (%)					F (fractures/m)	Defect Log
6																						6		
7																						7		
8																						8		
9				PQ Coring		8.4 [-6.80]	Qsed		<i>Resuming in Core Log format 8.4m.</i> SANDSTONE Fine to medium grained; brown patched pale grey and pale brown, locally spotted black; trace gravel, fine to coarse grained, angular, of gypsum. Borderline soil strength.	Wk					0		9.35-9.50 m, DB's 9.5m, SPT: N: 16/31, 30/80mm 79% recovery					9		
10						10.0											9.88-10.0 m, DB's					10		

COREHOLE: 12516706 GINT.GPJ GHD\LIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

* ROCK CORE FORMAT *

Borehole
No.:

BH15

Sheet 5 of 5

Client: K + S Salt Australia Pty Ltd	Coordinates: E 265 126, N 7565 578	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.6m AHD	Total Depth: 20.0m
Job No.: 12516706	Commenced: 31-Jan-20	Completed: 02-Feb-20
	Contractor: J&S Drilling	Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	02-Feb-20
Drilling Fluid: Polymer		Processed: AT	20-Oct-20
Core Diameter (mm): 85		Checked:	

Depth Scale (m)	Daily Progress/Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(Rocktype; grain size; texture & structure; colour; strength; fracture condition; minor constituents)</small>	Weathering/ Cementation	Estimated Rock Strength				Rock Core Quality				Drill Rate (min/m)	Defect Description & Comments	Piezometer Components	Depth Scale (m)		
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method							VL	LM	HM	VH	EH	TCR (%)	RQD (%)	F (fractures/m)					Defect Log	
15.00						[13.49]			SANDSTONE Fine to medium grained; brown patched pale grey and pale brown.	Wk-Mo					100	100			15.00 m, DB					
15.23																			15.23 m, DB					
15.36																			15.36 m to 15.50 m, DB					
15.60																			15.60 m, DB					
15.69																			15.69 m, DB					
15.89									15.80 m, 20 mm thick Clayey SAND layer.										15.89 m, DB		Gravel			
16.43															100	99			16.43 m, DB					
16.58																			16.58 m, DB					
16.70																			16.70 m, DB					
16.84																			16.84 m, DB					
17.00																			17.00 m, DB					
17.09																			17.09 m, DB					
17.13																			17.13 m, DB					
17.34																			17.34 m, DB					
17.51									From 17.5 m, brown streaked pale brown and locally spotted black.										17.51 m, DB					
17.70															100	100			17.70 m, DB					
17.93																			17.93 m, DB					
18.00																			18.00 m, DB					
18.35																			18.35 m, DB					
18.50																			18.50 m, DB					
18.58																			18.58 m, DB					
18.97																			18.97 m, DB					
19.00																			19.00 m, DB					
19.09																			19.09 m, DB					
19.15																			19.15 m, DB					
19.49									From 19.3 m, trace gravel, dark grey, fine to medium grained, sub-rounded of claystone.						100	100			19.49 m, DB					
19.73																			19.73 m, DB					
20.00	02-02					20.0			Termination Depth = 20.00m															

COREHOLE: 12516706 GINT.GPJ GHDLIB.GDT 20-10-20



STANDPIPE PIEZOMETER LOG

Borehole
No.:

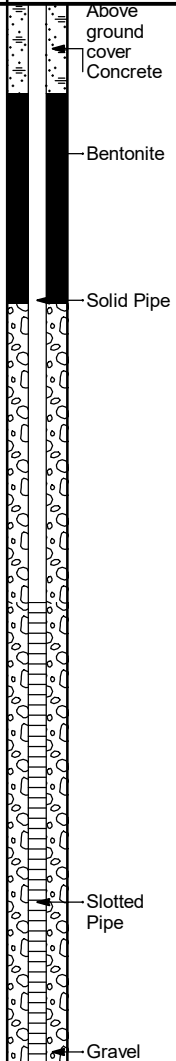
BH15A

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 265 126, N 7565 580	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.6m AHD	Total Depth: 5.0m
Job No.: 12516706	Commenced: 31-Jan-20	Completed: 02-Feb-20
	Contractor: J&S Drilling	Driller: Alan

Rig Type : Jacro 350 drill rig on Mangrove Buggy	Inclination: Vertical	Logged: DO	02-Feb-20
Flushing Fluid: Polymer		Processed: ZW	20-Oct-20
Hole Diameter (mm): 123		Checked:	

Depth Scale (m)	Daily Progress/ Observations				Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Piezometer Components	Depth Scale (m)
	Date	Casing Depth (m)	Fluid Depth (m)	Drilling Method													
1																1	
2				PQ Coring												2	
3																3	
4																4	
5						5.0 [-3.40]										5	



Appendix B – Test Pit (Auger) Logs



TEST EXCAVATION LOG

Test Pit No.:

TP Au-01

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 267 714, N 7587 874
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.2m AHD Total Depth: 3.0m
Job No.: 12516706	Commenced: 14-Jan-20 Completed: 14-Jan-20
	Contractor: NTC Contracting Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	14-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
	Orientation/ Bearing: Not Recorded	Checked: <i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
					SP	Calcareous SAND Fine to medium grained, sub-angular to sub-rounded, of quartz; pale red-brown; with coarse shell fragments; trace fines, non-plastic; trace root fibres; uncemented.	D	L			<p>Note: the relative consistency results are based on visual observations only.</p> <p>Hole collapsed to 2.7 m</p> <p>ASS Sample at 2.0 m ASS Sample at 2.25 m ASS Sample at 2.5 m</p>	
								0.25	ASS			
								0.50	ASS			
								0.75	ASS			
1								1.00	ASS			
								1.25	ASS			
						Between 1.4 m and 1.5 m, moderately cemented, recovered as sand; trace gravel, fine to medium grained, medium strength, calcareous [Calcareous SANDSTONE?]		1.50	ASS			
						Between 1.5 m and 1.8 m, with shells (predominantly Bivalve Mollusc up to 20 mm and Gastropod up to 10 mm) and Calcareous SANDSTONE gravel up to 50 mm.		1.75	ASS			
						From 1.8 m, with gravel, fine to coarse, up to 30 mm, rounded to sub-rounded, of Chert; trace clay, non-plastic.	M	L-MD				
2								2.00	B/ASS			
								2.25	ASS			
								2.50	ASS			
								2.75	ASS			
								2.90	ASS			
3		3.0 [+0.2]				Termination Depth = 3.00m (Target Depth)						3

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Dipped dry to 1.0 m (depth of hole collapse)

Qs



TEST EXCAVATION LOG

Test Pit No.:

TP Au-03

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 268 590, N 7584 385	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.5m AHD	Total Depth: 2.5m
Job No.: 12516706	Commenced: 15-Jan-20	Completed: 15-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	15-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		[+1.5]			CLAY/Halite Crust Halite, sand and clay banded crust layer (approximately 2 - 4 mm). Sand is pale red-brown, fine to medium grained, sub-rounded of quartz.	D	-			<p>Note: the relative consistency results are based on visual observations only. ASS Sample at 0.25 m</p> <p>ASS Sample at 0.75 m ASS Sample at 1.0 m</p> <p>ASS Sample at 1.75 m ASS Sample at 2.0 m</p>	
		0.2			Carbonate SAND Fine grained, sub-angular to sub-rounded; pale red-brown; with clay, non-plastic; trace silt, non-plastic.	M	L	0.15	B/ ASS		
		[+1.4]			Carbonate Clayey SAND Fine grained, sub-angular to sub-rounded; pale red-brown; clay is medium plasticity; trace coarse grained sand; trace silt, non-plastic.			0.30	ASS		
		0.3			Carbonate SAND Fine to medium grained, sub-angular to sub-rounded; pale red-brown; with clay, non-plastic; trace silt, non-plastic.			0.50	ASS		
		[+1.2]			Carbonate SAND Between 0.6 m and 0.7 m, becoming pale yellow-brown mottled red-brown; trace shell fragments.	W	L- MD	0.70	B/ ASS		
		0.7			Carbonate Clayey SAND Fine to medium grained, sub-angular to sub-rounded; pale brown to pale red-brown; clay is medium to high plasticity; trace silt, non-plastic. From 0.9 m, becoming pale grey.			1.00	ASS		
		[+0.8]			Carbonate Gravelly SAND Fine to coarse grained, sub-angular to sub-rounded; pale green-grey; gravel is fine-coarse grained of gypsum; cobbles, up to 75 mm, of gypsum; with clay, non-plastic; with shells and shell fragments, up to 5 mm.			1.25	ASS		
		1.2			Carbonate Sandy GRAVEL/COBBLE Gravel is fine to coarse grained, angular to sub-angular of gypsum; cobbles recovered up to 80 mm; pale brown to pale green-blue; sand is fine to medium grained, sub-angular to sub-rounded.			1.50	ASS		
		[+0.3]						1.70	B/ ASS		
		1.5						2.00	ASS		
		[+0.0]						2.25	ASS		
		2.5			Termination Depth = 2.50m (Refusal)			2.50	ASS		
		[-1.0]						2.75	ASS		
								2.90	ASS		

GENERAL LOG 12516706 GINT.GPJ_GHDLI.B.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-19

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 273 219, N 7582 594
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+3.3m AHD Total Depth: 3.0m
	Phase 2 Site Investigation	Commenced:	20-Jan-20 Completed: 20-Jan-20
Job No.:	12516706	Contractor:	NTC Contracting Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	20-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		[+3.3]			Cl Cl- CH	<p>CLAY Crust Clay crust layer (approximately 2 - 3 mm). Medium plasticity; pale red-brown; trace sand, fine grained, sub-rounded; trace root fibres.</p> <p>Carbonate CLAY Medium to high plasticity; pale red-brown; with sand, fine grained, sub-angular to sub-rounded; trace silt, non-plastic; trace root fibres.</p>	W<PL	Fr	0.10		Note: the relative consistency results are based on visual observations only.	
						From 1.7 m, trace sand, medium grained.			B			
						From 2.3 m, with gravel, fine grained, platy, of gypsum.	W~PL		0.50			
						Between 2.6 m and 2.8 m, interbedding of friable clay layers.		F-St				
		2.8 [+0.5]			GP	At 2.8 m, CALCARENITE recovered as gravel and cobbles up to 65 mm in size.			-			
		3.0 [+0.3]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20

Groundwater not encountered

Czp



TEST EXCAVATION LOG

Test Pit No.:

TP Au-22

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 273 715, N 7584 924
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+3.2m AHD
	Phase 2 Site Investigation	Total Depth:	3.0m
Job No.:	12516706	Commenced:	20-Jan-20
		Completed:	20-Jan-20
		Contractor:	NTC Contracting
		Operator:	Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	20-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked: <i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)	
					Cl-CH	Carbonate Sandy CLAY Medium to high plasticity; pale red-brown; sand is fine grained, sub-rounded; trace root fibres.	W<PL	Fr			Note: the relative consistency results are based on visual observations only.		
		0.7 [+2.5]			SC	Carbonate Clayey SAND Fine to medium grained, sub-rounded; pale red-brown; clay is medium to high plasticity.	M			0.70 B			
1	Groundwater not encountered												
		1.8 [+1.4]			Cl-CH	Carbonate Sandy CLAY Medium to high plasticity; pale red-brown; sand is fine to medium grained, sub-rounded.	W<PL	Fr-S					
2													
		2.5 [+0.7]			SC	Carbonate Clayey SAND Fine to medium grained, sub-rounded; pale red-brown; clay is medium to high plasticity; trace shells and shell fragments; moderately well cemented.	M						
3		3.0 [+0.2]				Termination Depth = 3.00m (Target Depth)							

GENERAL LOG 12516706 GINT.GPJ_GHDLI.B.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-30

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 270 050, N 7586 840
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+1.8m AHD
	Phase 2 Site Investigation	Total Depth:	3.0m
Job No.:	12516706	Commenced:	14-Jan-20
		Completed:	14-Jan-20
		Contractor:	NTC Contracting
		Operator:	Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	14-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		0.8 [+1.0]			SP-SC SC	SAND Fine to medium grained (predominantly fine grained), sub-angular to sub-rounded; pale red-brown; with clay, medium to high plasticity. From 0.05 m, becoming Clayey SAND.	D	L			Note: the relative consistency results are based on visual observations only.	
1		1.4 [+0.4]			Cl-CH	Sandy CLAY Medium to high plasticity; pale red-brown mottled pale grey; sand is predominantly fine grained, sub-angular to sub-rounded.	W<PL	Fr				
	Groundwater not encountered	2.0 [-0.2]	Czp		CH	CLAY Medium to high plasticity; pale red-brown mottled pale grey; with sand, fine grained; trace silt non-plastic.	W~PL	VS-S	1.50	B		
2						Cl-CH	Clayey SAND Fine grained, sub-angular to sub-rounded; red brown mottled pale yellow and brown; clay is medium to high plasticity; with silt, low plasticity; with shells and shell fragments up to 4 mm.	M	L-MD	1.80		
		2.7 [-0.9]			SP	SAND Fine to medium grained, sub-angular to sub-rounded; pale red-brown to grey; with shell fragments and shells up to 15 mm; with fines, non-plastic; locally Clayey SAND.	W		2.00	B		
3		3.0 [-1.2]				Termination Depth = 3.00m (Target Depth)			2.30			

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-33

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 270 246, N 7585 557
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.4m AHD Total Depth: 3.0m
Job No.: 12516706	Commenced: 14-Jan-20 Completed: 14-Jan-20
	Contractor: NTC Contracting Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	14-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked: <i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
1	Dipped dry to 1.0 m (depth of hole collapse)		Czp		SP-SC	SAND Fine to medium grained (predominantly fine grained), sub-angular to sub-rounded; pale red-brown; with clay, non-plastic; with root fibres; trace weakly cemented sand nodules. From 0.2 m, trace rootlets, loss of weakly cemented sand nodules.	D	L	0.50	B	Note: the relative consistency results are based on visual observations only.	1
2		1.8 [+1.6]			SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded; pale red-brown to red-brown; clay is medium to high plasticity.	M					2
		2.3 [+1.1]			CI-CH	Sandy CLAY Medium to high plasticity; pale red-brown to red-brown with pale grey and orange-brown spotting; sand is fine to medium grained, sub-angular to sub-rounded; trace silt, non-plastic.	W~PL	S				
		2.5 [+0.9]			CH	CLAY High plasticity; pale red-brown mottled blue-grey; with sand, fine grained; with silt, non-plastic. From 2.8 m, becoming pale blue-grey mottled red-brown.	W>PL	VS-S				
3		3.0 [+0.4]				Termination Depth = 3.00m (Target Depth)						3

GENERAL LOG: 12516706.GINT.GPJ_GHDLI.B.GDT_21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-36

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 273 016, N 7583 655	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +3.0m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 20-Jan-20	Completed: 20-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	20-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		[+3.0]			SP	SAND Fine grained, sub-rounded; pale red-brown; with clay, non-plastic; trace root fibres.	D	L			Note: the relative consistency results are based on visual observations only.	
		0.3 [+2.7]			CI-CH	Carbonate Sandy CLAY Medium to high plasticity; pale red-brown; sand is fine grained, sub-rounded.	W<PL	Fr				
					SC	Carbonate Clayey SAND Fine to medium grained, sub-rounded; pale red-brown; clay is medium to high plasticity.	D	L				
1							M					
					CH	Carbonate Sandy CLAY High plasticity; red-brown; sand is fine grained, sub-rounded.	W<PL	Fr				
		2.2 [+0.8]			CH	Gravelly CLAY High plasticity; red-brown; gravel is fine to medium grained, sub-angular; moderately cemented, medium strength.		Fr-F				
		2.4 [+0.6]			CH							
3		3.0 [+0.0]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-60

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 273 350, N 7580 769	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.0m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 18-Jan-20	Completed: 18-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	18-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		0.1 [+0.9]			SP-SC	Carbonate SAND Fine to medium grained, sub-angular to sub-rounded; pale brown to pale red-brown; with clay, non-plastic; trace root fibres; with gravel of halite; trace silt, non-plastic.	D	L			Note: the relative consistency results are based on visual observations only.	
					SC	Carbonate Clayey SAND Fine to medium grained, sub-angular to sub-rounded; pale red-brown; clay is friable, low plasticity.			0.25	ASS		
									0.50	ASS		
		0.6 [+0.4]			CI-CH	Carbonate Sandy CLAY Medium to high plasticity; pale brown to pale red-brown; sand is fine to medium grained, sub-angular to sub-rounded.	W<PL	Fr				
1	Groundwater not encountered		Czp			From 1.0 m, with gravel, fine grained of gypsum. Friable and soft clay mixture recovered from auger.			0.75	ASS		
										1.00	ASS	
										1.25	ASS	
										1.50	B/ ASS	ASS Sample at 1.5 m ASS Sample at 1.75 m
										1.80		
2		2.0 [-1.0]			CH	Carbonate CLAY High plasticity; red-brown; with sand, fine to medium grained, sub-angular to sub-rounded; with interbedded salt layers.			2.00	ASS		
									2.25	ASS		
									2.50	ASS		
									2.75	ASS		
									2.90	ASS		
3		3.0 [-2.0]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG: 12516706.GINT.GPJ.GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-66

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 273 516, N 7575 686	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +5.0m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 18-Jan-20	Completed: 18-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	18-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)	
					CH	Calcareous Sandy CLAY High plasticity; pale red-brown; sand is fine grained, sub-rounded.	W<PL	Fr			<p>Note: the relative consistency results are based on visual observations only.</p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">0.25 ASS</div> <div style="margin-bottom: 5px;">0.50 ASS</div> <div style="margin-bottom: 5px;">0.75 ASS</div> <div style="margin-bottom: 5px;">1.00 ASS</div> <div style="margin-bottom: 5px;">1.25 ASS</div> <div style="margin-bottom: 5px;">1.50 ASS</div> <div style="margin-bottom: 5px;">1.75 ASS</div> <div style="margin-bottom: 5px;">2.00 ASS</div> <div style="margin-bottom: 5px;">2.25 ASS</div> <div style="margin-bottom: 5px;">2.50 ASS</div> <div style="margin-bottom: 5px;">2.70 B/ASS</div> </div>		
1	Groundwater not encountered		Qe			From 1.4 m, becoming red-brown.	W-PL						1
2													2
3		3.0 [+2.0]				Termination Depth = 3.00m (Target Depth)					ASS Sample at 2.75 m ASS Sample at 3.0 m	3	

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-70

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 273 550, N 7573 918	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +7.6m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 18-Jan-20	Completed: 18-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	18-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
				Czp	CH	Calcareous Sandy CLAY High plasticity; pale red-brown; sand is fine grained, sub-rounded.	W<PL	Fr			Note: the relative consistency results are based on visual observations only.	
								0.25	ASS			
								0.50	ASS			
								0.75	ASS			
1								1.00	ASS			
						From 1.2 m, becoming red-brown.	W-PL		1.25	ASS		
								1.50	ASS			
								1.75	ASS			
2								2.00	ASS			
								2.25	ASS			
								2.50	ASS			
						From 2.5 m, increase in sand content, fine to medium grained; non-calcareous.			2.75	ASS		
								2.90	ASS			
3		3.0 [+4.6]				Termination Depth = 3.00m (Target Depth)						3

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-74

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 350, N 7571 021	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +4.9m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 19-Jan-20	Completed: 19-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	19-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		[+4.9]			CH	CLAY Crust Clay crust layer (approximately 3 - 5 mm). Pale red-brown; with sand, fine grained, sub-rounded.	D	-			Note: the relative consistency results are based on visual observations only.	
		0.3 [+4.6]			CI-CH	Calcareous Sandy CLAY Medium to high plasticity; pale red-brown to red-brown; sand is fine grained, sub-rounded.	W<PL	Fr	0.25	ASS		ASS Sample at 0.5 m
					CI-CH	CLAY Medium to high plasticity; red-brown; with sand, fine grained.	W~PL	Fr-St	0.30	B/ ASS	ASS Sample at 0.75 m	
								Fr	0.50 0.50	B/ ASS		
1								Fr-St	0.80			
									1.00	ASS		
									1.25	ASS		
									1.50	ASS		
									1.75	ASS		
						From 1.7 m, becoming dark red-brown; trace gravel, fine to coarse grained, angular, of gypsum.		St-VSt	2.00	ASS		
2									2.25	ASS		
									2.50	ASS		
									2.75	ASS		
									2.90	ASS		
3		3.0 [+1.9]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20

Groundwater not encountered

Qp



TEST EXCAVATION LOG

Test Pit No.:

TP Au-75

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 703, N 7568 714	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +2.4m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 19-Jan-20	Completed: 19-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	19-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked: <i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		0.2 [+2.2]			Cl-CH	Sandy CLAY Medium to high plasticity; red-brown; sand is fine to medium grained, sub-rounded, of halite. Slight calcareous reaction. Gravels were observed at surface, medium grained, rounded, of banded iron formation, chert and quartz.	W<PL W~PL	Fr			Note: the relative consistency results are based on visual observations only. ASS Sample at 1.75 m ASS Sample at 2.0 m	
					CH	CLAY High plasticity; red-brown; trace sand, fine to medium grained, of gypsum.		F-St	0.25	ASS		
									0.50	ASS		
									0.75	ASS		
1									1.00	ASS		
						From 1.2 m, with sand, fine grained; with gravel, fine grained, of gypsum.		St-Vst	1.25	ASS		
								St	1.50	ASS		
									1.70			
									2.00	B		
2		2.0 [+0.4]			CH	Sandy CLAY High plasticity; red-brown; sand is fine grained, sub-rounded.			2.25	ASS		
						From 2.5 m, with trace gravel, fine to medium grained, angular to sub-angular, of gypsum.			2.50	ASS		
									2.75	ASS		
									2.90	ASS		
3		3.0 [+0.6]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



TEST EXCAVATION LOG

Test Pit No.:

TP Au-101

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 268 018, N 7586 782
Ground Surface Elevation: +1.4m AHD **Total Depth:** 3.0m
Commenced: 15-Jan-20 **Completed:** 15-Jan-20
Contractor: NTC Contracting **Operator:** Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	15-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
		0.2 [+1.3]			SP-SC	Carbonate SAND Fine grained, sub-angular to sub-rounded; pale red-brown; with clay, non-plastic; with root fibres; trace samphire seeds.	D	L			<p>Note: the relative consistency results are based on visual observations only.</p> <p>ASS Sample at 0.25 m ASS Sample at 0.5 m</p>	
		0.6 [+0.8]			SC	Carbonate Clayey SAND Fine grained, sub-angular to sub-rounded; pale red-brown; clay is medium to high plasticity; trace samphire seeds.			0.20	B/ ASS		
		0.7 [+0.7]			CH	Carbonate Sandy CLAY Medium to high plasticity; pale red-brown; sand is fine grained, sub-angular to sub-rounded; trace shell fragments.	W<PL	S	0.50			
		1.4 [+0.0]			CH	Calcareous CLAY High plasticity; pale red-brown to red-brown; with sand, fine grained. From 0.9 m, becoming pale red-brown; trace shells.	W~PL		0.75	ASS		
		1.7 [-0.3]			CH		W>PL	VS	1.00	ASS		
		2.0 [-0.6]			CH				1.25	ASS		
		2.4 [-1.0]			SC	Carbonate Clayey SAND Fine-coarse grained sub-angular to sub-rounded; pale red-brown; clay is medium to high plasticity.	W	L- MD	1.50	ASS		
		2.6 [-1.2]			ML-MH	Carbonate Clayey SILT Low plasticity; grey; clay is medium to high plasticity; with sand, fine grained; with shell fragments.	W>PL	VS	1.75	ASS		
		3.0 [-1.6]			CH	Carbonate Sandy CLAY Medium to high plasticity; grey to pale grey; sand is fine grained; with silt, low plasticity; trace shell fragments.			2.00	ASS		
					SC	Calcareous Clayey SAND Fine to medium grained, sub-angular to sub-rounded; pale grey; clay is medium to high plasticity; with shell fragments.	W	L- MD	2.25	ASS		
					SP-SC	Calcareous SAND Fine to medium grained, sub-angular to sub-rounded; grey to pale grey; with clay, medium plasticity; with shell fragments.			2.50	ASS		
					SP-SC				2.60	B/ ASS	<p>ASS Sample at 2.75 m ASS Sample at 3.0 m</p>	
						Termination Depth = 3.00m (Target Depth)			3.00			

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20

Groundwater encountered at 2.72 m

Czp



TEST EXCAVATION LOG

Test Pit No.:

TP Au-102

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 737, N 7572 235	
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +5.3m AHD	Total Depth: 3.0m
Job No.: 12516706	Commenced: 18-Jan-20	Completed: 18-Jan-20
	Contractor: NTC Contracting	Operator: Eoin

Equipment: 20 t track mounted excavator, equipped with a 0.4 m diameter solid auger	Excavation Width (m): Not Recorded	Logged: AT	18-Jan-20
	Excavation Length (m): Not Recorded	Processed: AT	21-Oct-20
Bucket Size (m):	Orientation/ Bearing: Not Recorded	Checked:	

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components; structure and/or origin)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/Test Records & Comments	Depth Scale (m)
				Qp	SC	Calcareous Clayey SAND Fine to medium grained, sub-rounded; pale red-brown; clay is high plasticity.	D	VL-L			Note: the relative consistency results are based on visual observations only.	
		0.6 [+4.7]							0.25 ASS			
					CH	Calcareous Sandy CLAY High plasticity; red-brown; sand is fine grained, sub-rounded.	W<PL	Fr				
1						From 1.0 m, the material recovered from the auger feels moist.			0.50 ASS			
		1.3 [+4.0]			SC	Calcareous Clayey SAND Fine to medium grained, sub-rounded; red-brown; clay is high plasticity.	M	L			ASS Sample at 1.5 m	
	Groundwater not encountered					Between 1.7 m and 2.0 m, trace gravel, fine grained, sub-rounded, of gypsum.			0.75 ASS			
									1.00 ASS			
		2.0 [+3.3]			Cl-CH	Calcareous Sandy CLAY Medium to high plasticity; red-brown; sand is fine to medium grained, sub-rounded.	W<PL	Fr-St				
2						From 2.8 m, increase in sand content.			1.25 ASS			
									1.30 B/ASS			
									1.50 ASS			
									1.75 ASS			
									2.00 B		ASS Sample at 2.0 m ASS Sample at 2.25 m ASS Sample at 2.5 m	
									2.50 ASS			
									2.75 ASS			
									2.90 ASS			
3		3.0 [+2.3]				Termination Depth = 3.00m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20

Appendix C – Hand Auger Logs



HAND AUGER LOG

Location No.:

HA01

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 272 726, N 7579 376
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.2m AHD Total Depth: 0.7m
Job No.: 12516706	Commenced: 28-Jan-20 Completed: 28-Jan-20
	Equipment: Hand Auger Operator: DO

Equipment: Hand Auger Hole Diameter (mm): 60	Logged: DO	28-Jan-20
	Processed: AT	21-Oct-20
	Checked: <i>DO</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Groundwater Not Encountered		Czp		CI	Sandy CLAY Medium plasticity; brown mottled pale grey; sand is fine to medium grained; trace gravel, fine to medium, sub-rounded, of carbonate; calcareous.	W<PL St-Vst				Vane Shear refusal at 0.1 m. Hard augering from surface.	
		0.70 [+0.5]				Termination Depth = 0.7m (Refusal)	W>PL		0.40			
1												1
2												2



HAND AUGER LOG

Location No.:

HA02

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 271 652, N 7575 084
Ground Surface Elevation: +1.7m AHD **Total Depth:** 0.6m
Commenced: 28-Jan-20 **Completed:** 28-Jan-20
Equipment: Hand Auger **Operator:** DO

Equipment: Hand Auger**Logged:** DO 28-Jan-20**Processed:** AT 21-Oct-20**Checked:** *DO***Hole Diameter (mm):** 60

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Groundwater Not Encountered	0.60 [+1.1]	Czp		CI	Sandy CLAY Medium plasticity, brown mottled pale grey; sand is fine to medium grained; trace gravel, fine to medium grained, sub-rounded to sub-angular, of carbonate; calcareous.	W<PL St-VSt		0.20 		Hard augering from surface. Vane Shear refusal at 0.15 m.	
						Termination Depth = 0.6m (Refusal)	W>PL		0.60 			



HAND AUGER LOG

Location No.:

HA03

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 270 005, N 7570 990
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+1.4m AHD
	Phase 2 Site Investigation	Total Depth:	0.6m
Job No.:	12516706	Commenced:	28-Jan-20
		Completed:	28-Jan-20
		Equipment:	Operator: DO

Equipment: Hand Auger	Logged:	DO	28-Jan-20
	Processed:	AT	21-Oct-20
Hole Diameter (mm): 60	Checked:	<i>DO</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Groundwater Not Encountered	0.60 <small>(+0.8)</small>	Czp		Cl-CH	Sandy CLAY Medium to high plasticity, brown mottled pale grey; sand is fine to medium grained; trace gravel, fine to medium, sub-rounded, of carbonate; calcareous.	W<PL W>PL	F	0.10		Hard augering from surface.	
						Termination Depth = 0.6m (Refusal)			0.60			



HAND AUGER LOG

Location No.: **HA04**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 163, N 7584 415
Ground Surface Elevation: +0.9m AHD **Total Depth:** 1.8m
Commenced: 10-Nov-19 **Completed:** 10-Nov-19
Equipment: Hand Auger **Operator:** DO

Equipment: Hand Auger	Logged:	DO	10-Nov-19
	Processed:	AT	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+0.9]			CH	CRUST Halite crystals up to 5 mm, pale brown, trace fines, non-plastic.	W~LL	VS			0.1 m, large vane: SU= 8.0 kPa (peak), 6.0 kPa (residual)	
		0.20 [+0.7]	Qt		SC	Sandy CLAY High plasticity clay; brown; sand is fine grained, sub-angular to sub-rounded.	W	VL			0.2 m, large vane: SU= 7.5 kPa (peak), 7.0 kPa (residual)	
		0.40 [+0.5]			ML	Clayey SAND (borderline SAND) Fine to medium-grained, sub-angular to sub-rounded; brown; clay is low plasticity; with gravel, fine to medium grained, sub-angular to sub-rounded of quartz.	W>LL	VS			0.3 m, large vane: SU= 11.0 kPa (peak), 3.0 kPa (residual)	
											0.4-1.1 m, advanced with very little resistance	
											0.4 m, large vane: SU= 7.5 kPa (peak), 3.5 kPa (residual)	
											0.5 m, large vane: SU= 8.5 kPa (peak), 3.0 kPa (residual)	
											0.6 m, large vane: SU= 6.0 kPa (peak), 3.5 kPa (residual)	
											0.7 m, large vane: SU= 10.0 kPa (peak), 1.5 kPa (residual)	
											0.8 m, large vane: SU= 11.0 kPa (peak), 4.5 kPa (residual)	
											0.9 m, large vane: SU= 20.5 kPa (peak), 5.5 kPa (residual)	
1		1.00 [-0.1]	Qw		ML	Sandy SILT Low to medium plasticity; pale grey-blue; sand is fine grained, sub-angular to sub-rounded.	W>PL	S-F			1.0 m, large vane: SU= 31.0 kPa (peak), 4.5 kPa (residual)	1
											1.1 m, large vane: SU= 27.5 kPa (peak), 3.0 kPa (residual)	
											1.2 m, shear vane test: large vane (refusal)	
		1.30 [-0.4]			MH	Sandy SILT High plasticity; blue-grey; sand is fine-grained, sub-angular to sub-rounded.		St			1.3 m, large vane: SU= 49.5 kPa (peak), 15.5 kPa (residual)	
						From 1.5 m, blue-grey mottled brown; sand becoming fine to medium grained, sub-angular to sub-rounded.						
		1.75 [-0.9]				Termination Depth = 1.75m (Refusal)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.:

HA05

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 265 348, N 7565 998
Ground Surface Elevation: +1.3m AHD **Total Depth:** 0.4m
Commenced: 02-Feb-20 **Completed:** 02-Feb-20
Equipment: Hand Auger **Operator:** DO

Equipment: Hand Auger**Logged:** DO 02-Feb-20**Processed:** AT 21-Oct-20**Hole Diameter (mm):** 75**Checked:** *DO*

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	GNE	[+1.3]	Ct		SC	CRUST Halite crystals up to 5 mm, pale brown, trace fines, non-plastic. Clayey SAND Fine to medium grained, sub-angular to sub-rounded; brown; clay is low plasticity. From 0.15 m, trace gravel, fine to medium grained, angular of quartz.	D M	MD-D			GNE: Groundwater Not Encountered 0.15 m to 0.35 m: hard augering conditions (10 minutes to advance 200 mm).	
		0.35 [+1.0]				Termination Depth = 0.35m (Near Refusal)						



HAND AUGER LOG

Location No.:

HA06

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 263 828, N 7566 330
Ground Surface Elevation: +0.9m AHD **Total Depth:** 0.3m
Commenced: 03-Feb-20 **Completed:** 03-Feb-20
Equipment: Hand Auger **Operator:** DO

Equipment: Hand Auger**Logged:** DO 03-Feb-20**Processed:** AT 21-Oct-20**Checked:** *DO***Hole Diameter (mm):** 75

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	GNE	0.30 [+0.6]	Qt		Cl	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded.	W~PL	St-VSt	0.00		0.05 m, large vane: SU= 27.0 kPa (peak), 17.0 kPa (residual) GNE: Groundwater Not Encountered From 0.05 m: hard augering conditions (300 mm augered over 10 minutes)	
						Termination Depth = 0.3m (Near Refusal)			0.30			



HAND AUGER LOG

Location No.: **HA07**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 262 943, N 7567 112
Ground Surface Elevation: +0.8m AHD **Total Depth:** 0.4m
Commenced: 03-Feb-20 **Completed:** 03-Feb-20
Equipment: Hand Auger **Operator:** DO

Equipment: Hand Auger
Hole Diameter (mm): 75
Logged: DO 03-Feb-20
Processed: AT 21-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	GNE	0.05 [+0.8]	Ct		SC	Clayey SAND Fine to medium grained, sub-angular to sub-rounded of quartz and salt; brown; clay is low plasticity.	M	MD	0.00		GNE: Groundwater Not Encountered 0.05 m, large vane: SU= 13.0 kPa (peak), 9.5 kPa (residual)	
		0.35 [+0.5]			CI	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded.	W~Pl	St-VSt			0.05 m to 0.35 m: hard augering conditions (10 minutes to advance 350 mm).	
						Termination Depth = 0.35m (Near Refusal)						



HAND AUGER LOG

Location No.:

HA08

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 264 939, N 7581 502
Ground Surface Elevation: +0.8m AHD **Total Depth:** 1.1m
Commenced: 17-Jan-20 **Completed:** 17-Jan-20
Equipment: Hand Auger **Operator:** AT

Equipment: Hand Auger**Logged:** SD/AT 17-Jan-20**Processed:** DCH 21-Oct-20**Checked:** **Hole Diameter (mm):** 75

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	∇		Qt		CH	Sandy CLAY High plasticity; pale brown; sand is fine to medium-grained, sub-angular of quartz and salt; slightly calcareous.	W>PL	S	0.00	D1	0-0.25 m: disturbed sample	
		0.50 [+0.3]	Qt						0.25 0.25	D2	0.25-0.5 m: disturbed sample 0.25-0.5 m: QA sample 0.3 m, large vane: SU= 31.0 kPa (peak), 7.5 kPa (residual) 0.4 m, large vane: SU= 24.0 kPa (peak), 9.0 kPa (residual)	
1			Qw			0.5-1.1 m: No recovery.	W>LL	VS	0.50		0.7 m, large vane: SU= 35.0 kPa (peak), 13.0 kPa (residual)	1
		1.10 [-0.3]				Termination Depth = 1.1m (Difficulty extracting auger from hole)					1.2 m, large vane: SU= 10.0 kPa (peak), 11.5 kPa (residual)	2



HAND AUGER LOG

Location No.:

HA09

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd **Coordinates:** E 264 349, N 7567 781
Project: Ashburton Solar Salt Project **Ground Surface Elevation:** +0.8m AHD **Total Depth:** 0.4m
Phase 2 Site Investigation **Commenced:** 03-Feb-20 **Completed:** 03-Feb-20
Job No.: 12516706 **Equipment:** Hand Auger **Operator:** DO

Equipment: Hand Auger **Logged:** DO 03-Feb-20
Hole Diameter (mm): 75 **Processed:** AT 21-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	GNE	0.40 [+0.4]	Qt		Cl	Sandy CLAY Medium plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded; trace gravel, fine to medium grained, sub-rounded of carbonaceous well cemented mudstone.	W~PL	St-VSt	0.00		GNE: Groundwater Not Encountered 0.05 m, large vane: SU= 18.0 kPa (peak), 10.5 kPa (residual) From 0.05 m: hard augering conditions (15 minutes to advance 350 mm).	
						Termination Depth = 0.4m (Refusal)			0.40			



HAND AUGER LOG

Location No.: **HA10**

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd **Coordinates:** E 270 363, N 7585 954
Project: Ashburton Solar Salt Project **Ground Surface Elevation:** AHD **Total Depth:** 1.2m
 Phase 2 Site Investigation **Commenced:** 01-Apr-20 **Completed:** 01-Apr-20
Job No.: 12516706 **Equipment:** Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	01-Apr-20
	Processed:	DCH	21-Oct-20
	Checked:	<i>SD</i>	

Depth Scale (m)	Water	Depth (m)	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.55	CP		CH	CRUST Halite crystals, non-calcareous. Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-angular, of quartz and halite/gypsum; non-calcareous. From 0.07 m, becoming dark grey mottled yellow; trace sand, fine grained. From 0.10 m, trace gravel, fine to medium grained, angular, crystalline, of gypsum. From 0.32 m, becoming grey mottled yellow.	W>Pl	S-F		B1,2,3	0-0.5 m: 3 x bulk samples 0.25 m, small vane: SU= 53 kPa (peak), 29 kPa (residual) 0.50 m, small vane: SU= 79 kPa (peak), 24 kPa (residual) 0.6-1.2 m: bulk sample 0.75 m, small vane: SU= 118 kPa (peak), 29 kPa (residual)	
1		1.20			CH	Sandy CLAY High plasticity; brown; sand is fine grained; non-calcareous.		VSt		B4	At 1.0 m, unable to push small vane in.	1
2						Termination Depth = 1.2m (Refusal)					At 1.2 m, auger was making gravelly/crust augering sounds. No visible gravel or cementation at base of auger.	2



HAND AUGER LOG

Location No.:

HA11

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706

Coordinates: E 272 019, N 7572 946
Ground Surface Elevation: AHD **Total Depth:** 0.5m
Commenced: 01-Apr-20 **Completed:** 01-Apr-20
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger**Logged:** SD 01-Apr-20**Processed:** DCH 21-Oct-20**Checked:** *[Signature]***Hole Diameter (mm):** 60

Depth Scale (m)	Water	Depth (m)	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	GNE	0.50	Cp		CH	CLAY High plasticity; dark brown; with sand, fine to medium grained, sub-rounded, of quartz and gypsum; non-calcareous.	W < PL	Fr	0.00 0.30	B1,2,3	0.0-0.3 m: 3 x bulk samples 0.0-0.03 m: dessicated crust GNE: Groundwater Not Encountered	
1						Termination Depth = 0.5m (Difficulty advancing auger into the ground)						1
2												2



HAND AUGER LOG

Location No.:

HA12

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 265 093, N 7577 195
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +0.7m AHD Total Depth: 1.1m
Job No.: 12516706	Commenced: 26-Mar-20 Completed: 26-Mar-20
	Equipment: Hand Auger Operator: SG

Equipment: Hand Auger	Logged: SG	26-Mar-20
	Processed: WR	21-Oct-20
	Checked: <i>[Signature]</i>	

Hole Diameter (mm): 60

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.05 [+0.7]			SM	Silty SAND Medium to coarse grained, salt, angular; red/brown; non-plastic fines.	W	VL				
					CH	CLAY High plasticity; black, mottled pale yellow; with sand, fine grained; trace gravel, fine to coarse grained, angular, of gypsum.	W>LL	VS		0.10	0.1-0.55 m: U63 sample 0.1 m, large vane: SU= 3.4 kPa (peak), 0 kPa (residual) 0.2 m: Minor HCl reaction. 0.2 m, large vane: SU= 4.9 kPa (peak), 0 kPa (residual) 0.2 m: Material characterisation sample taken	
		0.30 [+0.4]			CL	Sandy CLAY Low plasticity; pale grey; sand is fine grained; trace gravel, fine grained, angular, of gypsum.		F		U(63)	0.3 m, large vane: SU= 7.4 kPa (peak), 0 kPa (residual)	
	▽		QW			From 0.5 m, becoming brown.				0.55	0.4 m, large vane: SU= 44.1 kPa (peak), 4.4 kPa (residual) 0.5 m, large vane: SU= 23.5 kPa (peak), 2.9 kPa (residual)	
								St			0.6 m, large vane: SU= 40.7 kPa (peak), 6.9 kPa (residual) 0.7 m, large vane: SU= 55.9 kPa (peak), 16.7 kPa (residual) 0.8 m, large vane: SU= 55.4 kPa (peak), 22.1 kPa (residual)	
1						From 1.0 m, with gravel; fine to medium grained; sub-angular, of limestone.					0.9 m, large vane: SU> 65 kPa (peak)	
		1.10 [+0.4]				Termination Depth = 1.1m (Refusal)					ASS samples taken at the following depths: 0.25, 0.5, 0.75 and 1.0 QA sample taken at 0.25 m depth	



HAND AUGER LOG

Location No.: **HA14**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 266 127, N 7577 651
Ground Surface Elevation: +0.9m AHD **Total Depth:** 1.0m
Commenced: 25-Mar-20 **Completed:** 25-Mar-20
Equipment: Hand Auger **Operator:** SG

Equipment: Hand Auger	Logged:	SG	25-Mar-20
	Processed:	WR	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.20 [+0.7]			SC	Clayey SAND Fine to medium grained, salt, angular; red/brown; clay is low plasticity; trace gravel, coarse grained, angular, of gypsum.	W	VL-L			No HCl reaction. 0.1 m, large vane: SU= 22.6 kPa (peak), 4.4 kPa (residual)	
					CL	Sandy CLAY (almost Clayey SAND) Low plasticity; red/brown; sand is fine to medium grained, angular; trace gravel, coarse grained, angular, of gypsum.	W>LL	S	0.25		0.2 m, large vane: SU= 38.3 kPa (peak), 2.0 kPa (residual) 0.25 m: ASS sample taken 0.3 m, large vane: SU= 24.5 kPa (peak), 2.5 kPa (residual)	
								0.40			0.4 m: Material characterisation sample 0.4 m: ASS quality assurance sample 0.4 m, large vane: SU= 19.6 kPa (peak), 2.0 kPa (residual)	
								0.50			0.5 m: ASS sample taken 0.5 m, large vane: SU= 13.7 kPa (peak), 2.9 kPa (residual)	
						From 0.6 m: Becoming grey.		F			0.6 m, large vane: SU= 17.7 kPa (peak), 2.5 kPa (residual)	
								0.75			0.7 m, large vane: SU= 24.5 kPa (peak), 1.0 kPa (residual) 0.75 m: ASS sample taken 0.8 m, large vane: SU= 35.3 kPa (peak), 3.9 kPa (residual)	
1		1.00 [-0.1]				Termination Depth = 1m (Target Depth)				1.00	1.0 m: ASS sample taken 1.0 m, large vane: SU= 25.5 kPa (peak), 2.0 kPa (residual) 1.1 m, large vane: SU= 30.4 kPa (peak), 2.0 kPa (residual)	1



HAND AUGER LOG

Location No.:

HA19

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 271 871, N 7581 025
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.1m AHD Total Depth: 0.5m
Job No.: 12516706	Commenced: 26-Mar-20 Completed: 26-Mar-20
	Equipment: Hand Auger Operator: SG

Equipment: Hand Auger	Logged: SG	26-Mar-20
	Processed: WR	21-Oct-20
	Checked: <i>[Signature]</i>	

Hole Diameter (mm): 60

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	∇		Qw		CL-CI	Carbonate Sandy CLAY Low to medium plasticity; red/brown; sand is fine grained.	w>LL	VS	0.00		0.0-0.45 m: U63 sample	
		0.40 [+0.7]	Qt		GC	Sandy Clayey GRAVEL Fine to coarse grained, angular, of shells and limestone; red/brown; clay is low plasticity; sand is fine grained.	W	-	0.45	U(63)	0.1 m, large vane: SU= 9.8 kPa (peak), 1.0 kPa (residual) 0.2 m, large vane: SU= 12.3 kPa (peak), 1.0 kPa (residual) 0.25 m: ASS sample taken 0.25 m: ASS QA sample taken 0.25 m: Material characterisation sample taken 0.3 m, large vane: SU= 12.3 kPa (peak), 2.0 kPa (residual) 0.4 m, large vane: SU= 15.2 kPa (peak), 2.9 kPa (residual)	
		0.50 [+0.6]				Termination Depth = 0.5m (Refusal)					0.5 m: ASS sample taken 0.5 m, large vane: SU= 10.3 kPa (peak), 1.5 kPa (residual) Vane shear refusal at 0.6 m.	



HAND AUGER LOG

Location No.: **HA20**

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 271 696, N 7581 722
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+0.9m AHD
	Phase 2 Site Investigation	Total Depth:	1.0m
Job No.:	12516706	Commenced:	28-Mar-20
		Completed:	28-Mar-20
		Equipment:	Operator: SG

Equipment: Hand Auger	Logged:	SG	28-Mar-20
	Processed:	WR	21-Oct-20
Hole Diameter (mm): 60	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	▽			Qt	CL	Sandy Clay Low plasticity; red/brown; sand is fine to medium grained, inferred of salt.	W~LL	VS-S			0.1 m, large vane: SU= 22.1 kPa (peak), 0.5 kPa (residual) 0.2 m, large vane: SU= 16.2 kPa (peak), 2.0 kPa (residual) 0.3 m, large vane: SU= 11.8 kPa (peak), 1.5 kPa (residual) 0.4 m, large vane: SU= 18.6 kPa (peak), 0.5 kPa (residual) Vane shear refusal at 0.5 m.	
		0.60 [+0.3]		Qt	CL	Sandy Gravelly CLAY Low plasticity; red/brown; gravel is fine grained, sub-angular to angular, of limestone and shell; sand is fine to medium grained, inferred of salt. From 0.9 m: Gravel becoming fine to coarse.	W>PL	St				
1		1.00 [+0.1]				Termination Depth = 1m (Refusal)						1
2												2



HAND AUGER LOG

Location No.: **HA30**

Sheet 1 of 1

Client:	K + S Salt Australia Pty Ltd	Coordinates:	E 259 897, N 7569 695
Project:	Ashburton Solar Salt Project	Ground Surface Elevation:	+1.0m AHD
	Phase 2 Site Investigation	Total Depth:	0.9m
Job No.:	12516706	Commenced:	06-Mar-20
		Completed:	06-Mar-20
		Equipment:	Operator: DO

Equipment: Hang Auger	Logged:	DO	06-Mar-20
Hole Diameter (mm): 60	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.05 [+1.0]	Qw		CH	Sandy CLAY Medium to high plasticity, brown; sand is fine to medium grained, of quartz.	W>PL	VS			0.1 m, large vane: SU= 5.0 kPa (peak), 2.5 kPa (residual) 0.2 m, large vane: SU= 6.5 kPa (peak), 3.0 kPa (residual)	
		0.30 [+0.7]			ML	Sandy SILT Low to medium plasticity, grey; sand is fine to medium grained, of quartz.	W>LL					0.3 m, large vane: SU= 10.5 kPa (peak), 4.0 kPa (residual) Pushed a U63 tube adjacent to the hole to 0.32m refusal. 100% rec.
	Groundwater Encountered at 0.4m	0.55 [+0.5]	Qt		CH	Sandy CLAY High plasticity, brown; sand is fine to medium grained, of quartz.	W>PL	F			0.4 m, large vane: SU= 30.0 kPa (peak), 14.5 kPa (residual) 0.5 m, large vane: SU= 44.0 kPa (peak), 18.5 kPa (residual)	
		0.85 [+0.2]							St			0.6m, large vane: SU= >60.0 kPa (peak), (p) (residual) 0.62m, HSV refusal
						Termination Depth = 0.85m (Near Refusal)					ASS samples taken at 0.25 m, 0.5 m and 0.75 m	



HAND AUGER LOG

Location No.: **Tr_Au01**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 273, N 7585 305
Ground Surface Elevation: +2.1m AHD **Total Depth:** 1.5m
Commenced: 18-Nov-19 **Completed:** 18-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	18-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
	Groundwater Not Encountered	0.80 [+1.3]	Qe		SP	SAND Fine to medium grained, rounded of quartz; orange-brown; trace fines; with root fibres; calcareous; uncemented.	D	L				
					M							
1						0.3 m: loss of root fibres. 0.35 m: Sand becoming sub-angular and non-calcareous.						
			Czp		CH	Sandy CLAY High plasticity; orange-brown; sand is fine to medium grained of quartz; non-calcareous.	W>PL	S-F			0.8 m, large vane: SU= 16.0 kPa (peak), 12.5 kPa (residual) 0.9 m, large vane: SU= 33.0 kPa (peak), 19.0 kPa (residual)	
							1.05 m: Becoming CLAY with Sand.					1.1 m, large vane: SU= 45.0 kPa (peak), 12.0 kPa (residual) 1.2 m, large vane: SU= 35.0 kPa (peak), 7.5 kPa (residual) 1.3 m, large vane: SU= 15.0 kPa (peak), 6.0 kPa (residual)
		1.50 [+0.6]				1.35 m: 50mm pocket of sand; fine to medium-grained.						
						Termination Depth = 1.5m (Target Depth)						



HAND AUGER LOG

Location No.: **Tr_Au03**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 271, N 7585 296
Ground Surface Elevation: +1.6m AHD **Total Depth:** 2.1m
Commenced: 24-Nov-19 **Completed:** 24-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger Hole Diameter (mm): 75	Logged:	SD	24-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.25 [+1.4]	Qe		SP-SC	Clayey SAND Fine to medium grained, sub-rounded of quartz; brown; non-plastic; calcareous; uncemented	M	L- MD				
		0.40 [+1.2]	Qt		CH	Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-rounded of quartz; calcareous. 0.35 m: Becoming CLAY with sand; fine grained, sub-angular.	W~PL	F			0.3 m, large vane: SU= 58.0 kPa (peak), 23.0 kPa (residual) 0.4 m, large vane: SU= 40.0 kPa (peak), 14.0 kPa (residual)	
					SP	SAND Fine to medium grained, sub-angular of quartz; orange-brown; calcareous; uncemented. 0.75 m: Addition of trace fines; non-plastic.	D	MD				
		0.85 [+0.8]			CH	Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-angular to sub-rounded of quartz; non-calcareous; uncemented.	W>PL	F			0.9 m, large vane: SU= 30.0 kPa (peak), 6.5 kPa (residual)	
		1.05 [+0.6]			CH	0.95 m: Becoming mottled brown and pale brown. CLAY High plasticity; grey mottled pale grey; non- calcareous.		VS- S			1.0 m, large vane: SU= 16.5 kPa (peak), 5.0 kPa (residual) 1.1 m, large vane: SU= 13.5 kPa (peak), 2.5 kPa (residual)	
		1.50 [+0.1]				Infered as above.	W>LU	VS			1.3 m, large vane: SU= 17.5 kPa (peak), 2.0 kPa (residual)	
		2.10 [-0.5]				Termination Depth = 2.1m (Target Depth)		S-F			2 m, large vane: SU= 16.5 kPa (peak), 6.5 kPa (residual)	

GENERAL LOG: 12516706.GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.:

Tr_Au08

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd	Coordinates: E 270 266, N 7585 272
Project: Ashburton Solar Salt Project Phase 2 Site Investigation	Ground Surface Elevation: +1.3m AHD Total Depth: 1.9m
Job No.: 12516706	Commenced: 18-Nov-19 Completed: 18-Nov-19
	Equipment: Hand Auger Operator: SD

Equipment: Hand Auger	Logged: SD	18-Nov-19
	Processed: ZW	21-Oct-20
	Checked: <i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+1.3]			SC SP SC	CRUST Halite crystals up to 3 mm.	M	L- MD				
		0.25 [+1.1]	Qt		CH	Clay High plasticity; brown; with sand, fine to medium grained of quartz; non-calcareous; uncemented. 0.3 m: Becoming Sandy CLAY.	W>PL	S-F			0.3 m, large vane: SU= 21.0 kPa (peak), 7.0 kPa (residual) 0.4 m, large vane: SU= 21.0 kPa (peak), 9.0 kPa (residual) 0.5 m, large vane: SU= 25.0 kPa (peak), 15.0 kPa (residual)	
		0.75 [+0.6]			CH	CLAY High plasticity; mottled pale grey and grey; trace sand, medium grained of quartz; non-calcareous.	VS			0.75 m, large vane: SU= 7.5 kPa (peak), 2.5 kPa (residual) 0.9 m, large vane: SU= 15.0 kPa (peak), 2.0 kPa (residual)		
			Qw					S-F			1.5 m, large vane: SU= 11.0 kPa (peak), 6.0 kPa (residual)	
									F			1.75 m, large vane: SU= 24.0 kPa (peak), 2.5 kPa (residual)
		1.85 [-0.6]				Termination Depth = 1.85m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.:

Tr_Au10

Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 263, N 7585 263
Ground Surface Elevation: +1.1m AHD **Total Depth:** 1.7m
Commenced: 24-Nov-19 **Completed:** 24-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	24-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+1.1]			CH	CRUST Halite crystals up to 3 mm; white mottled brown, trace fines.	W>PL	S-F				
		0.20 [+0.9]			SP	Sandy CLAY High plasticity; brown; sand is fine to coarse grained, sub-angular to sub-rounded of quartz; calcareous.	M	L			0.15 m, large vane: SU= 29.5 kPa (peak), 15.5 kPa (residual)	
		0.30 [+0.8]	Qt		CH	SAND Fine to medium grained, sub-angular to sub-rounded of quartz; orange-brown; trace fines; non-calcareous; uncemented.	W>PL	S-F			0.3 m, large vane: SU= 30.0 kPa (peak), 21.0 kPa (residual)	
		0.60 [+0.5]			CH	CLAY High plasticity; brown; with sand, fine to coarse grained, sub-angular to sub-rounded of quartz; non-calcareous. 0.4 m: Addition of trace gravel, fine; angular of salt.		VS-S			0.45 m, large vane: SU= 16.5 kPa (peak), 3.5 kPa (residual)	
		0.95 [+0.2]			CH	CLAY High plasticity; mottled grey and pale grey; non-calcareous. 0.9 m: Becoming grey with trace sand; fine grained. Inferred as above.		VS			0.7 m, large vane: SU= 9.5 kPa (peak), 1.0 kPa (residual) 0.85 m, large vane: SU= 10.0 kPa (peak), 2.0 kPa (residual)	
1		1.30 [-0.2]	Qw		CH	CLAY High plasticity; mottled grey and dark grey; non-calcareous.	W>PL	S-F			1.1 m, large vane: SU= 1.0 kPa (peak), 0 kPa (residual) 1.4 m, large vane: SU= 19.0 kPa (peak), 3.5 kPa (residual)	
		1.70 [-0.6]				Termination Depth = 1.7m (Target Depth)		F-St			1.5 m, large vane: SU= 55.0 kPa (peak), 25.0 kPa (residual) 1.7 m, large vane: SU= 65.0 kPa (peak), 45.0 kPa (residual)	

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.: **Tr_Au30**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 222, N 7585 065
Ground Surface Elevation: +1.0m AHD **Total Depth:** 1.5m
Commenced: 18-Nov-19 **Completed:** 18-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger
Hole Diameter (mm): 75
Logged: SD 18-Nov-19
Processed: ZW 21-Oct-20
Checked: *[Signature]*

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+1.0]			CH	CRUST Halite crystals up to 30 mm; white.	W>PL	S				
		0.35 [+0.7]	Qt		CH	CLAY High plasticity; brown; with sand, fine to coarse grained, sub-angular of quartz and salt; non-calcareous 20-30 mm: Crust of salt crystals at surface, white, coarse grained (sand). 0.1 m: Sand becoming fine to coarse grained.					0.3 m, large vane: SU= 16.0 kPa (peak), 5.5 kPa (residual)	
	▽				CH	CLAY High plasticity; mottled pale brown and pale grey; trace sand, fine grained, of quartz? 0.45 m: Becoming grey.	W	S- VS			0.5 m, large vane: SU= 9.0 kPa (peak), 2.5 kPa (residual)	
1			Qw			1.0 m: Becoming pale grey, trace sand becoming fine to medium grained. 1.25 m: Becoming dark grey, loss of sand.				F	0.7 m, large vane: SU= 11.0 kPa (peak), 3.0 kPa (residual) 1.0 m, large vane: SU= 20.0 kPa (peak), 3.5 kPa (residual) 1.2 m, large vane: SU= 46.0 kPa (peak), 6.5 kPa (residual)	1
		1.50 [-0.5]				Termination Depth = 1.5m (Target Depth)					1.35 m, large vane: SU= 56.0 kPa (peak), 9.0 kPa (residual) 1.5 m, large vane: SU= 52.5 kPa (peak), 20.5 kPa (residual)	

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.: **Tr_Au50**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 212, N 7585 018
Ground Surface Elevation: +1.5m AHD **Total Depth:** 1.5m
Commenced: 18-Nov-19 **Completed:** 18-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	18-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)	
		[+1.5]			CH	CRUST Halite crystals up to 1 mm.	W>PL	S-F					
		0.10 [+1.4]	Qt		SW-SC	CLAY High plasticity; brown; trace sand, fine to coarse grained, sub-angular of quartz and salt.	M	L					
		0.40 [+1.1]			CH	CLAY High plasticity; mottled pale grey and grey; trace sand; fine-grained.	W>PL	VS-S				0.55 m, large vane: SU= 8.0 kPa (peak), 2.0 kPa (residual)	
1			Qw						S		0.75 m, large vane: SU= 19.0 kPa (peak), 2.0 kPa (residual)		
										S-F		1.0 m, large vane: SU= 28.0 kPa (peak), 4.0 kPa (residual)	1
										F		1.3 m, large vane: SU= 32.0 kPa (peak), 10.0 kPa (residual)	
		1.50 [+0.0]				Termination Depth = 1.5m (Target Depth)					1.5 m, large vane: SU= 50.0 kPa (peak), 18.0 kPa (residual)		



HAND AUGER LOG

Location No.: **Tr_Au60**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 199, N 7584 943
Ground Surface Elevation: +1.1m AHD **Total Depth:** 1.7m
Commenced: 18-Nov-19 **Completed:** 20-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	20-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.10 [+1.0]	Qe		SC	Clayey SAND Fine to medium grained, sub-angular of quartz; pale brown; non-plastic; calcareous; uncemented.	D	L				
		0.20 [+0.9]	Qt		CH	Sandy CLAY High plasticity; pale brown; sand is fine to medium grained, sub-angular to angular of quartz; calcareous.	W>PL	S-F			0.2 m, large vane: SU= 26.0 kPa (peak), 15.5 kPa (residual)	
		0.40 [+0.7]			SC	Clayey SAND Fine to medium grained, sub-angular of quartz; pale brown; non-plastic; calcareous; uncemented. 0.3 m: Becoming orange-brown, trace fines.	M	L			0.5 m, large vane: SU= 18.0 kPa (peak), 9.5 kPa (residual)	
		0.60 [+0.5]	Qw		CH	Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-angular of quartz; non-calcareous.	W>PL	S-F			0.8 m, large vane: SU= 23.0 kPa (peak), 8.0 kPa (residual)	
		1.0			CH	CLAY High plasticity; mottled grey and pale grey; trace sand, fine grained; non-calcareous.					1.0 m, large vane: SU= 12.0 kPa (peak), 4.0 kPa (residual)	
		1.1							VS-S		1.1 m, large vane: SU= 19.0 kPa (peak), 4.0 kPa (residual)	
		1.3								1.3 m, large vane: SU= 15.0 kPa (peak), 2.0 kPa (residual)		
		1.5								1.5 m, large vane: SU= 20.0 kPa (peak), 4.0 kPa (residual)		
		1.70 [+0.6]				1.55 m: Becoming dark grey.			S-F		1.7 m, large vane: SU= 50.0 kPa (peak), 7.5 kPa (residual)	
						Termination Depth = 1.7m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.: **Tr_Au75**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 183, N 7584 864
Ground Surface Elevation: +1.0m AHD **Total Depth:** 1.8m
Commenced: 20-Nov-19 **Completed:** 20-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	20-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.20 [+0.8]			CH	CLAY High plasticity; brown; with sand, fine to medium grained, sub-angular of quartz; calcareous 1 to 3 mm thick crust of sand at surface; fine to coarse grained of quartz and salt.	W>PL	S-F			0.2 m, large vane: SU= 28.0 kPa (peak), 20.5 kPa (residual)	
		0.30 [+0.7]			SP	SAND Fine to medium grained, sub-angular of quartz; orange-brown; trace fines, non-plastic; non-calcareous; uncemented.	M	L-MD				
		0.50 [+0.5]			SP-SC	0.3 m: Becoming Clayey SAND; brown. 0.35 m: Addition of trace gravel; fine grained, angular of granite.						
					CH	CLAY High plasticity; brown; with sand, fine to coarse grained, sub-angular of quartz; trace gravel, fine grained, angular of salt; non-calcareous.	W>PL	S-F			0.55 m, large vane: SU= 52.0 kPa (peak), 13.0 kPa (residual)	
						0.8 m: loss of sand content.					0.65 m, large vane: SU= 46.0 kPa (peak), 13.0 kPa (residual)	
											0.85 m, large vane: SU= 26.0 kPa (peak), 1.5 kPa (residual)	
											1.05 m, large vane: SU= 38.0 kPa (peak), 6.5 kPa (residual)	
											1.3 m, large vane: SU= 40.0 kPa (peak), 6.5 kPa (residual)	
								S			1.4 m, large vane: SU= 27.0 kPa (peak), 6.0 kPa (residual)	
						1.5 m: Loss of gravel; sand is fine to medium, sub-angular to sub-rounded of quartz.					1.6 m, large vane: SU= 16.5 kPa (peak), 11.0 kPa (residual)	
		1.80 [-0.8]				1.75 m: With bivalve shells, intact, 15 x 20 mm.						
						Termination Depth = 1.8m (Target Depth)						

GENERAL LOG 12516706 GINT.GPJ_GHDLB.GDT 21-10-20



HAND AUGER LOG

Location No.: **Tr_Au91**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 178, N 7584 851
Ground Surface Elevation: +1.0m AHD **Total Depth:** 1.6m
Commenced: 24-Nov-19 **Completed:** 24-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	24-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+1.0]			SW	CRUST Halite crystals up to 10 mm.	D	L- MD				
		0.20 0.20			SW-SC	SAND Fine to coarse, typically fine to medium grained, sub-angular of quartz; brown; trace fines, non-plastic; non-calcareous; uncemented. 1 to 10 mm duricrust of sand and salt at surface. 0.2 m: Becoming Clayey SAND.						
		0.30 [+0.7]			CH	CLAY High plasticity; brown; with sand; fine to coarse grained, sub-angular to sub-rounded, fine to medium of quartz, coarse of salt; calcareous. 0.4 m: Non-calcareous, trace sand of halite, addition of trace gravel; fine grained, angular, of halite. 0.6 m: Becoming mottled brown and black (non-organic). 0.7 m: Loss of gravel fraction. 0.9 m: Regain of gravel fraction. 0.95 m: Rare shells, 15mm, non-intact. 1.1 m: Frequent shells, non-intact, size 5 to 20mm, include possible bivalve, oyster and gastropod; loss of gravel.	W~PL W>PL	S-F F			0.35 m, large vane: SU= 30.0 kPa (peak), 20.0 kPa (residual) 0.45 m, large vane: SU= 35.5 kPa (peak), 17.5 kPa (residual) 0.55 m, large vane: SU= 39.0 kPa (peak), 16.0 kPa (residual) 0.7 m, large vane: SU= 47.0 kPa (peak), 13.0 kPa (residual) 0.85 m, large vane: SU= 55.5 kPa (peak), 7.0 kPa (residual) 1.05 m, large vane: SU= 52.5 kPa (peak), 18.0 kPa (residual) 1.25 m, large vane: SU= 50.5 kPa (peak), 15.5 kPa (residual) 1.5 m, large vane: SU= 57.5 kPa (peak), 12.5 kPa (residual)	
		1.60 [-0.6]				Termination Depth = 1.6m (Target Depth)					1.65 m, large vane: SU= 45.0 kPa (peak), 8.5 kPa (residual)	

GENERAL LOG 12516706 GINT.GPJ_GHDLIB.GDT 21-10-20



HAND AUGER LOG

Location No.: **Tr_Au94**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 165, N 7584 817
Ground Surface Elevation: +0.9m AHD **Total Depth:** 1.6m
Commenced: 25-Nov-19 **Completed:** 25-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	25-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+0.9]			CH	CRUST Halite crystals up to 3 mm.	W>PL	S				
		0.10 [+0.8]			SW	CLAY High plasticity, brown; trace sand, fine to medium grained, sub-rounded of salt and quartz; calcareous.	D	L-MD			0.2 m, large vane: SU= 21.0 kPa (peak), 15.5 kPa (residual)	
		0.20 [+0.7]	Qt		CH	SAND Fine to coarse grained, sub-angular of quartz; orange-brown; trace fines, non-plastic; non-calcareous.	W>PL	S-F			0.35 m, large vane: SU= 43.5 kPa (peak), 22.5 kPa (residual)	
						CLAY High plasticity, brown; with sand, fine to coarse, sub-angular to angular of salt and quartz; calcareous. From 0.45 m, becoming mottled grey and pale grey; trace sand, fine grained, sub-rounded of quartz; non-calcareous.					0.5 m, large vane: SU= 23.0 kPa (peak), 10.5 kPa (residual)	
						0.75 m: Becoming brown-grey.					0.7 m, large vane: SU= 37.5 kPa (peak), 13.5 kPa (residual)	
											0.85 m, large vane: SU= 34.0 kPa (peak), 7.0 kPa (residual)	
											1 m, large vane: SU= 53.0 kPa (peak), 7.0 kPa (residual)	
1			Qw			0.95 m: Trace shells, less than 15mm, bivalve, not-intact.					1.15 m, large vane: SU= 28.0 kPa (peak), 15.0 kPa (residual)	1
											1.3 m, large vane: SU= 63.0 kPa (peak), 14.0 kPa (residual)	
								F-St			1.45 m, large vane: SU= 45.0 kPa (peak), 14.5 kPa (residual)	
											1.6 m, large vane: SU= 62.5 kPa (peak), 14.5 kPa (residual)	
		1.60 [+0.7]				Termination Depth = 1.6m (Target Depth)						



HAND AUGER LOG

Location No.: **Tr_Au101**
Sheet 1 of 1

Client: K + S Salt Australia Pty Ltd
Project: Ashburton Solar Salt Project
 Phase 2 Site Investigation
Job No.: 12516706
Coordinates: E 270 240, N 7585 164
Ground Surface Elevation: +0.8m AHD **Total Depth:** 1.5m
Commenced: 20-Nov-19 **Completed:** 20-Nov-19
Equipment: Hand Auger **Operator:** SD

Equipment: Hand Auger	Logged:	SD	20-Nov-19
	Processed:	ZW	21-Oct-20
	Checked:	<i>[Signature]</i>	

Hole Diameter (mm): 75

Depth Scale (m)	Water	Depth (m) / [Elev.]	Geological Unit	Graphic Log	Classification	Strata Description <small>(type; colour; fines plasticity or particle characteristics; minor components)</small>	Moisture Condition	Consistency/Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		[+0.8]	Qt		CH	CRUST Halite crystals up to 5 mm; white mottled brown; with sand, fine to medium grained, of quartz. Sandy CLAY High plasticity; brown; sand is fine to medium grained, sub-rounded of quartz; non-calcareous.	W>PL	S-F			1 to 5 mm: Crust of sand at ground surface, fine to medium grained of quartz and salt. 0.2 m, small vane: SU= 15.0 kPa (peak), 4.0 kPa (residual) 0.35 m, small vane: SU= 3.0 kPa (peak), 1.0 kPa (residual) 0.45 m, small vane: SU= 5.0 kPa (peak), 1.5 kPa (residual) 0.55 m, small vane: SU= 6.0 kPa (peak), 1.5 kPa (residual) 0.7 m, small vane: SU= 3.5 kPa (peak), 1.0 kPa (residual)	
		0.40 [+0.4]			CH	CLAY High plasticity; mottled grey and pale grey; trace sand, fine grained, sub-rounded; non-calcareous		VS-S				
		0.70 [+0.1]	Qw			NOT RECOVERED (0.7 to 1.05 m)	W>LL	VS				
		1.05 [-0.3]	Qt		CH	CLAY High plasticity; brown; with sand, fine to medium grained, sub-angular of quartz; non-calcareous.	W>PL	S-F				
		1.50 [-0.7]				Termination Depth = 1.5m (Target Depth)						

Appendix D – Offshore (Vibracore) Sediment Logs



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED01

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbridgi, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocore Total Depth (m) 2 Diameter (mm) 101	Easting 266990 Northing 7588603 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED01_0.0			ML: Clayey SILT low plasticity, well sorted, rounded, grey-brown, with fine to coarse sized angular shells and trace fine grained sand.	S	VL	No staining, no odour	-0.2
0.4			SED01_0.3-0.6 (Composite sample)		/ / / /	SC: Clayey SAND low plasticity, well sorted, fine grained, sub-rounded to rounded, red-brown, with silt.	VM	MD		-0.4
1.0			SED01_1.0		/ / / /					-1.0
1.2					/ / / /	CL: Sandy CLAY low plasticity, fine grained, well sorted, sub-rounded, red-brown, with silt and some fine to medium sized angular calcarenite gravel.	VM	ST		-1.2
1.4			SED01_1.5		/ / / /	- becoming fine to coarse sized gravel from 1.4 m.				-1.4
2.0			SED01_2.0		/ / / /	Termination Depth at: 2.00 m. Refusal, hard drilling.				-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC - Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED02

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2.5 Diameter (mm) 101	Easting 267057 Northing 7588537 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED02_0.0 - 0.3 (Composite sample)			ML: Clayey SILT low plasticity, well sorted, rounded, brown, with fine to coarse sized angular shells, trace fine grained sand.	S	VL	No odour, no staining	-0.2
0.4			SED02_0.5			SC: Clayey SAND well sorted, fine grained, sub-rounded to rounded, red-brown, with silt and low plasticity.	VM	MD		-0.4
1.0			SED02_1.0							-1.0
1.2						CL: Sandy CLAY low plasticity, fine grained, well sorted, sub-rounded, red-brown with silt.	VM	ST		-1.2
1.4			SED02_1.5			with fine to medium sized angular calcarenite gravel from 1.3 m.				-1.4
2.0			SED02_2.0			becoming fine to coarse sized gravel from 2.0 m.				-2.0
2.4			SED02_2.5							-2.4
2.6						Termination Depth at: 2.50 m. Refusal, hard drilling.				-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

SOIL BORE SED03

ENVIRONMENTAL-SOIL BORE

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2.2 Diameter (mm) 101	Easting 266978 Northing 7588557 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	VC		SED03_0.0			ML: Clayey SILT low plasticity, well sorted, rounded, brown with some fine to coarse sized angular shells and shell fragments, trace rounded fine-grained sand.	S	S	No odour, no staining	-0.2
0.2			SED03_0.25							-0.4
0.4			SED03_0.3 - 0.6 (Composite sample)			SC: Clayey SAND well sorted, fine to medium grained, subrounded to rounded, red-brown with silt and low plasticity with a thin band of dark grey sand with fine sized shells between 0.4-0.41 m.	VM	MD		-0.6
0.6						with a thin band of grey-brown sand with fine sized shells between 0.6-0.61 m.				-0.8
0.8			SED03_0.75							-1.0
1.0			SED03_1.0							-1.2
1.2			SED03_1.25			CI: Sandy CLAY medium plasticity, fine to medium grained, well sorted, sub-rounded, red-brown with silt.	VM	ST		-1.4
1.4			SED03_1.5			with some medium sized angular calcarenite gravel from 1.4 m.				-1.6
1.6										-1.8
1.8			SED03_1.75							-2.0
2.0			SED03_2.0							-2.2
2.2						Termination Depth at: 2.20 m. Refusal, hard drilling.				-2.4
2.4										-2.6
2.6										-2.8
2.8										-3.0

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED04

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocore Total Depth (m) 2.2 Diameter (mm) 101	Easting 267000 Northing 7588580 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED04_0.0			ML: Clayey SILT low plasticity, well sorted, rounded, grey-brown with fine to coarse sized shells and shell fragments and a trace of rounded fine-grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED04_0.5							-0.4
0.6						SC: Clayey SAND well sorted, fine grained, subrounded to subangular, red-brown with silt and low plasticity.	VM	MD		-0.6
0.8										-0.8
1.0			SED04_1.0							-1.0
1.2						CI: Sandy CLAY medium plasticity, fine grained, well sorted, sub-rounded, red-brown with silt and fine to medium sized angular calcarenite gravel.	VM	ST		-1.2
1.4			SED04_1.5			becoming fine to coarse sized gravel from 1.2 m.				-1.4
1.6										-1.6
1.8										-1.8
2.0			SED04_2.0 - 2.2 (Composite sample)							-2.0
2.2						Termination Depth at: 2.20 m. Refusal, hard drilling.				-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED05

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 05/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2.4 Diameter (mm) 101	Easting 267005 Northing 7588552 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED05_0.0			ML: Clayey SILT low plasticity, well sorted, subrounded, brown, with coarse sized angular shells and a trace of fine grained rounded sand.	S	VS	No odour, no staining	-0.2
0.4			SED05_0.5			SC: Clayey SAND well sorted, fine to medium grained, sub-rounded, red-brown with silt and low plasticity.	VW	MD		-0.4
1.0			SED05_1.0 - 1.2 (Composite sample)			with fine to medium sized angular calcarenite gravel from 1.2 m.				-1.0
1.4			SED05_1.5			with a band of dark grey clayey sand between 1.4 - 1.6 m.				-1.4
1.8			SED05_2.0			SC: Gravelly CLAYEY SAND well sorted, fine to medium grained, sub rounded, red-brown; fine to coarse sized angular calcarenite gravel; with silt.	VW	D		-1.8
2.4			SED05_2.4			Termination Depth at: 2.40 m. Refusal, hard drilling.				-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED06

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2 Diameter (mm) 101	Easting 267017 Northing 7588530 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED06_0.0			ML: Clayey SILT low plasticity, well sorted, sub angular, brown with fine to coarse sized shells and a trace of fine grained rounded sand.	S	VS	No odour, no staining	-0.2
0.6			SED06_0.5 - 0.7 (Composite sample)			SC: Clayey SAND well sorted, fine to medium grained, sub angular to sub rounded, red-brown with silt and low plasticity.	VM	MD		-0.6
1.0			SED06_1.0							-1.0
1.5			SED06_1.5							-1.5
1.6						Cl: Sandy CLAY medium plasticity, fine to medium grained, well sorted, sub-rounded, red-brown with silt and fine to medium sized angular calcarenite gravel.	VM	ST		-1.6
2.0			SED06_2.0			Termination Depth at: 2.00 m. Refusal, hard drilling.				-2.0

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

SOIL BORE SED07

ENVIRONMENTAL-SOIL BORE

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 05/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocore Total Depth (m) 2.7 Diameter (mm) 101	Easting 267056 Northing 7588503 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED07_0.0 - 0.4 (Composite sample)			ML: Clayey SILT low plasticity, well sorted, sub rounded to sub angular, brown and grey with fine to large sized angular shells, trace fine grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED07_0.5							-0.4
0.6										-0.6
0.8						SC: Clayey SAND well sorted, fine to medium grained, sub rounded, red-brown with silt, fine to medium sized calcarenite angular gravel, low plasticity.	VW	MD		-0.8
1.0			SED07_1.0							-1.0
1.2										-1.2
1.4			SED07_1.5							-1.4
1.6										-1.6
1.8										-1.8
2.0			SED07_2.0							-2.0
2.2										-2.2
2.4			SED07_2.5							-2.4
2.6			SED07_2.7			becoming fine to coarse sized gravel from 2.6 m.				-2.6
2.8						Termination Depth at: 2.70 m. refusal, hard drilling.				-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

SOIL BORE SED08

ENVIRONMENTAL-SOIL BORE

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 05/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 1.5 Diameter (mm) 101	Easting 267061 Northing 7588474 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED08_0.0			ML: Clayey SILT low plasticity, well sorted, rounded, brown, with some large sized angular shells, trace fine grained rounded sand.	S	VS	No odour, no staining	-0.2
0.4			SED08_0.3 - 0.6 (Composite sample)			SC: Clayey SAND well sorted, fine grained, sub rounded, red-brown with silt, trace fine to medium sized calcarenite gravel.	VM	MD		-0.4
0.6										-0.6
0.8						Core loss from 0.7 m				-0.8
1.0										-1.0
1.2										-1.2
1.4										-1.4
1.6						Termination Depth at: 1.50 m. Refusal, hard drilling.				-1.6
1.8										-1.8
2.0										-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

SOIL BORE SED08A

ENVIRONMENTAL-SOIL BORE

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbridgi, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 1.3 Diameter (mm) 101	Easting 267061 Northing 7588474 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED08A_0.0			ML: Clayey SILT low plasticity, well sorted, rounded, brown, with large sized angular shells, trace fine grained rounded sand.	VM	F	No odour, no staining	-0.2
0.4			SED08A_0.5			SC: Clayey SAND well sorted, fine grained, sub rounded, red-brown with silt, trace fine to medium sized calcarenite gravel.	VM	MD		-0.4
1.0			SED08A_1.0							-1.0
1.2			SED08A_1.3			becoming fine to coarse sized gravel from 1.2 m.				-1.2
1.4						Termination Depth at: 1.30 m. Refusal, hard drilling.				-1.4
1.6										-1.6
1.8										-1.8
2.0										-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED09

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 05/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocore Total Depth (m) 1.7 Diameter (mm) 101	Easting 267083 Northing 7588464 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED09_0.0 - 0.3 (Composite sample)			ML: Clayey SILT low plasticity, well sorted, sub rounded, grey-brown with large sized angular shells, trace fine grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED09_0.5			SC: Clayey SAND well sorted, fine to medium grained, sub rounded to sub angular, red-brown with silt and low plasticity.	VM	MD		-0.4
1.0			SED09_1.0							-1.0
1.2			SED09_1.5			SC: Gravelly CLAYEY SAND well sorted, fine to medium grained, subrounded; red-brown; fine to medium sized angular calcarenite gravel; with silt.	VM	MD		-1.2
1.6			SED09_1.7							-1.6
1.8						Termination Depth at: 1.70 m. Refusal, hard drilling.				-1.8
2.0										-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocore	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED10

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 05/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2.4 Diameter (mm) 101	Easting 267095 Northing 7588477 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED10_0.0			ML: Clayey SILT low plasticity, well sorted, sub rounded, brown with coarse sized angular shells, trace fine grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED10_0.5			SC: Clayey SAND well sorted, fine to medium grained, sub rounded, red-brown with silt and low plasticity.	VM	MD		-0.4
1.0			SED10_1.0							-1.0
1.2						with some fine to medium sized angular calcarenite gravels from 1.2 m.				-1.2
1.4			SED10_1.5							-1.4
1.6										-1.6
1.8						CI: Sandy CLAY medium plasticity, fine grained, well sorted, sub rounded, red-brown with silt, with fine to coarse sized calcarenite gravel.	VM	ST		-1.8
2.0			SED10_2.0							-2.0
2.2			SED10_2.1 - 2.4 (Composite sample)							-2.2
2.4						Termination Depth at: 2.40 m. Refusal, hard drilling.				-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED11

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 1.9 Diameter (mm) 101	Easting 267117 Northing 7588466 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED11_0.0 - 0.3 (Composite sample)			ML: Clayey SILT low plasticity, well sorted, sub angular, grey-brown with fine to coarse sized angular shells, trace fine grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED11_0.5							-0.4
0.6						SC: Clayey SAND well sorted, fine grained, sub rounded, red-brown with silt and low plasticity. with a band of grey brown clayey silt with fine sized shells between 0.6-0.7 m	VM	MD		-0.6
0.8										-0.8
1.0			SED11_1.0							-1.0
1.2						CL: Sandy CLAY low plasticity, fine grained, well sorted, red-brown, with silt.	VM	ST		-1.2
1.4			SED11_1.5			with fine to medium sized angular calcarenite from 1.2 m.				-1.4
1.6						becoming fine to coarse sized angular calcarenite from 1.4 m.				-1.6
1.8			SED11_1.9							-1.8
2.0						Termination Depth at: 1.90 m. Refusal, hard drilling.				-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE SED12

Page 1 of 1

Client K + S Salt Australia Pty Ltd Project Phase 2 Investigation - ASS Project No. 12516706 Site Proposed Marine Facility Location Turbidge, Onslow 6710 WA Date Drilled 06/02/2020	Drill Co. SEAS Offshore Driller Jim Phipps Rig Type 450 Vibrocorer Drill Method Vibrocoring Total Depth (m) 2.2 Diameter (mm) 101	Easting 267110 Northing 7588426 Grid Ref GDA94_MGA_zone_50 Logged By R Walker Checked By P Baker
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.2	VC		SED12_0.0			ML: Clayey SILT low plasticity, well sorted, sub angular to sub rounded, brown with fine to coarse sized shells, trace fine grained sand.	S	VS	No odour, no staining	-0.2
0.4			SED12_0.5							-0.4
0.6						SC: Clayey SAND well sorted, fine grained, sub rounded, red-brown with silt and low plasticity.	VM	MD		-0.6
0.8										-0.8
1.0										-1.0
1.2			SED12_1.2 - 1.4 (Composite sample)			CI: Sandy CLAY medium plasticity, fine to medium grained, sub-rounded, red-brown with silt, with fine to medium sized angular calcarenite gravel.	VM	ST		-1.2
1.4			SED12_1.5							-1.4
1.6						becoming fine to coarse sized gravel from 1.5 m.				-1.6
1.8										-1.8
2.0										-2.0
2.2			SED12_2.2			Termination Depth at: 2.20 m. Refusal, hard drilling.				-2.2
2.4										-2.4
2.6										-2.6
2.8										-2.8

Notes Depth of seawater between 3.5 - 4 m.

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler, VC-Vibrocoring	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

Appendix E – Laboratory Result Tables

Table	Description
E-1	Soil laboratory analysis
E-2	Groundwater laboratory analysis
E-3	Sediment laboratory analysis
E-4	Elutriate laboratory analysis
E-5	Soil RPDs



Definitions:

"-" - denotes not analysed

ANZECC - Australian and New Zealand Environment and Conservation Council

ANZG - Australian New Zealand Guidelines

ARMCANZ - Agriculture and Resource Management Council of Australia and New Zealand

ASS - Acid Sulfate Soil

CRS - Chromium Reducible Sulfur

DER - Department of Environmental Regulation

EIL - Ecological investigation levels

LOR - Limit of reporting

ND - No detect

NEPM - National Environmental Protection Measure

NPUG - Non-potable use guidelines

OCP - Organochlorine pesticides

PAH - Polycyclic aromatic hydrocarbon

PCB - Polychlorinated biphenyl

SPOCAS - Peroxide Oxidation Combined Acidity and Sulphur

SQG - Sediment quality guidelines

TPH - Total petroleum hydrocarbons

Notes:

ANZECC 2018 SQG

Values taken from: ANZECC & ARMCANZ (2018), Toxicant default guideline values for sediment quality. Available from: <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants>
Where no revised 2018 guideline has been assigned for an analyte the 2000 value has been assumed.

ANZG (2018) - Marine water - 95% level of species protection

Values taken from: ANZECC & ARMCANZ (2018), Default guideline values. Available from: <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default>

DER 2014 Non-potable Groundwater Use (NPUG)

Values taken from: Department of Environmental Regulation (DER) (2014), Assessment and management of contaminated sites: Contaminated sites guidelines, December 2014.

NEPM 2013 EIL-Areas of Ecological Significance

Values taken from: National Environmental Protection Measure (NEPM) (2013), Schedule B1: Guideline on Investigation Levels For Soil and Groundwater.

WA DER 2015 ASS Criteria

Values taken from: Department of Environment Regulation (DER) (2015), Acid Sulfate Soil Guideline Series: Identification and investigation of acid sulfate soils and acidic landscapes
Dissolved Aluminium value relates to water with a pH > 6.50, no guideline is available for water with pH < 6.50.



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail					ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon		
	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO3	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
AU01	AU01_0.25	0.25	9.5	7.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_0.5	0.5	9.4	9.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_0.75	0.75	9.5	9.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_1	1	9.5	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_1.25	1.25	9.4	9.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_1.5	1.5	9.8	9.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_1.75	1.75	9.7	7.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_2	2	9.5	9.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_2.25	2.25	9.9	7.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_2.5	2.5	9.9	7.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_2.75	2.75	9.9	9.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU01	AU01_3	3	9.6	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_0.25	0.25	8.7	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_0.5	0.5	9.5	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_0.75	0.75	8.5	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_1	1	8.3	7.6	2	8.6	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.7	350	0.56	0.3	499.5
AU02	AU02_1.25	1.25	8.4	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_1.5	1.5	9	7.5	2	9.1	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	4.5	890	1.4	-	-
AU02	AU02_1.75	1.75	8.6	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_2	2	8.5	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_2.25	2.25	8.8	7.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_2.3	2.3	8.9	6.8	4	9.3	-	<2	<0.003	<2	-	-	-	0.21	130	-	-	-	-	130	0.21	6.9	1400	2.2	0.9	1498.5
AU02	AU02_2.5	2.5	9	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU02	AU02_2.75	2.75	9.2	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_0.25	0.25	8.5	7.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_0.5	0.5	8.3	7.8	4	9.2	-	<2	<0.003	<2	-	-	-	0.2	130	-	-	-	-	130	0.2	6.4	1300	2.1	-	-
AU03	AU03_0.75	0.75	8.4	8.1	4	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	2.8	-	-	-	
AU03	AU03_1	1	8.8	7.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_1.25	1.25	8.7	7.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_1.5	1.5	8.8	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_1.75	1.75	8.8	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_2	2	8.6	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_2.25	2.25	8.6	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU03	AU03_2.5	2.5	8.6	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_0.25	0.25	8.7	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_0.5	0.5	9	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_0.75	0.75	9	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_1	1	8.6	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_1.25	1.25	8.3	8.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_1.5	1.5	8.3	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_1.75	1.75	9	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_2	2	9.1	8.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_2.25	2.25	9.2	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_2.5	2.5	8.7	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_2.75	2.75	9.1	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU101	AU101_3	3	8.7	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU102	AU102_0.25	0.25	7.8	8.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU102	AU102_0.5	0.5	7.7	8	4	9	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2.7	540	0.86	0.3	499.5
AU102	AU102_0.75	0.75	7.9	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU102	AU102_1	1	8.3	8.9	4	9.1	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.5	310	0.49	-	-
AU102	AU102_1.25	1.25	8.4	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU102	AU102_1.5	1.5	8.3	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail						ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon	
	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	0.1	<4	<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	8.4	8.7	4	8.3	-	<2	<0.003	<2	-	-	-	0.006	3.9	-	-	-	-	<10	<0.02	0.9	180	0.29	0.2	333	
AU102	AU102_1.75	1.75	8.4	8.7	4	8.3	-	<2	<0.003	<2	-	-	-	0.006	3.9	-	-	-	-	<10	<0.02	0.9	180	0.29	0.2	333	
	AU102_2	2	8.4	9.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU102_2.25	2.25	8.3	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU102_2.5	2.5	8.5	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU102_2.75	2.75	8.2	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU102_3	3	8.4	8.9	4	8.3	-	<2	<0.003	<2	-	-	-	0.005	3.4	-	-	-	-	<10	<0.02	0.78	160	0.25	0.1	166.5		
AU20	AU20_0.25	0.25	8.5	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_0.5	0.5	8.5	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_0.75	0.75	8.4	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_1	1	8.2	7.6	2	8.7	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.9	390	0.62	-	-	
	AU20_1.25	1.25	8.4	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_1.5	1.5	8.4	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_1.75	1.75	8.4	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_2	2	8.6	8.4	4	8.7	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	5.7	1100	1.8	-	-	
	AU20_2.25	2.25	8.4	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU20_2.5	2.5	8.5	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU20_2.75	2.75	8.8	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU20_3	3	8.8	9.3	4	8.9	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2	390	0.63	-	-	
AU60	AU60_0.25	0.25	9.2	9.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU60_0.5	0.5	9.3	10	4	9.2	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	34	6900	11	-	-	
	AU60_0.75	0.75	9.2	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU60_1	1	9.1	9.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU60_1.25	1.25	9.1	9.1	4	9.2	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	18	3500	5.6	-	-	
	AU60_1.5	1.5	9.2	9.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU60_1.75	1.75	9.2	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU60_2	2	8.9	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU60_2.25	2.25	8.7	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU60_2.5	2.5	9	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU60_2.75	2.75	9.2	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU60_3	3	9	8.8	4	8.8	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	9.6	1900	3.1	-	-	
AU66	AU66_0.25	0.25	9.1	7.9	4	9.1	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2.8	560	0.89	-	-	
	AU66_0.5	0.5	9	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_0.75	0.75	8.8	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_1	1	8.1	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_1.25	1.25	8.5	9.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_1.5	1.5	8.2	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_1.75	1.75	8.4	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_2	2	8.3	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU66_2.25	2.25	8.6	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU66_2.5	2.5	8.9	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AU66_2.75	2.75	8.5	7.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU66_3	3	8.4	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU70	AU70_0.25	0.25	8.6	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_0.5	0.5	8.8	7.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_0.75	0.75	9.1	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_1	1	9	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_1.25	1.25	9.4	9.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_1.5	1.5	9.6	9.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_1.75	1.75	9.5	9.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_2	2	9.6	9.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AU70_2.25	2.25	9.7	8.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU70_2.5	2.5	9.7	7.9	4	9.3	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.9	370	0.59	-	-		



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail					ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon		
	pH (Field)	pH _{fox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	pH (Field)	pH _{fox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion	
AU70	AU70_2.75	2.75	9.4	9.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU70_3	3	9.7	9.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU74	AU74_0.25	0.25	8.2	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_0.3	0.3	7.7	8.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_0.5	0.5	7.5	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_1	1	8.3	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_1.25	1.25	8.5	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_1.5	1.5	8.2	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU74_1.75	1.75	8.2	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU74_2	2	7.4	8.8 - 8.9	2 - 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU74_2.25	2.25	7.8	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU74_2.5	2.5	8.1	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU74_2.75	2.75	8.7	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU74_3	3	7.8	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AU74_30.75	30.75	7.1	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU75	AU75_0.25	0.25	8.2	8.8	4	8.6	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.3	250	0.41	-	-	
	AU75_0.75	0.75	8.8	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU75_1.25	1.25	7.3	8.7	4	8.2	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.1	210	0.34	-	-	
	AU75_1.5	1.5	8.1	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU75_1.75	1.75	8.3	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU75_2.25	2.25	8.2	9.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AU75_2.5	2.5	8.1	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	AU75_2.75	2.75	7.5	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
AU75_3	3	7.4	8.7	4	8.8	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.7	330	0.53	-	-		
AU75_4	4	8.2	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH01	BH01_1.0	1	8.1	8.2	4	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	5.9	-	-	-	-	
	BH01_6.5	6.5	7.1	7.6	4	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	1.6	-	-	-	-	
BH03	BH03_0.25	0.25	9.4	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_0.5	0.5	8.7	7.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_0.75	0.75	7.8	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_1	1	9.1	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_1.25	1.25	8	7.1	2	8.3	-	<2	<0.003	<2	-	-	<0.005	<3	-	-	-	-	-	<10	<0.02	0.72	140	0.23	0.1	166.5	
	BH03_1.5	1.5	7.5	2	4	5.1	-	10	0.02	430	-	-	-	0.57	350	-	-	-	-	360	0.58	-	-	-	-	-	
	BH03_1.75	1.75	7.8	2.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_2	2	8.3	4.6	4	6.8	-	<2	<0.003	31	-	-	-	0.36	220	-	-	-	-	220	0.36	1.7	330	0.53	0.6	999	
	BH03_2.25	2.25	8.7	7.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_2.5	2.5	8.6	2.8	4	9	-	<2	<0.003	<2	-	-	-	0.31	190	-	-	-	-	190	0.31	3.3	650	1.1	-	-	
	BH03_2.75	2.75	8.7	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH03_3	3	9	7.5	2	9.6	-	<2	<0.003	<2	-	-	-	0.03	19	<0.02	-	-	-	19	0.03	4.6	910	1.5	0.7	1165.5	
	BH03_3.25	3.25	9	7.4	2	9.6	-	<2	<0.003	<2	-	-	-	0.031	19	<0.02	-	-	-	19	0.03	5.9	1200	1.9	-	-	
	BH03_3.4	3.4	9	7.2	4	-	-	-	-	-	-	-	-	0.023	-	-	-	-	-	-	-	5.8	-	-	-	-	
	BH03_3.8	3.8	9.2	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH03_3-3.4	3-3.4	8.8	7.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH03_4	4	9.1	7.6	2	9.8	-	<2	<0.003	<2	-	-	-	0.008	5.1	<0.02	-	-	-	<10	<0.02	11	2200	3.5	1.4	2331		
BH05	BH05_0.2	0.2	6.1	2.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH05_0.25	0.25	8.6	6.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH05_0.5	0.5	8.5	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH05_0.6	0.6	8.9	7.3	2	-	-	-	-	-	-	-	0.006	-	-	-	-	-	-	-	-	42	-	-	-	-	
	BH05_0.75	0.75	8.7	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH05_1	1	8.7	7.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH05_1.25	1.25	9.1	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH05_1.5	1.5	8.9	7.7	2	9.2	-	<2	<0.003	<2	-	-	-	0.007	4.5	<0.02	-	-	-	<10	<0.02	24	4800	7.7	3	4995		



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

			ASS - pH Screening			ASS - pH		ASS - Acidity Trail					ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon		
			pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR			pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t	%	
WA DER 2015 ASS Criteria			0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth																								
BH05	BH05_1.75	1.75	8.8	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_2	2	5.7	4.9	2	5.8	-	7	0.01	22	-	-	-	0.007	4.2	<0.02	-	-	-	11	0.02	-	-	-	-	-
	BH05_2.25	2.25	9.2	7.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_2.5	2.5	9.1	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_2.75	2.75	8.9	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_3	3	7.9	7.5 - 7.8	2	9	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	3.4	690	1.1	-	-
	BH05_3.25	3.25	8.8	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_3.5	3.5	8.4	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_3.75	3.75	8.4	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH05_4	4	8	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05_4.5	4.5	7.8	7.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH05_4.75	4.75	7.7	7.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH05_5	5	7.8	7.2	2	8.4	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	0.9	180	0.29	-	-	
BH07	BH07_0.25	0.25	9	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH07_0.5	0.5	9.1	9.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH07_0.75	0.75	9.1	9.2	4	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	53	-	-	-	-	-	
	BH07_1.0	1	9.3	7.8	2	9.7	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	47	9500	15	6.2	10323
	BH07_1.25	1.25	9.1	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH07_1.5	1.5	9.5	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_1.75	1.75	8.9	7.8	2	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	49	-	-	-	-	-
	BH07_2.0	2	9	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_2.25	2.25	8.8	7.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_2.5	2.5	8.3	7.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_2.75	2.75	9.1	7.7	2	9.4	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	22	4400	7	2.8	4662
	BH07_3.0	3	7.4	7.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_3.25	3.25	8.6	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_3.5	3.5	8.2	7.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH07_3.75	3.75	8.9	7.7	2	9.3	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	2.8	560	0.91	-	-
	BH07_4.0	4	8.6	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07_4.25	4.25	8.8	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH07_4.5	4.5	8.8	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH07_4.75	4.75	9.3	8.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH07_5.0	5	8.7	7.4	2	9.5	-	<2	<0.003	<2	-	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	12	2300	3.7	1.3	2164.5	
BH08_0.5						9.4	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	4.8	950	1.5	-	-	
BH08	BH08_0.25	0.25	9.1	7.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_0.5	0.5	9.2	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_0.75	0.75	8.8	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_1.0	1	9.1	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_1.25	1.25	8.6	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_1.5	1.5	8.8	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_1.75	1.75	8.8	7.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_2.0	2	9.1	7.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_2.25	2.25	8.8	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_2.5	2.5	9.2	7.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_2.75	2.75	9.3	8.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_3.0	3	9	9.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_3.25	3.25	9.1	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_3.5	3.5	9.1	9.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_3.75	3.75	9	9.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH08_4.0	4	9.1	10	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08_4.25	4.25	9.3	9.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH08_4.5	4.5	9	9.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail						ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon	
	pH (Field)	pH _{fox}	Reaction Ratings*	pH Units	PH UNITS	Titrate Actual Acidity	Titrate Actual Acidity (sulfur units)	Titrate Peroxide Acidity	Titrate Peroxide Acidity (sulfur units)	Titrate Sulfidic Acidity	Titrate Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	%S	mole H+/t	%S	%S	mole H+/t	%S	mole H+/t	%S	% CaCO3	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	9	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH08	BH08_4.75	4.75	9	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_5.0	5	9	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH08_5.2	5.2	9.2	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH09	BH09_0.25	0.25	7.5	7	4	8.8	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	0.7	140	0.22	0.2	333
	BH09_0.5	0.5	8.2	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_0.75	0.75	9.1	9.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_1.25	1.25	9.1	9.6	4	9.3	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	13	2700	4.3	-	-
	BH09_1.5	1.5	9.1	9.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_1.5-2.5	1.5-2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_1.75	1.75	9.1	9.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_13.25-14.5	13.25-14.5	8.5	7.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_15.77-16.77	15.77-16.77	9.2	8.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH09_2	2	9.4	9.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_2.25	2.25	9.1	9.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_2.5	2.5	9.4	9.1	4	9.3	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	19	3800	6.2	2.3	3829.5
	BH09_2.75	2.75	9	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_3	3	8.8	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_3.5	3.5	8.7	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_3.75	3.75	8.1	7.7	3	9.2	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	2.5	490	0.78	-	-
	BH09_4	4	9.1	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_4.25	4.25	6.5	7.8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_4.5	4.5	8.2	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH09_4.75	4.75	8.6	7.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09_5	5	8.2	7.4	2	9.3	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	9.6	1900	3.1	1.2	1998	
BH10	BH10_0.25	0.25	7.8	7.2	2	8.4	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	1.1	220	0.35	-	-
	BH10_0.5	0.5	7.9	8.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH10_0.75	0.75	8.5	8.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH10_1.25	1.25	8.5	8.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH10_1.5	1.5	8.4	8.7	2	9	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	0.9	180	0.29	-	-
	BH10_1.75	1.75	8	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_17.0-17.8	17-17.8	8.7	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH10_2	2	8.2	8.3	4	8.9	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	0.89	180	0.28	-	-
	BH10_2.25	2.25	7.4	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_2.5	2.5	7.7	8.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_2.75	2.75	7.8	7	2	8.6	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	0.67	130	0.21	-	-
	BH10_3	3	8.1	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_3.25	3.25	7.4	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_3.5	3.5	7.1	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_3.75	3.75	7	7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_4	4	7	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_4.1-5.0	4.1-5	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	1.1	-	-	-	-
	BH10_4.25	4.25	8	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_4.5	4.5	7.4	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH10_4.5-5.0	4.5-5	7.6	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10_4.75	4.75	6.6	8.9	4	8.9	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	1.1	220	0.35	-	-	
BH10_5	5	7.5	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	BH11_0.25	0.25	8.9	8.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_0.5	0.5	8.5	8.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_0.75	0.75	9	8.1	2	9.2	-	<2	<0.003	<2	-	-	<0.005	<3	<0.02	-	-	-	<10	<0.02	9	1800	2.9	1.2	1998
	BH11_1.0	1	8.9	8.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH11_1.0-1.5	1-1.5	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	16	-	-	-	-	-
BH11_1.0-1.5	1-1.5	9.2	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail						ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon	
	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion	
BH11	BH11_1.25	1.25	8.9	8.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH11_1.5	1.5	9.2	8.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH11_1.75	1.75	9.6	8.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH11_2.0	2	9.1	8.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH11_2.0-2.5	2-2.5	8.6	7.7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH11_2.25	2.25	9	8.2	3	9.4	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	34	6900	11	4.2	6993
	BH11_2.5	2.5	8.9	8.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_2.75	2.75	8.9	8.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_3.0	3	8.9	8.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_3.25	3.25	9.1	8.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_3.5	3.5	9.1	8.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_3.75	3.75	9	8.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_3.8-4.5	3.8-4.5	8.7	7.8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_4.0	4	9.2	8.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH11_4.25	4.25	8.5	8.2	3	9.4	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	12	2300	3.8	-	-
	BH11_4.5	4.5	8.7	8.6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11_4.75	4.75	9	8.8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH11_5.0	5	8.9	8.8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH12	BH12_0.25	0.25	8	7.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12_0.5	0.5	7.8	6	4	9.5	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.1	230	0.36	-	-	
	BH12_1.2-1.5	1.2-1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12_1.25	1.25	8.1	7.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12_1.5	1.5	8.5	7.2	2	9.2	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.87	170	0.28	0.2	333	
	BH12_1.75	1.75	8.5	8.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_12.5-13	12.5-13	7.4	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12_2.25	2.25	8.9	8.8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_3.0	3	9.5	9.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_3.25	3.25	9.4	9.6	3	9.4	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.97	190	0.31	-	-	
	BH12_4.0	4	9.4	8.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_4.25	4.25	9.5	9.5	4	9.5	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2.7	540	0.87	0.4	666	
	BH12_4.5	4.5	9.7	10	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_4.75	4.75	9.8	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12_5.0	5	9.9	10	4	9.5	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	11	2200	3.5	-	-	
	BH12_6.5-7.2	6.5-7.2	9.5	9.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH12A	BH12A_0.75	0.75	8.2	7.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12A_1.0	1	7	5.8	3	8.1	-	<2	<0.003	<2	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.6	120	0.19	-	-		
	BH12A_2.0	2	8.4	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH12A_2.5	2.5	8.9	8.1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12A_2.75	2.75	8.9	9.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH12A_3.5	3.5	9	8.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH13	BH13_1.3-1.5	1.3-1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH13_3.3-3.5	3.3-3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH13_4.0-4.2	4-4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH14	BH14_0.25	0.25	8.1	7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH14_0.5	0.5	7.8	7.2	3	8.6	-	<2	<0.003	<2	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.81	160	0.26	-	-		
	BH14_0.75	0.75	8.2	7.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH14_1.0	1	8.2	7.8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH14_1.0_1.5	1-1.5	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	5.1	-	-	-	-	-		
	BH14_1.0-1.5	1-1.5	7.6	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	BH14_1.25	1.25	8.2	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH14_1.5	1.5	7.7	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

		ASS - pH Screening			ASS - pH		ASS - Acidity Trail					ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon		
		pH (Field)	pH _{FOX}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR		pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t
		0.1	0.1		<4	<4	18	0.03	18	0.03	18	0.03	18	0.03	18	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-
WA DER 2015 ASS Criteria																									

Location ID	Sample ID	Sample depth	6.8	8.2	3	7.7	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.46	93	0.15	-	-	
BH14	BH14_1.75	1.75	6.8	8.2	3	7.7	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.46	93	0.15	-	-	
	BH14_2.0	2	8.1	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_2.25	2.25	8.3	8.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_2.5	2.5	7.3	8.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_2.75	2.75	7.9	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_3.0	3	8.3	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_3.25	3.25	7.9	8.9	3	9.2	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.4	280	0.45	-	-
	BH14_3.5	3.5	8.7	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_3.75	3.75	8.9	8.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_4.0	4	9	8.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_4.25	4.25	8.4	8.2	2	9.3	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	1.5	290	0.46	-	-
	BH14_4.5	4.5	8.4	8.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_4.75	4.75	9	8.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH14_5.0	5	9	8.6	2	9.3	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	4.3	850	1.4	-	-
	BH14_5.0_5.5	5-5.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	1.1	-	-	-	-	
	BH14_5.0-5.5	5-5.5	8.2	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH14_8.0_8.5	8-8.5	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	3	-	-	-	-		
BH14_8.0-8.5	8-8.5	6.9	8.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BH15	BH15_0.25	0.25	7.9	7.2	4	8.9	-	<2	<0.003	<2	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2.1	410	0.66	0.2	333	
	BH15_0.5	0.5	7.7	7.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_0.75	0.75	9	8.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_1	1	8.8	9	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_1.25	1.25	8.7	9.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_1.5	1.5	8.6	9	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_1.75	1.75	7.3	8.7	3	8.9	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	2.2	440	0.71	-	-
	BH15_2	2	8.9	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH15_2.25	2.25	8.5	8.9	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_2.5	2.5	7.3	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_2.5-3.5	2.5-3.5	8.6	8.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_2.75	2.75	8.4	9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_3	3	7	8.8	3	8.1	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	0.83	170	0.26	0.2	333
	BH15_3.25	3.25	8.8	8.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_3.5	3.5	8.2	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_3.75	3.75	8.6	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BH15_4	4	8.1	8.6	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15_4.25	4.25	8.4	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH15_4.5	4.5	7.3	8.4	4	8.6	-	<2	<0.003	<2	-	-	-	-	<0.005	<3	-	-	-	-	<10	<0.02	4.8	960	1.5	-	-	
SWI-HA01	HA01_0	0	4.5	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA01_0.2	0.2	8.8	7.5	4	9.5	8.7	<2	<0.003	<2	<0.02	<2	<0.02	0.15	90	0.07	0.24	110	0.17	90 - 100	0.14 - 0.17	13	2600	3 - 4.2	-	-	
SWI-HA02	HA02_0	0	8.7	7.7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA02_0.2	0.2	8.8	8.1	4	9.4	-	<2	<0.003	<2	-	-	-	0.16	99	-	-	-	-	99	0.16	14	2800	4.5	-	-	
SWI-HA03	HA03_0	0	8.6	7.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA03_0.2	0.2	8.9	8.2	4	9.5	8.7	<2	<0.003	<2	<0.02	<2	<0.02	0.16	100	0.09	0.28	120	0.19	100 - 120	0.16 - 0.19	19	3700	4.7 - 6	-	-	
SWI-HA04	HA04_0	0	8.9	7.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA04_0.2	0.2	8.9	7.5	4	9.5	-	<2	<0.003	<2	-	-	-	0.14	89	-	-	-	-	89	0.14	15	3100	5	1.8	2997	
SWI-HA05	HA05_0	0	8.7	7.4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA05_0.2	0.2	9	8	4	9.5	8.8	<2	<0.003	<2	<0.02	<2	<0.02	0.15	95	0.08	0.24	94	0.15	94 - 95	0.15	20	4100	4.9 - 6.5	-	-	
SWI-HA06	HA06_0	0	8.6	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA06_0.5	0.5	8.8	7.7	4	9.5	8.6	<2	<0.003	<2	<0.02	<2	<0.02	0.21	130	0.12	0.35	150	0.23	130 - 150	0.21 - 0.23	22	4400	5.8 - 7	-	-	
SWI-HA07	HA07_0	0	8.7	7.3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA07_0.5	0.5	8.7	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWI-HA08	HA08_0.25-0.5	0.25-0.5	8.8	8.5	4	9.2	-	<2	<0.003	<2	-	-	-	0.007	4.6	-	-	-	-	<10	<0.02	5.3	1100	1.7	0.4	666	
	HA08_0-0.25	0-0.25	8.9	8.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA08_0-1	0-1	8.8	7.5	4	9.5	8.7	<2	<0.003	<2	<0.02	<2	<0.02	0.14	87	0.1	0.24	89	0.14	87 - 89	0.14	17	3500	4.2 - 5.5	-	-	
SWI-HA09	HA09_0-1	0-1	8.6	7.8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Appendix E, Table E-1
Onshore Materials
Soil Laboratory Results

	ASS - pH Screening			ASS - pH		ASS - Acidity Trail					ASS - Potential Acidity		ASS - Sulfur Trail				Acid Base Accounting		Acid Neutralising Capacity			Total Inorganic Carbon		
	pH (Field)	pH _{ox}	Reaction Ratings*	pH _{KCl}	pH _{OX}	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Titratable Peroxide Acidity (sulfur units)	Titratable Sulfidic Acidity	Titratable Sulfidic Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	KCl Extractable Sulfur	Peroxide Sulfur	Peroxide Oxidisable Sulfur (acidity units)	Peroxide Oxidisable Sulfur	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	Acid Neutralising Capacity (sulfur units)	Total Inorganic Carbon	Total Inorganic Carbon - GHD conversion
LOR	pH Units	pH Units	COMMENT	pH Units	PH UNITS	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	% CaCO ₃	mole H+/t	%S	%	mole H+/t
WA DER 2015 ASS Criteria	0.1	<4		<4	<4	18	0.03	18	0.03	18	0.03	0.03	18	0.03	0.03	18	0.03	18	0.03	0.01	2	0.02	0.1	-

Location ID	Sample ID	Sample depth	9.1	7.6	3	9.3	-	<2	<0.003	<2	-	-	-	0.27	170	-	-	-	-	170	0.27	16	3100	5	1.7	2830.5
SWI-HA10	HA10_0-1	0-1	9.1	7.6	3	9.3	-	<2	<0.003	<2	-	-	-	0.27	170	-	-	-	-	170	0.27	16	3100	5	1.7	2830.5
HA12	HA12_0.2	0.2	4.2	2.7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HA12_0.25	0.25	4.4	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HA12_0.5	0.5	6.5	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HA12_0.75	0.75	6.8	3.9	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HA12_1.0	1	7.9	7.5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HA14	HA14_0.25	0.25	8.8	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA14	HA14_0.4	0.4	8.2	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA14_0.5	0.5	8.7	7.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA14_0.75	0.75	8.9	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA14_1.0	1	8.8	7.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HA19	HA19_0.25	0.25	8.1	8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HA19_0.5	0.5	8.4	8.2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HA30	HA30_0.25	0.25	5.2	3.2	3	6.5	-	<2	<0.003	4	-	-	-	0.049	30	-	-	-	-	30	0.05	-	-	-	-	-
	HA30_0.5	0.5	5.6	2.4	4	4.9	-	14	0.02	210	-	-	-	0.3	190	-	-	-	-	200	0.33	-	-	-	-	
	HA30_0.75	0.75	6.7	8.3	4	9.1	-	<2	<0.003	<2	-	-	-	0.016	9.9	-	-	-	-	<10	0.02	10	2100	3.3	-	



**Appendix E, Table E-2
On Shore Materials
Soil Laboratory Results - Metal and Metalloid**

			Metals and metalloids													
			Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Silicon	Selenium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			2	2	10	0.4	1	5	5	5	5	0.1	5	5	2	5
NEPM 2013 EIL-Areas of Ecological Significance																
0-2m			40						20	470			5			15

Location ID	Sample ID	Sample depth														
BH05	BH05_0.2	0.2	14	<2	56	<0.4	<1	<5	13	<5	14	<0.1	<5	-	<2	<5
	BH05_0.6	0.6	15	<2	110	<0.4	<1	8.4	15	7.6	590	<0.1	18	-	<2	29
	BH05_3.5	3.5	14	<2	41	<0.4	<1	7.5	17	8.7	120	<0.1	20	-	<2	27
	BH09_1.5-2.5	1.5-2.5	10	<2	13	<0.4	-	5.8	13	5.7	230	<0.1	12	-	<2	15
	BH12_1.2-1.5	1.2-1.5	5.9	<2	<10	<0.4	-	<5	7.3	<5	100	<0.1	9.7	-	<2	13
BH13	BH13_1.3-1.5	1.3-1.5	7	<2	<10	<0.4	-	20	33	12	880	<0.1	32	-	<2	54
	BH13_3.3-3.5	3.3-3.5	7.6	<2	<10	<0.4	-	14	31	11	520	<0.1	28	-	<2	46
	BH13_4.0-4.2	4-4.2	5.2	<2	<10	<0.4	-	6.2	15	6.6	250	<0.1	15	-	<2	22

Statistical Summary

Number of Results	8	8	8	8	8	8	8	8	8	8	8	8	8	5	8	8
Number of Detects	8	0	4	0	5	6	8	6	8	6	8	0	7	5	0	7
Minimum Concentration	5.2	<2	<10	<0.4	<1	<5	7.3	<5	14	<0.1	<5	99999	<2	<5	<5	<5
Minimum Detect	5.2	ND	13	ND	ND	5.8	7.3	5.7	14	ND	9.7	ND	ND	ND	13	13
Maximum Concentration	15	<2	110	<0.4	<1	20	33	12	880	<0.1	32	0	<2	54	54	54
Maximum Detect	15	ND	110	ND	ND	20	33	12	880	ND	32	ND	ND	54	54	54
Average Concentration	9.8	1	30	0.2	0.5	8.4	18	7.1	338	0.05	17		1	26	26	26
Median Concentration	8.8	1	9	0.2	0.5	6.85	15	7.1	240	0.05	16.5		1	24.5	24.5	24.5
Standard Deviation	4	0	38	0	0	6	9.1	3.5	297	0	9.6		0	17	17	17
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	2	0	0	0	7	0	0	5	5	5

Location ID	SED01	SED02			SED03								SED04		SED05		SED06		SED07		SED09	SED11									
		SED02_0	SED02_1	SED02_15	SED03_0	SED03_0.25	SED03_0.3_0.6	SED03_0.3-0.6	SED03_0.5	SED03_0.75	SED03_1	SED03_1.25	SED03_1.5	SED03_1.75	SED03_2	SED04_0.5	SED04_2-2.2	SED05_1.5	SED05_1-1.2	SED06_0.5-0.7	SED07_0.5	SED07_0-0.4	SED07_1	SED07_1.5	SED09_0.3	SED11_0-0.3					
Sample depth	0.3-0.6	0	1	1.5	0	0.25	0.3-0.6	0.3-0.6	0.5	0.75	1	1.25	1.5	1.75	2	0.5	2-2.2	1.5	1-1.2	0.5-0.7	0.5	0-0.4	1	1.5	0.3	0-0.3					
Analyte	Units	EQL	ANZECC 2000 ISQG - High	ANZECC 2000 ISQG - Low	NEPM 2013 ELI-Areas of Ecological Significance	WA DER 2015 ASS Criteria																									
Heavy Metal																															
Antimony	mg/kg	10	25	2	40	<10	<10	<10	<10	-	-	-	<10	-	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	<10	<10			
Arsenic	mg/kg	2	70	20	40	15	14	12	11	-	-	-	13	-	-	17	-	-	9.7	9.9	-	12	9.2	-	23	9.7	11	15	15		
Cadmium	mg/kg	0.4	10	1.5	40	<0.4	<0.5	<0.4	<0.5	-	-	-	<0.4	-	-	<0.4	-	-	<0.4	<0.5	-	<0.4	<0.5	-	<0.4	<0.4	<0.5	<0.5			
Chromium (III+VI)	mg/kg	5	370	80	40	73	37	45	50	-	-	-	60	-	-	52	-	-	40	50	-	41	44	-	50	38	42	37	39		
Copper	mg/kg	5	270	65	20	21	8.7	14	17	-	-	-	16	-	-	15	-	-	13	22	-	12	13	-	10	13	11	10	10		
Lead	mg/kg	5	220	50	470	7.5	<5	6.7	7.2	-	-	-	6.6	-	-	8	-	-	6.1	7.2	-	6.2	5.9	-	5.2	5.7	6.8	5.4	5.6		
Mercury	mg/kg	0.1	1	0.15	470	<0.1	<0.1	<0.1	<0.1	-	-	-	<0.1	-	-	<0.1	-	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1		
Nickel	mg/kg	5	52	21	5	21	12	15	19	-	-	-	16	-	-	12	-	-	12	19	-	12	12	-	12	12	16	12	12		
Selenium	mg/kg	2				<2	<2	<2	<2	-	-	-	<2	-	-	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	<2		
Zinc	mg/kg	5	410	200	15	25	23	14	24	-	-	-	22	-	-	20	-	-	13	24	-	13	18	-	23	20	17	23	25		
SPOCAS																															
>2mm Fraction	G	0.005				<0.005	16	<0.005	2.6	-	-	3.9	-	-	<0.005	-	-	2.8	-	-	2.1	9.8	-	<0.005	1.6	-	6.6	7.6	10	8.2	
Analysed Material	%	0.1				100	77	100	97	-	-	94	-	-	100	-	89	-	94	-	-	97	85	-	100	97	-	89	88	89	87
Extraneous Material	%	0.1				<0.1	23	<0.1	3	-	-	5.7	-	-	<0.1	-	11	-	-	-	2.9	15	-	<0.1	2.7	-	11	12	11	13	
<2mm Fraction	G	0.005				50	52	48	84	-	-	64	-	-	42	-	24	-	-	-	70	55	-	65	57	-	55	54	84	56	
Field Parameters																															
pH (Field)	pH Units	0.1								9.2	9.1	-	-	9	8.9	8.9	8.9	8.3	5.1	4.6	-	-	-	-	-	-	-	-	-	-	
Inorganics																															
Moisture Content (%)	%	1				17	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-		
ASS - Field																															
pH _{FOX}	pH Units	0.1				4-14	-	-	-	7.7	7.8	-	-	8.6	8	8.1	9	9.1	9.2	9.1	-	-	-	-	-	-	-	-	-	-	
Reaction Ratings*	COMMENT									4	3	-	-	4	3	3	4	4	4	4	-	-	-	-	-	-	-	-	-	-	
ASS - pH																															
pH _{KCl}	pH Units	0.1				4-14	8.3	9.3	8.9	9.2	-	-	9.4	-	-	9.2	-	-	9.3	-	-	9.2	9.3	-	9.3	9.2	-	9.3	9.3	9.4	9.4
pH _{Ox}	PH UNITS	0.1				4-14	7.3	7.9	7.8	8.1	-	-	7.6	-	-	8.8	-	-	8.7	-	-	8.2	9	-	8.4	8.9	-	7.8	8.1	8.7	8.6
ASS - Acidity Trail																															
Titration Actual Acidity	mole H+/t	2				18	<2	<2	<2	<2	-	-	<2	-	-	<2	-	-	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	
Titration Actual Acidity (sulfur units)	%S	0.003				0.03	<0.003	<0.003	<0.003	<0.003	-	-	<0.003	-	-	<0.003	-	-	<0.003	-	-	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Titration Peroxide Acidity	mole H+/t	2				18	<2	<2	<2	<2	-	-	<2	-	-	<2	-	-	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	
Titration Peroxide Acidity (sulfur units)	%S	0.02				0.03	<0.02	<0.02	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Titration Sulfidic Acidity (sulfur units)	%S	0.02				0.03	<0.02	<0.02	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Titration Sulfidic Acidity	mole H+/t	2				18	<2	<2	<2	<2	-	-	<2	-	-	<2	-	-	<2	-	-	<2	<2	-	<2	<2	-	<2	<2	<2	
ASS - Potential Acidity																															
Chromium Reducible Sulfur	%S	0.005				0.03	<0.005	0.36	0.007	<0.005	-	-	0.074	-	-	0.3	-	0.01	-	-	<0.005	0.15	-	0.086	0.12	-	0.005	0.028	0.17	0.17	
Chromium Reducible Sulphur (acidity units)	mole H+/t	3				18	<3	220	4.1	<3	-	-	46	-	-	190	-	6.4	-	-	<3	96	-	54	77	-	3.3	18	110	100	
ASS - Sulfur Trail																															
KCl Extractable Sulfur	%S	0.02				0.03	0.02	0.1	0.02	0.02	-	-	0.04	-	-	0.08	-	0.03	-	-	0.02	0.05	-	0.04	0.05	-	0.02	0.03	0.07	0.07	
Peroxide Sulfur	%S	0.02				0.03	0.03	0.45	0.03	0.02	-	-	0.13	-	-	0.42	-	0.04	-	-	0.02	0.2	-	0.04	0.17	-	0.03	0.08	0.22	0.23	
Peroxide Oxidisable Sulfur (acidity units)	mole H+/t	10				18	<10	220	<10	<10	-	-	55	-	-	220	-	<10	-	-	<10	94	-	51	77	-	<10	<10	97	100	
Peroxide Oxidisable Sulfur	%S	0.02				0.03	<0.02	0.35	<0.02	<0.02	-	-	0.09	-	-	0.35	-	<0.02	-	-	<0.02	0.15	-	0.08	0.12	-	<0.02	<0.02	0.16	0.16	
ASS - Calcium Values																															
KCl Extractable Calcium	%Ca	0.02				0.06	0.19	0.11	0.16	-	-	0.16	-	-	0.2	-	0.18	-	-	-	0.16	0.16	-	0.15	0.16	-	0.15	0.16	0.18	0.17	
Calcium in Peroxide	%Ca	0.02				0.07	5.7	0.11	4.3	-	-	2	-	-	1.2	-	5.1	-	-	-	4.8	2.3	-	5.1	1.1	-	2.7	1.7	5.6	6.2	
Acid Reacted Calcium	%Ca	0.02				<0.02	5.5	<0.02	4.1	-	-	1.8	-	-	0.96	-	5	-	-	-	4.6	2.1	-	5	0.91	-	2.5	1.5	5.4	6	
acidity - Acid Reacted Calcium	mole H+/t	10				<10	2800	<10	2100	-	-	900	-	-	480	-	2500	-	-	-	2300	1100	-	2500	460	-	1300	740	2700	3000	
sulfidic - Acid Reacted Calcium	%S	0.02				<0.02	4.4	<0.02	3.3	-	-	1.4	-	-	0.76	-	4	-	-	-	3.7	1.7	-	4	0.73	-	2	1.2	4.3	4.8	
ASS - Magnesium Values																															
KCl Extractable Magnesium	%Mg	0.02				0.06	0.06	0.05	0.04	-	-	0.05	-	-	0.06	-	0.05	-	-	-	0.04	0.05	-	0.05	0.06	-	0.04	0.04	0.06	0.07	
Magnesium in Peroxide	%Mg	0.02				0.09	0.29	0.07	0.13	-	-	0.14	-	-	0.13	-	0.13	-	-	-	0.11	0.1	-	0.09	0.11	-	0.09	0.09	0.29	0.3	
Acid Reacted Magnesium	%Mg	0.02				0.04	0.23	0.02	0.08	-	-	0.09	-	-	0.07	-	0.08	-	-	-	0.07	0.05	-	0.05	0.05	-	0.06	0.05	0.23	0.23	
Acid Reacted Magnesium (acidity units)	mole H+/t	10				29	190	19	69	-	-	75	-	-	60	-	67	-	-	-	55	44	-	38	41	-	46	43	190	190	
Acid Reacted Magnesium (sulfur units)	%S	0.02				0.05	0.3	0.03	0.11	-	-	0.12	-	-	0.1	-	0.11	-	-	-	0.09	0.07	-	0.06	0.07	-	0.07	0.07	0.31	0.31	
ASS - ANC																															
Acid Neutralising Capacity	% CaCO3	0.01				0.69	17	0.79	11	-	-	7.9	-	-	4.1	-	14	-	-	-	11	7.3	-	3	4.5	-	7.1	4.6	16	17	
Acid Neutralising Capacity (acidity units)	mole H+/t	2				140	3300	160	2200	-	-	1600	-	-	810	-	2800	-	-	-	2300	1500	-	590	890	-	1400	930	3200	3400	
Acid Neutralising Capacity (sulfur units)	%S	0.02																													

Analyte	Units	EQL	ANZECC 2000 ISQG -High	ANZECC 2000 ISQG -Low	NEPM 2013 EIL-Areas of Ecological Significance	WA DER 2015 ASS Criteria	Location ID		SED03										SED04		SED05		SED06		SED07		SED09	SED11									
							SED01	SED02	SED03_0	SED03_0.25	SED03_0.3_0.6	SED03_0.3-0.6	SED03_0.5	SED03_0.75	SED03_1	SED03_1.25	SED03_1.5	SED03_1.75	SED03_2	SED04_0.5	SED04_2-2.2	SED05_1.5	SED05_1-1.2	SED06_0.5-0.7	SED07_0.5	SED07_0-0.4	SED07_1	SED07_1.5	SED09_0.3	SED11_0-0.3							
Sample ID							SED01_0.3-0.6	SED02_0	SED02_1	SED02_1.5	SED03_0	SED03_0.25	SED03_0.3_0.6	SED03_0.3-0.6	SED03_0.5	SED03_0.75	SED03_1	SED03_1.25	SED03_1.5	SED03_1.75	SED03_2	SED04_0.5	SED04_2-2.2	SED05_1.5	SED05_1-1.2	SED06_0.5-0.7	SED07_0.5	SED07_0-0.4	SED07_1	SED07_1.5	SED09_0.3	SED11_0-0.3					
Sample depth							0.3-0.6	0	1	1.5	0	0.25	0.3-0.6	0.3-0.6	0.5	0.75	1	1.25	1.5	1.75	2	0.5	2-2.2	1.5	1-1.2	0.5-0.7	0.5	0-0.4	1	1.5	0.3	0-0.3					
OC Pesticides																																					
Organochlorine pesticides EPAVic	mg/kg	0.01					<0.01	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-
Other organochlorine pesticides EPAVic	mg/kg	0.01					<0.01	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-
4,4'-DDE	mg/kg	0.005	0.007	0.0014			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	
α-BHC	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	
Aldrin	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-		
Aldrin + Dieldrin	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-		
β-BHC	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-		
Chlordane	mg/kg	0.01	0.009	0.0035			<0.01	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-		
δ-BHC	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-		
4,4 DDD	mg/kg	0.005	0.02	0.002			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
4,4 DDT	mg/kg	0.005	0.05	0.0012			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
DDT+DDE+DDD - Lab Calc	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
Dieldrin	mg/kg	0.005	0.007	0.0028			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
Endosulfan I (alpha)	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
Endosulfan II (beta)	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
Endosulfan Sulfate	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-			
Endrin	mg/kg	0.005	0.06	0.0027			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Endrin aldehyde	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Endrin ketone	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
γ-BHC (Lindane)	mg/kg	0.005	0.0014	0.0009			<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Heptachlor	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Heptachlor epoxide	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Hexachlorobenzene	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Methoxychlor	mg/kg	0.005					<0.005	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-				
Toxaphene	mg/kg	0.1					<0.1	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-				
PCBs																																					
Arochlor 1016	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-			
Arochlor 1221	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
Arochlor 1232	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
Arochlor 1242	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
Arochlor 1248	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
Arochlor 1254	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
Arochlor 1260	µg/kg	100					<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		
PCBs (Total)	µg/kg	100	550,000	280,000			<100	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	-	-	-	-	<100	-	-	-	-	-	-	-		



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 56483	Sample N°: 1	Date Received: 23/4/20	Report Status: Final
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Client Name: Eurofins - Melbourne	Project Name: Ref: 701587
Client Contact: Eurofins Report	SESL Quote N°:
Client Order N°: 20-433-0122 701587	Sample Name: SED01-0.3-0.6 M20-FE15077
Address: PO Box 276 Oakleigh VIC 3166	Description: Soil
	Test Type: PSA_AS

SUMMARY	D VALUES	PERFORMANCE FACTORS
Analysed by SESL Australia Pty Ltd, NATA # 15633 Results only requested.	D₉₅: 0.441 D₉₀: 0.403 D₈₅: 0.366 D₆₀: 0.128 D₅₀: 0.078 D₁₅: 0.001 D₁₀: 0.001 D₅: 00	Gradation Index (D₉₀/D₁₀): 400.00 Coefficient of Uniformity (D₆₀/D₁₀): 130.00

PARTICLE SIZE DISTRIBUTION GRAPH	PARTICLE SIZE ANALYSIS																																																																																				
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Consultant: *Murphy*
Michelle Murphy

Authorised Signatory: *Simon Leake*
Simon Leake

Date Report Generated
5/05/2020



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 56483 Sample N°: 2 Date Received: 23/4/20 Report Status: Final

Client Name: Eurofins - Melbourne Project Name: Ref: 701587
SESL Quote N°:
Client Contact: Eurofins Report Sample Name: SED03-0.3-0.6 M20-FE15080
Client Order N°: 20-433-0122 701587 Description: Soil
Address: PO Box 276 Test Type: PSA_AS
Oakleigh VIC 3166

SUMMARY

Analysed by SESL Australia Pty Ltd, NATA # 15633
Results only requested.

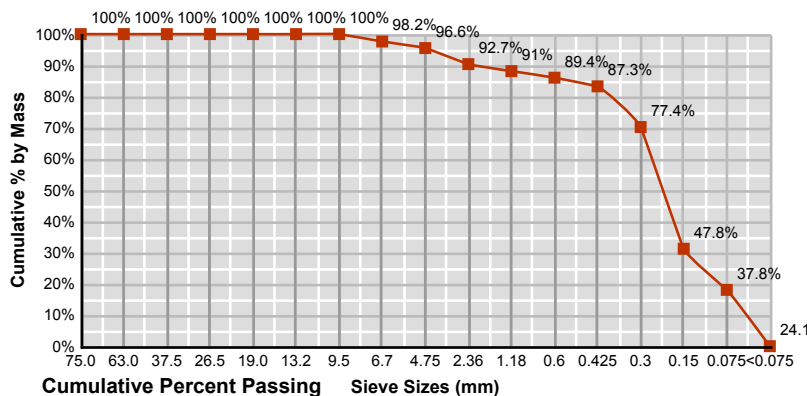
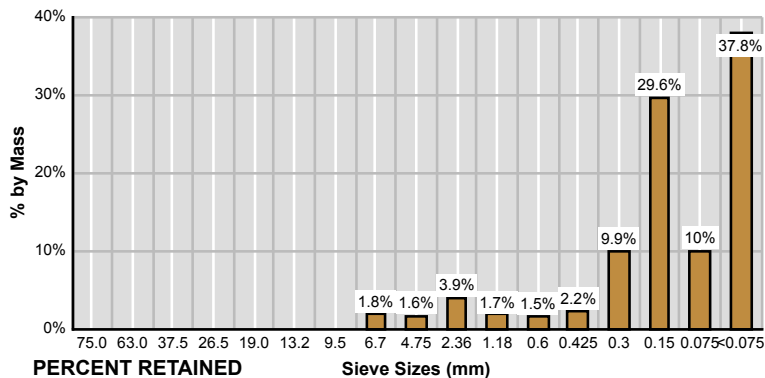
D VALUES

D₉₅: 0.504
D₉₀: 0.467
D₈₅: 0.429
D₆₀: 0.164
D₅₀: 0.124
D₁₅: 0.002
D₁₀: 0.001
D₅: 0.001

PERFORMANCE FACTORS

Gradation Index (D₉₀/D₁₀): 470.00
Coefficient of Uniformity (D₆₀/D₁₀): 160.00

PARTICLE SIZE DISTRIBUTION GRAPH



PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	0	100
19.0	Medium Gravel	0	100
13.2	Medium Gravel	0	100
9.5	Medium Gravel	0	100
6.7	Fine Gravel	1.83	98.17
4.75	Fine Gravel	1.62	96.55
2.36	Fine Gravel	3.85	92.7
1.18	Very Coarse Sand	1.72	90.98
0.6	Medium Sand	1.54	89.44
0.425	Medium Sand	2.15	87.29
0.3	Medium Sand	9.89	77.4
0.15	Fine Sand	29.6	47.8
0.075	Fine Sand	9.99	37.81

FINE PARTICLES (Hydrometer calculated)

0.02	Very Fine Sand	13.73	24.08
0.002	Silt	5.14	18.94
<0.002	Clay	18.94	N/A

Consultant: *Murphy*
Michelle Murphy

Authorised Signatory: *Simon Leake*
Simon Leake

Date Report Generated
5/05/2020

DISCLAIMER OF ENDORSEMENT:

The use of trade, firm or company names in this report is for the information and convenience of the reader. Such use does not necessarily constitute or imply an official endorsement or approval by SESL of any product or service to the exclusion of others that may be suitable. This report shall not be used for advertising or product endorsement purposes.

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 56483	Sample N°: 3	Date Received: 23/4/20	Report Status: Final
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Client Name: Eurofins - Melbourne	Project Name: Ref: 701587
Client Contact: Eurofins Report	SESL Quote N°:
Client Order N°: 20-433-0122 701587	Sample Name: SED07-0-0.4 M20-FE15088
Address: PO Box 276 Oakleigh VIC 3166	Description: Soil
	Test Type: PSA_AS

SUMMARY	D VALUES	PERFORMANCE FACTORS
Analysed by SESL Australia Pty Ltd, NATA # 15633	D ₉₅ : 0.721	Gradation Index (D ₉₀ /D ₁₀): 340.00
Results only requested.	D ₉₀ : 0.683	Coefficient of Uniformity: (D ₆₀ /D ₁₀) 230.00
	D ₈₅ : 0.644	
	D ₆₀ : 0.452	
	D ₅₀ : 0.357	
	D ₁₅ : 0.013	
	D ₁₀ : 0.002	
	D ₅ : 0.001	

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Consultant: *Murphy*
Michelle Murphy

Authorised Signatory: *Leake*
Simon Leake

Date Report Generated
5/05/2020

EUROFINS-MGT (Vic Melbourne)
Mr Robert JOHNSTON
6 Monterey Road
Dandenong South
3175 VIC

Bruz, 27/04/2020

Test report

Dear Sir,

Please find below your test report corresponding to your samples sent for radiological analysis, as received in our laboratory on 21/02/2020.

We would like to thank you for your confidence and, if you need any further information, please, do not hesitate to contact us.

Yours sincerely,



Patrice Letessier
Managing Director



Eichrom Laboratories is agreed by French Ministry of Health for the radioactive measurements of drinking water and French Nuclear Safety Authority (ASN) for radioactivity analyses on environmental matrices.

+33 (0)2 23 50 13 80

eichromlab@eichromlab.com - www.eichromlab.com



Eichrom Laboratories is agreed by French Ministry of Health for the radioactive measurements of drinking water and French Nuclear Safety Authority (ASN) for radioactivity analyses on environmental matrices.

EUROFINS-MGT (Vic Melbourne)
Mr Robert JOHNSTON
6 Monterey Road
Dandenong South
3175 VIC
Australie

TEST REPORT N° 20-00758-02203

This test report only deals with the tests performed on the samples received

Customer ID : ICO045 - Order N° : 20-433-0044 701587	Sampling date : 06/02/2020
Sample reference : M20-FE15077	
Matrix : SOL / Soil	Sampling location : SED01_0.3-0.6
Date of delivery : 21/02/2020	

Parameter	Reference method	Unit	Result	Incertainty (k=2)	Detection Limit (LD)	Date of preparation	Date of measurement	COFRAC
Gross Alpha	NF ISO 18589-6	Bq.kg ⁻¹	258	41	20	21/04/2020	21/04/2020	NO
Gross Beta	NF ISO 18589-6	Bq.kg ⁻¹	680	85	26	21/04/2020	21/04/2020	NO

Remarks : not applicable.

Bruz, on 27/04/2020

Benoît DANIEL
Technical Manager



Eichrom Laboratories is agreed by French Ministry of Health for the radioactive measurements of drinking water and French Nuclear Safety Authority (ASN) for radioactivity analyses on environmental matrices.

EUROFINS-MGT (Vic Melbourne)
Mr Robert JOHNSTON
6 Monterey Road
Dandenong South
3175 VIC
Australie

TEST REPORT N° 20-00758-02204

This test report only deals with the tests performed on the samples received

Customer ID : ICO045 - Order N° : 20-433-0044 701587	Sampling date : 06/02/2020
Sample reference : M20-FE15080	
Matrix : SOL / Soil	Sampling location : SED03_0.3-0.6
Date of delivery : 21/02/2020	

Parameter	Reference method	Unit	Result	Incertainty (k=2)	Detection Limit (LD)	Date of preparation	Date of measurement	COFRAC
Gross Alpha	NF ISO 18589-6	Bq.kg ⁻¹	204	38	21	21/04/2020	21/04/2020	NO
Gross Beta	NF ISO 18589-6	Bq.kg ⁻¹	530	67	24	21/04/2020	21/04/2020	NO

Remarks : not applicable.

Bruz, on 27/04/2020

Benoît DANIEL
Technical Manager



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EUROFINS-MGT (Vic Melbourne)
Mr Robert JOHNSTON
6 Monterey Road
Dandenong South
3175 VIC
Australie

TEST REPORT N° 20-00758-02205

This test report only deals with the tests performed on the samples received

Customer ID : ICO045 - Order N° : 20-433-0044 701587	Sampling date : 06/02/2020
Sample reference : M20-FE15088	
Matrix : SOL / Soil	Sampling location : SED07_0-0.4
Date of delivery : 21/02/2020	

Parameter	Reference method	Unit	Result	Incertainty (k=2)	Detection Limit (LD)	Date of preparation	Date of measurement	COFRAC
Gross Alpha	NF ISO 18589-6	Bq.kg ⁻¹	245	50	29	21/04/2020	21/04/2020	NO
Gross Beta	NF ISO 18589-6	Bq.kg ⁻¹	514	67	27	21/04/2020	21/04/2020	NO

Remarks : not applicable.

Bruz, on 27/04/2020

Benoît DANIEL
Technical Manager



Appendix E, Table E-2
Groundwater Laboratory Results

	Physicochemical parameters			Metals and Metalloids										Major Ions				Inorganics & Nutrients							
	pH (Lab)	Electrical conductivity (lab)	Total Dissolved Solids	Aluminium	Aluminium (Filtered)	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Iron	Iron (Filtered)	Manganese (Filtered)	Nickel (Filtered)	Selenium (Filtered)	Zinc (Filtered)	Alkalinity (total as CaCO3)	Chloride	Sulfate	Sodium	Silica (SiO2)	Ammonia as N	Nitrogen (Total)	Phosphorus filterable reactive (P) (Filtered)	Phosphate total (P)		
	pH Units	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
LOR	0.1	10	10	0.05	0.05	0.001	0.0002	0.001	0.05	0.05	0.005	0.001	0.001	0.005	20	1	5	0.5	0.01	0.2	0.01	0.01			
ANZG (2018) - Marine water - 95% level of species protection							0.0055	0.0044				0.07	0.015						0.91						
DER 2014 Non-potable Groundwater Use (NPUG)				0.2	0.2	0.1	0.02		0.3		5	0.2	0.1			250	1000		0.411						
WA DER 2015 ASS Criteria	<5				1										<30										
Sample ID	Sample date	Lab report no.																							
BH02D	13/04/2020	716307	6.9	92,000	68,000	1.6	<0.1	<0.01	<0.002	<0.01	3.5	<0.1	0.026	<0.01	<0.01	<0.05	140	43,000	8500	22,000	20	0.26	1	<0.01	0.06
BH02S			7.4	81,000	67,000	8	0.13	<0.01	<0.002	<0.01	22	0.18	0.082	<0.01	<0.01	<0.05	200	30,000	8400	18,000	43	0.09	0.4	0.02	0.06
BH03D			7.7	44,000	33,000	0.96	<0.5	<0.01	<0.002	<0.01	1.9	<0.5	1.2	<0.01	<0.01	<0.05	160	18,000	2800	10,000	17	0.02	1.1	0.01	0.03
BH03S			7.7	33,000	21,000	2	<0.5	<0.01	<0.002	<0.01	11	<0.5	0.13	<0.01	<0.01	<0.05	250	11,000	1700	5900	16	0.19	0.5	<0.01	0.16
BH04			7.2	110,000	400,000	11	<0.5	<0.01	<0.002	0.024	29	<0.5	<0.05	<0.01	<0.01	<0.05	89	59,000	7800	29,000	16	0.04	3.9	<0.01	0.12
BH05D			7	170,000	180,000	1.5	<0.5	<0.01	<0.002	<0.01	2.9	<0.5	6.1	0.013	<0.01	0.09	220	130,000	9800	57,000	11	5.2	4	0.01	0.09
BH05S			7	160,000	240,000	6.7	<0.5	<0.01	<0.002	<0.01	22	0.13	2.9	<0.01	<0.01	0.062	170	120,000	11,000	72,000	15	2	2	<0.01	0.11
BH07			7.1	150,000	190,000	1.6	0.11	<0.01	<0.002	<0.01	2.4	0.13	0.23	<0.01	<0.01	<0.05	150	100,000	7200	57,000	15	0.05	3.2	<0.01	0.12
BH07D			7.1	160,000	240,000	2.6	<0.5	<0.01	<0.002	<0.01	5.3	<0.5	3.8	<0.01	<0.01	0.061	160	120,000	8600	51,000	11	0.3	0.7	<0.01	0.17
BH07S			6.9	160,000	140,000	3.3	<0.5	<0.01	<0.002	<0.01	5.7	<0.5	0.39	<0.01	<0.01	0.025	160	96,000	18,000	41,000	18	0.23	1.1	<0.01	0.14
BH08			7.2	140,000	230,000	2.9	0.1	<0.01	<0.002	<0.01	5.4	0.25	0.97	0.04	<0.01	0.057	110	76,000	7300	43,000	21	0.65	2.6	<0.01	0.11
BH09D			7.1	130,000	150,000	9.2	<0.1	<0.01	0.0023	<0.01	21	<0.1	0.68	<0.01	<0.01	<0.05	86	93,000	4100	30,000	24	0.35	1.9	0.01	0.05
BH09S			7.1	99,000	86,000	200	<0.1	<0.01	0.0009	0.021	490	<0.1	0.007	<0.01	0.009	<0.05	510	51,000	3500	23,000	37	0.12	2.7	<0.01	0.05
BH10			6.7	170,000	300,000	<0.5	<0.5	<0.01	0.0021	<0.01	<0.05	0.07	3.6	<0.01	<0.01	<0.05	160	150,000	13,000	94,000	11	2.3	1.7	<0.01	0.09
BH10S			6.7	150,000	280,000	0.65	<0.1	<0.01	0.0031	<0.01	1.2	<0.1	16	0.021	0.004	0.1	160	170,000	12,000	77,000	12	0.76	0.8	<0.01	0.04
BH11D			7.3	150,000	200,000	1	<0.1	<0.01	0.0024	<0.01	2.1	<0.1	2.9	0.026	<0.01	0.18	120	130,000	9200	49,000	9.4	0.53	1	0.02	0.08
BH11S			7.2	150,000	200,000	4.3	0.12	<0.01	0.0022	<0.01	9.5	0.13	6.4	0.029	<0.01	0.14	150	130,000	10,000	45,000	48	0.07	5.4	<0.01	0.11
BH12			7.3	100,000	220,000	9	<0.5	<0.01	<0.002	<0.01	53	<0.5	8.1	0.017	<0.01	<0.05	690	56,000	3200	29,000	61	6	6	<0.01	0.11
BH13			7.2	67,000	40,000	3.6	<0.5	<0.01	<0.002	<0.01	25	<0.5	41	0.054	<0.01	<0.05	290	37,000	2700	12,000	31	0.89	1.2	<0.01	0.1
BH14D			6.7	170,000	130,000	0.99	<0.5	<0.01	<0.002	<0.01	1.9	1.4	5.2	0.011	<0.01	0.057	150	190,000	11,000	55,000	15	0.14	0.4	<0.01	0.03
BH14S	6.9	160,000	260,000	0.92	0.17	<0.01	0.0033	<0.01	8.5	0.28	2.1	0.013	<0.01	0.13	140	160,000	11,000	53,000	8.5	0.26	0.6	<0.01	0.07		
BH15D	7	94,000	220,000	<0.1	<0.1	<0.01	0.0067	<0.01	<0.1	<0.1	1.1	0.013	0.011	0.093	110	150,000	6000	68,000	16	<0.1	6.7	<0.01	0.06		
BH15S	7	150,000	130,000	11	<0.1	<0.01	0.004	0.12	28	<0.1	0.21	0.013	0.015	<0.05	77	95,000	6700	35,000	82	0.04	11	0.02	0.15		



Appendix E
Table E-5
Soil RPDs

Lab re	S BH05_3.75 QA02		RPD	HA08_0.25-0.5 HA08_QC		RPD	AU102_2.75 QC04		RPD	AU60_1.5 QC02		RPD	AU66_2.25 QC03		RPD	AU74_2.5 QC05		RPD	AU20_0.5 QC06		RPD	BH09_1.25 QA03		RPD	BH10_2.5 QA05		RPD	BH10_2.5 QA05		RPD	BH15_3.25 QA10		RPD				
	698189 soil	698189 soil		698298 soil	698189 soil		698189 soil	698189 soil		698189 soil	698298 soil		698189 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil		698298 soil	698298 soil	698298 soil	698298 soil
Field Parameters																																					
pH (Field)	pH Units	8.4	8.6	2	8.8	8.8	0	8.2	8.5	4	9.2	9.4	2	8.6	8.6	0	8.1	8.3	2	8.5	8.4	1	9.1	9.1	0	7.7		7.7	7.5	3	8.8	8.5	3				
NA																																					
CRS Suite - Liming Rate	KG CaCO3/T																																				
HCl Extractable Sulfur Correction Factor	FACTOR																																				
Total Inorganic Carbon																																					
Total Inorganic Carbon	%																																				
ASS - Field																																					
Reaction Ratings*	COMMENT	2.0	2.0	0	4.0	2.0	67	4.0	4.0	0	4.0	4.0	0	4.0	4.0	0	4.0	4.0	0	4.0	4.0	0	4.0	4.0	0	2.0		2.0	4.0	67	3.0	4.0	29				
pHfox	pH Units	7.7	7.4	4	8.5	7.7	10	8.8	8.9	1	9.6	9.3	3	8.7	9.0	3	8.4	8.6	2	8.6	8.3	4	9.6	9.5	1	8.5		8.5	8.4	1	8.7	8.6	1				
ASS - pH																																					
pH KCl	pH Units																																				
ASS - Acidity Trail																																					
Titration Actual Acidity	mole H+/t																																				
Titration Actual Acidity (sulfur units)	%S																																				
Titration Peroxide Acidity	mole H+/t																																				
ASS - Potential Acidity																																					
Chromium Reducible Sulfur	%S																																				
Chromium Reducible Sulphur (acidity units)	mole H+/t																																				
ASS - Sulfur Trail																																					
KCl Extractable Sulfur	%S																																				
ASS - ANC																																					
Acid Neutralising Capacity	% CaCO3																																				
Acid Neutralising Capacity (acidity units)	mole H+/t																																				
Acid Neutralising Capacity (sulfur units)	%S																																				
ASS - Acid Base Accounting																																					
Net Acidity (Acidity Units) Minus ANC	mole H+/t																																				
Net Acidity (Sulfur Units) Minus ANC	% S																																				
ANC Fineness Factor	-																																				
Net Acidity (acidity units)	mole H+/t																																				
Net Acidity (sulfur units)	%S																																				
ASS - Liming Rate																																					
Liming Rate excluding ANC	kg CaCO3/t																																				
SPOCAS																																					
Analysed Material	%																																				
>2mm Fraction	G																																				
Extraneous Material	%																																				
<2mm Fraction	G																																				

*RPDs have only been considered where a conc

**Elevated RPDs are highlighted as per QAQC Pr

***Interlab Duplicates are matched on a per com

Concentration x EQL	RPD %
1 to 10	200
10 to 30	50
>30	30

Appendix F – Laboratory Certificates and Records

Index	Laboratory report	Report date
1	696731	16 January 2020
2	698189	29 January 2020
3	698298	06 February 2020
4	701587	09 June 2020
5	701828	14 February 2020
6	703226	21 February 2020
7	708420	19 March 2020
8	716307	04 May 2020
9	724405	15 June 2020
10	726720	10 July 2020
11	730742	16 July 2020
12	732827	30 July 2020

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street PO Box 3106
Perth WA 6000 Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706
 Site Name (as set up in ESdat) K+S
 Laboratory: Eurofins MGT
 Address: 2/91 Leach Hwy, Kewdale 6105
 Laboratory Contact: Sample Receipt

Laboratory Quote No. National Price List for GHD
 Turnaround Time Standard (5 days)

Job Manager (Invoice) & GHD accounts
 louise.cockerton@ghd.com AP-FSS@ghd.com
 Email Address (Results)
 louise.cockerton@ghd.com
 ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix s-Soil/ sL- Sludge/ W-Water/ A-Air	Container	No	pH screening (pH and pHFOX)	Analyses	Remarks
BH03_0.25				S	B unpres.	1	✓		<div style="text-align: center; font-size: 2em; color: blue;">896731</div> <div style="text-align: right; color: red; font-weight: bold;">HOLD</div>
BH03_0.5				S	B unpres.	1	✓		
BH03_0.75				S	B unpres.	1	✓		
BH03_1				S	B unpres.	1	✓		
BH03_1.25				S	B unpres.	1	✓		
BH03_1.5				S	B unpres.	1	✓		
BH03_2				S	B unpres.	1	✓		
BH03_2.25				S	B unpres.	1	✓		
BH03_2.5				S	B unpres.	1	✓		
BH03_2.75				S	B unpres.	1	✓		
BH03_3				S	B unpres.	1	✓		
BH03_3.25				S	B unpres.	1	✓		
BH03_3-3.4				S	B unpres.	1	✓		
BH03_3.4				S	B unpres.	1	✓		
BH03_3.8				S	B unpres.	1	✓		
BH03_4				S	B unpres.	1	✓		

Type B-Bottle/J-Jar/V-
 Vial/Bag/G-Glass/P-Plastic
 Preservative
 Unpreserved/ HCl/
 H2SO4/HNO3/Other
 pH screening (pH and pHFOX)



Date/Time: 14/1/20 3:23PM
 Checked: ⁰¹ / No
 Temp: 7.5
 3.2
 4.9
 Correction: +8.5
 Final Temp: 8.7°C

Sampled by: DO Date/Time: - Relinquished by: R Walker Date/Time: 14/1/2020
 Received by: Rob Johnston Eurofins Date/Time: 14/1/20 15:27 Relinquished by: Date/Time:

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Ryan Walker
Project name: K + S
Project ID: 12516706
COC number: Not provided
Turn around time: 2 Day
Date/Time received: Jan 14, 2020 3:23 PM
Eurofins reference: **696731**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Additional samples BH02_11.45-11.75, BH02_17.45-17.75 and BH03_11.45-11.75. Please advise.

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Ryan Walker - ryan.walker@ghd.com.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Ryan Walker**

Report **696731-S**
 Project name **K + S**
 Project ID **12516706**
 Received Date **Jan 14, 2020**

Client Sample ID			BH03_0.25	BH03_0.5	BH03_0.75	BH03_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja09855	P20-Ja09856	P20-Ja09857	P20-Ja09858
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.4	8.7	7.8	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.3	7.2	7.8
Reaction Ratings* ^{S05}		comment	4.0	3.0	2.0	4.0

Client Sample ID			BH03_1.25	BH03_1.5	BH03_1.75	BH03_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja09859	P20-Ja09860	P20-Ja09861	P20-Ja09862
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.5	7.8	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	2.0	2.3	4.6
Reaction Ratings* ^{S05}		comment	2.0	4.0	4.0	4.0

Client Sample ID			BH03_2.25	BH03_2.5	BH03_2.75	BH03_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja09863	P20-Ja09864	P20-Ja09865	P20-Ja09866
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	8.6	8.7	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	2.8	7.4	7.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	2.0	2.0

Client Sample ID			BH03_3.25	BH03_3-3.4	BH03_3.4	BH03_3.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja09867	P20-Ja09868	P20-Ja09869	P20-Ja09870
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	8.8	9.0	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.4	7.3	7.2	7.5
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	2.0

Client Sample ID			BH03_4	QA01
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Ja09871	P20-Ja09872
Date Sampled			Not Provided	Not Provided
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	9.1	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.5
Reaction Ratings* ^{S05}		comment	2.0	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

Acid Sulfate Soils Field pH Test

Testing Site

Perth

Extracted

Jan 15, 2020

Holding Time

7 Days

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

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 696731
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 14, 2020 3:23 PM
Due: Jan 16, 2020
Priority: 2 Day
Contact Name: Ryan Walker

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						HOLD	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	BH03_0.25	Not Provided		Soil	P20-Ja09855		X
2	BH03_0.5	Not Provided		Soil	P20-Ja09856		X
3	BH03_0.75	Not Provided		Soil	P20-Ja09857		X
4	BH03_1	Not Provided		Soil	P20-Ja09858		X
5	BH03_1.25	Not Provided		Soil	P20-Ja09859		X
6	BH03_1.5	Not Provided		Soil	P20-Ja09860		X
7	BH03_1.75	Not Provided		Soil	P20-Ja09861		X
8	BH03_2	Not Provided		Soil	P20-Ja09862		X
9	BH03_2.25	Not Provided		Soil	P20-Ja09863		X
10	BH03_2.5	Not Provided		Soil	P20-Ja09864		X

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 696731
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 14, 2020 3:23 PM
Due: Jan 16, 2020
Priority: 2 Day
Contact Name: Ryan Walker

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						HOLD	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736						X	X
11	BH03_2.75	Not Provided		Soil	P20-Ja09865		X
12	BH03_3	Not Provided		Soil	P20-Ja09866		X
13	BH03_3.25	Not Provided		Soil	P20-Ja09867		X
14	BH03_3-3.4	Not Provided		Soil	P20-Ja09868		X
15	BH03_3.4	Not Provided		Soil	P20-Ja09869		X
16	BH03_3.8	Not Provided		Soil	P20-Ja09870		X
17	BH03_4	Not Provided		Soil	P20-Ja09871		X
18	QA01	Not Provided		Soil	P20-Ja09872		X
19	BH02_11.45-11.75	Not Provided		Soil	P20-Ja09873	X	
20	BH02_17.45-17.75	Not Provided		Soil	P20-Ja09874	X	
21	BH03_11.45-11.75	Not Provided		Soil	P20-Ja09875	X	

Australia

Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 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

New Zealand

Auckland
 35 O'Rorke Road
 Penrose, Auckland 1061
 Phone : +64 9 526 45 51
 IANZ # 1327

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

ABN – 50 005 085 521

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
 Perth
 WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 696731
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 14, 2020 3:23 PM
Due: Jan 16, 2020
Priority: 2 Day
Contact Name: Ryan Walker

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	HOLD	Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271		
Sydney Laboratory - NATA Site # 18217		
Brisbane Laboratory - NATA Site # 20794		
Perth Laboratory - NATA Site # 23736	X	X
Test Counts	3	18

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
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.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	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)*	P20-Ja09855	CP	pH Units	9.4	9.6	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja09855	CP	pH Units	7.6	7.7	pass	30%	Pass	
Reaction Ratings*	P20-Ja09855	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja09865	CP	pH Units	8.7	8.9	PASS	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja09865	CP	pH Units	7.4	7.4	pass	30%	Pass	
Reaction Ratings*	P20-Ja09865	CP	comment	2.0	2.0	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	N/A
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

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)


**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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 5

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. National Price List for GHD	Turnaround Time Standard (5 days)
--	---

Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com	Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com
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GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil / SL- Sludge / W-Water / A-Air	Container Type B-bottle/J-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved / HCl/ H2SO4/HNO3/Other	No	pH screening (pH and pHFOX)	Analyses										HOLD	Remarks
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AU01_0.5		14-Jan-20		S	B	unpres.	1	✓																
AU01_1		14-Jan-20		S	B	unpres.	1	✓																
AU01_1.25		14-Jan-20		S	B	unpres.	1	✓																
AU01_2		14-Jan-20		S	B	unpres.	1	✓																
AU02_0.75		15-Jan-20		S	B	unpres.	1	✓																
AU02_1		15-Jan-20		S	B	unpres.	1	✓																
AU02_1.5		15-Jan-20		S	B	unpres.	1	✓																
AU02_1.75		15-Jan-20		S	B	unpres.	1	✓																
AU02_2		15-Jan-20		S	B	unpres.	1	✓																
AU02_2.25		15-Jan-20		S	B	unpres.	1	✓																
AU02_3		15-Jan-20		S	B	unpres.	1	✓																
AU03_0.25		15-Jan-20		S	B	unpres.	1	✓																
AU03_0.5		15-Jan-20		S	B	unpres.	1	✓																
AU03_0.75		15-Jan-20		S	B	unpres.	1	✓																Date/Time: 22/1/20 4:58pm
AU03_1.25		15-Jan-20		S	B	unpres.	1	✓																Chilled: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
AU03_1.5		15-Jan-20		S	B	unpres.	1	✓																Temp: 5.4
AU03_1.75		15-Jan-20		S	B	unpres.	1	✓																Correction: 5.6 7.4 + 3.5 Final Temp: 9.6°C

Sampled by: SD / AT	Date/Time: various	Relinquished by: R Walker	Date/Time: 22/01/2020
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Received by:	Date/Time: 22/1/20 4:58	Relinquished by:	Date/Time: 6/9/18/9
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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 3 of 5

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. National Price List for GHD		Turnaround Time Standard (5 days)		Sample Matrix <small>S-Soil/ SL- Sludge/ W-Water/ A-Air</small>	Container				Analyses								Remarks			
GHD Sample ID	Lab Sample ID	Date	Time		Type <small>B-Bottle/J-Jar/V- Vial/Bag/S-Glass/P-Plastic</small>	Preservative <small>Unpreserved/ HCl/ H2SO4/HNO3/Other</small>	No	pH screening (pH and pHFOX)												
				AU60_0.75						18-Jan-20		S	B	unpres.	1	✓				
AU60_1.25		18-Jan-20		S	B	unpres.	1	✓												
AU60_1.75		18-Jan-20		S	B	unpres.	1	✓												
AU60_2		18-Jan-20		S	B	unpres.	1	✓												
AU60_2.25		18-Jan-20		S	B	unpres.	1	✓												
AU60_2.5		18-Jan-20		S	B	unpres.	1	✓												
AU60_2.75		18-Jan-20		S	B	unpres.	1	✓												
AU60_3		18-Jan-20		S	B	unpres.	1	✓												
AU66_0.25		18-Jan-20		S	B	unpres.	1	✓												
AU66_1		18-Jan-20		S	B	unpres.	1	✓												
AU66_1.25		18-Jan-20		S	B	unpres.	1	✓												
AU66_2		18-Jan-20		S	B	unpres.	1	✓												
AU66_2.5		18-Jan-20		S	B	unpres.	1	✓												
AU66_2.75		18-Jan-20		S	B	unpres.	1	✓												
AU70_1		18-Jan-20		S	B	unpres.	1	✓												
AU70_1.25		18-Jan-20		S	B	unpres.	1	✓												
AU70_1.75		18-Jan-20		S	B	unpres.	1	✓												

Sampled by: SD / AT	Date/Time: various	Relinquished by: R Walker	Date/Time: 22/01/2020
Received by: <i>Carlyne Gibson</i>	Date/Time: <i>22/1/20 4:58</i>	Relinquished by:	Date/Time:

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832
Reception Ph: 08 6222 8222

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S

Laboratory: Eurofins MGT
Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Contact: Sample Receipt

Laboratory Quote No.
National Price List for GHD

Turnaround Time
Standard (5 days)

Job Manager (Invoice) & GHD accounts
louise.cockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL- Sludge/ W-Water/ A-Air	Container				pH screening (pH and pHFOX)	Analyses											Remarks																														
					Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No																																												
AU70_2		18-Jan-20		S	B	unpres.	1	✓																																											
AU70_2.75		18-Jan-20		S	B	unpres.	1	✓																																											
AU74_0.25		19-Jan-20		S	B	unpres.	1	✓																																											
AU74_0.5		19-Jan-20		S	B	unpres.	1	✓																																											
AU74_2.25		19-Jan-20		S	B	unpres.	1	✓																																											
AU75_0.3		19-Jan-20		S	B	unpres.	1	✓																																											
AU75_2		19-Jan-20		S	B	unpres.	1	✓																																											
BH05_0.2		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_0.25		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_0.5		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_0.6		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_0.75		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_1		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_1.25		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_1.5		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_1.75		15-Jan-20		S	B	unpres.	1	✓																																											
BH05_2		15-Jan-20		S	B	unpres.	1	✓																																											

HOLD

Sampled by: SD / AT

Date/Time: various

Relinquished by: R Walker

Date/Time: 22/01/2020

Received by:

Date/Time: 22/1/20 4:58

Relinquished by:

Date/Time:

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832
Reception Ph: 08 6222 8222

Page 5 of 5

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT	Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Quote No. National Price List for GHD		Turnaround Time Standard (5 days)	
Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com	

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL- Sludge/ W-Water/ A-Air	Container			pH screening (pH and pHFOX)	Analyses										Remarks				
					Type B-Bottle/J-Jar/V- Via/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	NO																
BH05_2.25		15-Jan-20		S	B	unpres.	1	✓															
BH05_2.5		15-Jan-20		S	B	unpres.	1	✓															
BH05_2.75		15-Jan-20		S	B	unpres.	1	✓															
BH05_3		15-Jan-20		S	B	unpres.	1	✓															
BH05_3		15-Jan-20		S	B	unpres.	1	✓															
BH05_3.25		15-Jan-20		S	B	unpres.	1	✓															
BH05_3.5		15-Jan-20		S	B	unpres.	1	✓															
BH05_3.75		15-Jan-20		S	B	unpres.	1	✓															
BH05_4		15-Jan-20		S	B	unpres.	1	✓															
BH05_4.5		15-Jan-20		S	B	unpres.	1	✓															
BH05_4.75		15-Jan-20		S	B	unpres.	1	✓															
BH05_5		15-Jan-20		S	B	unpres.	1	✓															
HA08_QC		17-Jan-20		S	B	unpres.	1	✓															
QA02		-		S	B	unpres.	1	✓															
QC02		-		S	B	unpres.	1	✓															
QC04		-		S	B	unpres.	1	✓															

Sampled by: SD / AT	Date/Time: various	Relinquished by: R Walker	Date/Time: 22/01/2020
Received by:	Date/Time: 22/1/20 4:58	Relinquished by:	Date/Time:

Melbourne

6 Monterey Road
Dandenong South Vic 3175
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

ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K+S
Project ID: 12516706
COC number: Not provided
Turn around time: 3 Day
Date/Time received: Jan 23, 2020 4:58 PM
Eurofins reference: **698189**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Louise Cockerton**

Report **698189-S**
 Project name **K+S**
 Project ID **12516706**
 Received Date **Jan 23, 2020**

Client Sample ID			AU01_0.5	AU01_1	AU01_1.25	AU01_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21641	P20-Ja21642	P20-Ja21643	P20-Ja21644
Date Sampled			Jan 14, 2020	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.4	9.5	9.4	9.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.4	8.9	9.3	9.9
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU02_0.75	AU02_1	AU02_1.5	AU02_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21645	P20-Ja21646	P20-Ja21647	P20-Ja21648
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.3	9.0	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.6	7.5	7.5
Reaction Ratings* ^{S05}		comment	4.0	2.0	2.0	2.0

Client Sample ID			AU02_2	AU02_2.25	AU02_2.3	AU03_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21649	P20-Ja21650	P20-Ja21651	P20-Ja21652
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.8	8.9	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.3	6.8	7.9
Reaction Ratings* ^{S05}		comment	4.0	2.0	4.0	4.0

Client Sample ID			AU03_0.5	AU03_0.75	AU03_1.25	AU03_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21653	P20-Ja21654	P20-Ja21655	P20-Ja21656
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.4	8.7	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	8.1	7.1	7.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	2.0

Client Sample ID			AU03_1.75	AU03_2	AU03_2.25	AU03_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21657	P20-Ja21658	P20-Ja21659	P20-Ja21660
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.6	8.6	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.5	7.5	7.4	7.5
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	2.0

Client Sample ID			AU101_0.25	AU101_1	AU101_1.25	AU101_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21661	P20-Ja21662	P20-Ja21663	P20-Ja21664
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	8.6	8.3	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.5	8.5	8.1	8.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU101_1.75	AU101_2.5	AU101_2.75	AU101_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21665	P20-Ja21666	P20-Ja21667	P20-Ja21668
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	8.7	9.1	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.0	8.5	8.0	7.2
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	2.0

Client Sample ID			AU102_1.5	AU102_2.25	AU102_2.75	AU102_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21669	P20-Ja21670	P20-Ja21671	P20-Ja21672
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.3	8.2	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	9.0	8.8	8.9
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU20_1.75	AU20_2	AU60_0.75	AU60_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21673	P20-Ja21674	P20-Ja21675	P20-Ja21676
Date Sampled			Jan 20, 2020	Jan 20, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.6	9.2	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	8.4	9.2	9.1
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU60_1.75	AU60_2	AU60_2.25	AU60_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21677	P20-Ja21678	P20-Ja21679	P20-Ja21680
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	8.9	8.7	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	8.6	8.9	9.2
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU60_2.75	AU60_3	AU66_0.25	AU66_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21681	P20-Ja21682	P20-Ja21683	P20-Ja21684
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.0	9.1	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.2	8.8	7.9	8.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU66_1.25	AU66_2	AU66_2.5	AU66_2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21685	P20-Ja21686	P20-Ja21687	P20-Ja21688
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.3	8.9	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.1	8.5	8.6	7.9
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	2.0

Client Sample ID			AU70_1	AU70_1.25	AU70_1.75	AU70_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21689	P20-Ja21690	P20-Ja21691	P20-Ja21692
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	9.4	9.5	9.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.5	9.1	9.6	9.8
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	2.0

Client Sample ID			AU70_2.75	AU74_0.25	AU74_0.5	AU74_2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21693	P20-Ja21694	P20-Ja21695	P20-Ja21696
Date Sampled			Jan 18, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.4	8.2	7.5	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.8	8.7	8.5	8.7
Reaction Ratings**S05		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU74_0.3	AU74_2	BH05_0.2	BH05_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21697	P20-Ja21698	P20-Ja21699	P20-Ja21700
Date Sampled			Jan 19, 2020	Jan 19, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	8.4	6.1	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	8.9	2.1	6.8
Reaction Ratings**S05		comment	2.0	2.0	2.0	2.0

Client Sample ID			BH05_0.5	BH05_0.6	BH05_0.75	BH05_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21701	P20-Ja21702	P20-Ja21703	P20-Ja21704
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.9	8.7	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	7.3	7.2	7.6
Reaction Ratings**S05		comment	4.0	2.0	2.0	2.0

Client Sample ID			BH05_1.25	BH05_1.5	BH05_1.75	BH05_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21705	P20-Ja21706	P20-Ja21707	P20-Ja21708
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	8.9	8.8	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	7.7	7.8	4.9
Reaction Ratings**S05		comment	2.0	2.0	2.0	2.0

Client Sample ID			BH05_2.25	BH05_2.5	BH05_2.75	BH05_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21709	P20-Ja21710	P20-Ja21711	P20-Ja21712
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.1	8.9	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	8.9	8.0	7.5
Reaction Ratings**S05		comment	2.0	4.0	2.0	2.0

Client Sample ID			BH05_3	BH05_3.25	BH05_3.5	BH05_3.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21713	P20-Ja21714	P20-Ja21715	P20-Ja21716
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	8.8	8.4	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.8	7.8	7.7
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	2.0

Client Sample ID			BH05_4	BH05_4.5	BH05_4.75	BH05_5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21717	P20-Ja21718	P20-Ja21719	P20-Ja21720
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.8	7.7	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	7.3	7.3	7.2
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	2.0

Client Sample ID			HA08_QC	QA02	QC02	QC04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja21721	P20-Ja21722	P20-Ja21723	P20-Ja21724
Date Sampled			Jan 17, 2020	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.6	9.4	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	7.4	9.3	8.9
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	4.0

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

Acid Sulfate Soils Field pH Test

Testing Site

Perth

Extracted

Jan 23, 2020

Holding Time

7 Days

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

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 698189
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 23, 2020 4:58 PM
Due: Jan 29, 2020
Priority: 3 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	Acid Sulfate Soils Field pH Test
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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	AU01_0.5	Jan 14, 2020		Soil	P20-Ja21641	X
2	AU01_1	Jan 14, 2020		Soil	P20-Ja21642	X
3	AU01_1.25	Jan 14, 2020		Soil	P20-Ja21643	X
4	AU01_2	Jan 14, 2020		Soil	P20-Ja21644	X
5	AU02_0.75	Jan 15, 2020		Soil	P20-Ja21645	X
6	AU02_1	Jan 15, 2020		Soil	P20-Ja21646	X
7	AU02_1.5	Jan 15, 2020		Soil	P20-Ja21647	X
8	AU02_1.75	Jan 15, 2020		Soil	P20-Ja21648	X
9	AU02_2	Jan 15, 2020		Soil	P20-Ja21649	X
10	AU02_2.25	Jan 15, 2020		Soil	P20-Ja21650	X

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Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
11	AU02_2.3	Jan 15, 2020		Soil	P20-Ja21651		X
12	AU03_0.25	Jan 15, 2020		Soil	P20-Ja21652		X
13	AU03_0.5	Jan 15, 2020		Soil	P20-Ja21653		X
14	AU03_0.75	Jan 15, 2020		Soil	P20-Ja21654		X
15	AU03_1.25	Jan 15, 2020		Soil	P20-Ja21655		X
16	AU03_1.5	Jan 15, 2020		Soil	P20-Ja21656		X
17	AU03_1.75	Jan 15, 2020		Soil	P20-Ja21657		X
18	AU03_2	Jan 15, 2020		Soil	P20-Ja21658		X
19	AU03_2.25	Jan 15, 2020		Soil	P20-Ja21659		X
20	AU03_2.5	Jan 15, 2020		Soil	P20-Ja21660		X
21	AU101_0.25	Jan 15, 2020		Soil	P20-Ja21661		X
22	AU101_1	Jan 15, 2020		Soil	P20-Ja21662		X
23	AU101_1.25	Jan 15, 2020		Soil	P20-Ja21663		X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
24	AU101_1.5	Jan 15, 2020		Soil	P20-Ja21664	X
25	AU101_1.75	Jan 15, 2020		Soil	P20-Ja21665	X
26	AU101_2.5	Jan 15, 2020		Soil	P20-Ja21666	X
27	AU101_2.75	Jan 15, 2020		Soil	P20-Ja21667	X
28	AU101_3	Jan 15, 2020		Soil	P20-Ja21668	X
29	AU102_1.5	Jan 18, 2020		Soil	P20-Ja21669	X
30	AU102_2.25	Jan 18, 2020		Soil	P20-Ja21670	X
31	AU102_2.75	Jan 18, 2020		Soil	P20-Ja21671	X
32	AU102_3	Jan 18, 2020		Soil	P20-Ja21672	X
33	AU20_1.75	Jan 20, 2020		Soil	P20-Ja21673	X
34	AU20_2	Jan 20, 2020		Soil	P20-Ja21674	X
35	AU60_0.75	Jan 18, 2020		Soil	P20-Ja21675	X
36	AU60_1.25	Jan 18, 2020		Soil	P20-Ja21676	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
37	AU60_1.75	Jan 18, 2020		Soil	P20-Ja21677	X
38	AU60_2	Jan 18, 2020		Soil	P20-Ja21678	X
39	AU60_2.25	Jan 18, 2020		Soil	P20-Ja21679	X
40	AU60_2.5	Jan 18, 2020		Soil	P20-Ja21680	X
41	AU60_2.75	Jan 18, 2020		Soil	P20-Ja21681	X
42	AU60_3	Jan 18, 2020		Soil	P20-Ja21682	X
43	AU66_0.25	Jan 18, 2020		Soil	P20-Ja21683	X
44	AU66_1	Jan 18, 2020		Soil	P20-Ja21684	X
45	AU66_1.25	Jan 18, 2020		Soil	P20-Ja21685	X
46	AU66_2	Jan 18, 2020		Soil	P20-Ja21686	X
47	AU66_2.5	Jan 18, 2020		Soil	P20-Ja21687	X
48	AU66_2.75	Jan 18, 2020		Soil	P20-Ja21688	X
49	AU70_1	Jan 18, 2020		Soil	P20-Ja21689	X

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Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
50	AU70_1.25	Jan 18, 2020		Soil	P20-Ja21690	X
51	AU70_1.75	Jan 18, 2020		Soil	P20-Ja21691	X
52	AU70_2	Jan 18, 2020		Soil	P20-Ja21692	X
53	AU70_2.75	Jan 18, 2020		Soil	P20-Ja21693	X
54	AU74_0.25	Jan 19, 2020		Soil	P20-Ja21694	X
55	AU74_0.5	Jan 19, 2020		Soil	P20-Ja21695	X
56	AU74_2.25	Jan 19, 2020		Soil	P20-Ja21696	X
57	AU74_0.3	Jan 19, 2020		Soil	P20-Ja21697	X
58	AU74_2	Jan 19, 2020		Soil	P20-Ja21698	X
59	BH05_0.2	Jan 15, 2020		Soil	P20-Ja21699	X
60	BH05_0.25	Jan 15, 2020		Soil	P20-Ja21700	X
61	BH05_0.5	Jan 15, 2020		Soil	P20-Ja21701	X
62	BH05_0.6	Jan 15, 2020		Soil	P20-Ja21702	X

Australia

Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 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

New Zealand

Auckland
 35 O'Rorke Road
 Penrose, Auckland 1061
 Phone : +64 9 526 45 51
 IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
 Perth
 WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 698189
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 23, 2020 4:58 PM
Due: Jan 29, 2020
Priority: 3 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
63	BH05_0.75	Jan 15, 2020		Soil	P20-Ja21703	X
64	BH05_1	Jan 15, 2020		Soil	P20-Ja21704	X
65	BH05_1.25	Jan 15, 2020		Soil	P20-Ja21705	X
66	BH05_1.5	Jan 15, 2020		Soil	P20-Ja21706	X
67	BH05_1.75	Jan 15, 2020		Soil	P20-Ja21707	X
68	BH05_2	Jan 15, 2020		Soil	P20-Ja21708	X
69	BH05_2.25	Jan 15, 2020		Soil	P20-Ja21709	X
70	BH05_2.5	Jan 15, 2020		Soil	P20-Ja21710	X
71	BH05_2.75	Jan 15, 2020		Soil	P20-Ja21711	X
72	BH05_3	Jan 15, 2020		Soil	P20-Ja21712	X
73	BH05_3	Jan 15, 2020		Soil	P20-Ja21713	X
74	BH05_3.25	Jan 15, 2020		Soil	P20-Ja21714	X
75	BH05_3.5	Jan 15, 2020		Soil	P20-Ja21715	X

Australia

Melbourne
 6 Monterey Road
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 Site # 1254 & 14271

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 Site # 23736

New Zealand

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 IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
 Perth
 WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 698189
Phone: 08 6222 8222
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Received: Jan 23, 2020 4:58 PM
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Priority: 3 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test	
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							X
76	BH05_3.75	Jan 15, 2020		Soil	P20-Ja21716		X
77	BH05_4	Jan 15, 2020		Soil	P20-Ja21717		X
78	BH05_4.5	Jan 15, 2020		Soil	P20-Ja21718		X
79	BH05_4.75	Jan 15, 2020		Soil	P20-Ja21719		X
80	BH05_5	Jan 15, 2020		Soil	P20-Ja21720		X
81	HA08_QC	Jan 17, 2020		Soil	P20-Ja21721	X	
82	QA02	Not Provided		Soil	P20-Ja21722	X	
83	QC02	Not Provided		Soil	P20-Ja21723	X	
84	QC04	Not Provided		Soil	P20-Ja21724	X	
Test Counts						84	

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21641	CP	pH Units	9.4	9.4	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21641	CP	pH Units	9.4	9.6	pass	30%	Pass	
Reaction Ratings*	P20-Ja21641	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21651	CP	pH Units	8.9	8.8	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21651	CP	pH Units	6.8	7.1	pass	30%	Pass	
Reaction Ratings*	P20-Ja21651	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21661	CP	pH Units	8.7	8.7	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21661	CP	pH Units	8.5	8.5	pass	30%	Pass	
Reaction Ratings*	P20-Ja21661	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21671	CP	pH Units	8.2	8.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21671	CP	pH Units	8.8	8.9	pass	30%	Pass	
Reaction Ratings*	P20-Ja21671	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21681	CP	pH Units	9.2	8.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21681	CP	pH Units	9.2	9.0	pass	30%	Pass	
Reaction Ratings*	P20-Ja21681	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21691	CP	pH Units	9.5	9.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21691	CP	pH Units	9.6	9.8	pass	30%	Pass	
Reaction Ratings*	P20-Ja21691	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21701	CP	pH Units	8.5	8.4	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21701	CP	pH Units	8.4	8.4	pass	30%	Pass	
Reaction Ratings*	P20-Ja21701	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja21711	CP	pH Units	8.9	9.0	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21711	CP	pH Units	8.0	7.9	pass	30%	Pass	
Reaction Ratings*	P20-Ja21711	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)*	P20-Ja21721	CP	pH Units	8.8	8.8	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja21721	CP	pH Units	7.7	7.7	pass	30%	Pass	
Reaction Ratings*	P20-Ja21721	CP	comment	2.0	2.0	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	N/A
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

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)


**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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. National Price List for GHD	Turnaround Time Standard (5 days)	Analyses										Remarks
--	---	-----------------	--	--	--	--	--	--	--	--	--	----------------

Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com									
---	--	---	--	--	--	--	--	--	--	--	--

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ S-L Sludge/ W-Water/ A-Air	Container			No	pH screening (pHF and pHFOX)											HOLD	Remarks					
					Type B-bottle/Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other																				
AU20_2.75		20-Jan-20		S	B	unpres.	1	✓																		
AU20_3		20-Jan-20		S	B	unpres.	1	✓																		
AU60_0.25		18-Jan-20		S	B	unpres.	1	✓																		
AU60_0.5		18-Jan-20		S	B	unpres.	1	✓																		
AU60_1		18-Jan-20		S	B	unpres.	1	✓																		
AU60_1.5		18-Jan-20		S	B	unpres.	1	✓																		
AU66_0.5		18-Jan-20		S	B	unpres.	1	✓																		
AU66_0.75		18-Jan-20		S	B	unpres.	1	✓																		
AU66_1.5		18-Jan-20		S	B	unpres.	1	✓																		
AU66_1.75		18-Jan-20		S	B	unpres.	1	✓																		
AU66_2.25		18-Jan-20		S	B	unpres.	1	✓																		
AU66_3		18-Jan-20		S	B	unpres.	1	✓																		
AU70_0.25		18-Jan-20		S	B	unpres.	1	✓																		
AU70_0.5		18-Jan-20		S	B	unpres.	1	✓																		
AU70_0.75		18-Jan-20		S	B	unpres.	1	✓																		
AU70_1.5		18-Jan-20		S	B	unpres.	1	✓																		698298
AU70_2.25		18-Jan-20		S	B	unpres.	1	✓																		

Sampled by: SD / AT / DO	Date/Time: various	Relinquished by: R Walker	Date/Time: 23/01/2020
Received by:	Date/Time:	Relinquished by:	Date/Time:

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

Reception Ph: 08 6222 8222

Page 5 of 5

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. National Price List for GHD	Turnaround Time Standard (5 days)																		
---	--------------------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com	Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com
--	--

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL- Sludge/ W-Water / A-Air	Container				Analyses							Remarks			
					Type B-Bottle/J-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	pH screening (pH and pHFOX)	Exchangeable cations	Exchangeable sodium percentage	Silica	Metals*							
AU75_2.5		19-Jan-20		S	B	unpres.	1	✓											*As, Be, B, Cd, Co, Cu, Hg, Pb, Ni, Mn, Se, Zn, Cr6+
AU75_2.75		19-Jan-20		S	B	unpres.	1	✓											
AU75_3		19-Jan-20		S	B	unpres.	1	✓											
AU75_4		19-Jan-20		S	B	unpres.	1	✓											
HA08_0.25-0.5		17-Jan-20		S	B	unpres.	1	✓											
HA08_0-0.25		17-Jan-20		S	B	unpres.	1	✓											
QC01		14-Jan-20		S	B	unpres.	1	✓											
QC03		18-Jan-20		S	B	unpres.	1	✓											
QC05		-		S	B	unpres.	1	✓											
QC06		-		S	B	unpres.	1	✓											
BH05_0.2		14-Jan-20		S	GJ	unpres.	2		✓	✓	✓	✓							
BH05_0.6		14-Jan-20		S	GJ	unpres.	2		✓	✓	✓	✓							
BH05_3.5		14-Jan-20		S	GJ	unpres.	2		✓	✓	✓	✓							
BH02_11.45-11.75				S	GJ	unpres.	2												✓
BH02_17.45-17.8				S	GJ	unpres.	2												✓
BH03_3.0-3.4				S	GJ	unpres.	2												✓
BH03_11.45-11.75				S	GJ	unpres.	2												✓

Sampled by: SD / AT / DO	Date/Time: various	Relinquished by: R Walker 	Date/Time: 23/01/2020
Received by:	Date/Time:	Relinquished by:	Date/Time:

698298

Melbourne

6 Monterey Road
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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

Perth

2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K + S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jan 23, 2020 1:18 PM
Eurofins reference: **698298**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 23736

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

Attention: Louise Cockerton

Report 698298-S
Project name K + S
Project ID 12516706
Received Date Jan 23, 2020

Client Sample ID			AU01_0.25	AU01_0.75	AU01_1.5	AU01_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22549	P20-Ja22550	P20-Ja22551	P20-Ja22552
Date Sampled			Jan 14, 2020	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.5	9.5	9.8	9.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.5	9.6	9.8	7.9
Reaction Ratings* ^{S05}		comment	4.0	2.0	2.0	2.0

Client Sample ID			AU01_2.25	AU01_2.5	AU01_2.75	AU01_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22553	P20-Ja22554	P20-Ja22555	P20-Ja22556
Date Sampled			Jan 14, 2020	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.9	9.9	9.9	9.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	7.9	9.3	7.8
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	2.0

Client Sample ID			AU02_0.25	AU02_0.5	AU02_1.25	AU02_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22557	P20-Ja22558	P20-Ja22559	P20-Ja22560
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	9.5	8.4	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	8.0	7.4	8.7
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	4.0

Client Sample ID			AU02_2.75	AU03_1	AU101_0.5	AU101_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22561	P20-Ja22562	P20-Ja22563	P20-Ja22564
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 15, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	8.8	9.0	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	7.4	9.0	9.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU101_2	AU101_2.25	AU102_0.25	AU102_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22565	P20-Ja22566	P20-Ja22567	P20-Ja22568
Date Sampled			Jan 15, 2020	Jan 15, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.2	7.8	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3	8.2	8.1	8.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU102_0.75	AU102_1	AU102_1.25	AU102_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22569	P20-Ja22570	P20-Ja22571	P20-Ja22572
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.3	8.4	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.9	9.0	8.7
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU102_2	AU102_2.5	AU20_0.25	AU20_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22573	P20-Ja22574	P20-Ja22575	P20-Ja22576
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 20, 2020	Jan 20, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.5	8.5	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.1	8.9	8.5	8.6
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU20_0.75	AU20_1	AU20_1.25	AU20_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22577	P20-Ja22578	P20-Ja22579	P20-Ja22580
Date Sampled			Jan 20, 2020	Jan 20, 2020	Jan 20, 2020	Jan 20, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.2	8.4	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.6	8.7	8.9
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	4.0

Client Sample ID			AU20_2.25	AU20_2.5	AU20_2.75	AU20_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22581	P20-Ja22582	P20-Ja22583	P20-Ja22584
Date Sampled			Jan 20, 2020	Jan 20, 2020	Jan 20, 2020	Jan 20, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.5	8.8	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	9.0	9.2	9.3
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU60_0.25	AU60_0.5	AU60_1	AU60_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22585	P20-Ja22586	P20-Ja22587	P20-Ja22588
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.3	9.1	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.7	10	9.5	9.6
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU66_0.5	AU66_0.75	AU66_1.5	AU66_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22589	P20-Ja22590	P20-Ja22591	P20-Ja22592
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	8.8	8.2	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.0	8.0	8.5	8.7
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU66_2.25	AU66_3	AU70_0.25	AU70_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22593	P20-Ja22594	P20-Ja22595	P20-Ja22596
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	8.4	8.6	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.9	8.2	7.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU70_0.75	AU70_1.5	AU70_2.25	AU70_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22597	P20-Ja22598	P20-Ja22599	P20-Ja22600
Date Sampled			Jan 18, 2020	Jan 18, 2020	Jan 18, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.6	9.7	9.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.2	9.6	8.3	7.9
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU70_3	AU74_30.75	AU74_1	AU74_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22601	P20-Ja22602	P20-Ja22603	P20-Ja22604
Date Sampled			Jan 18, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.7	7.1	8.3	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.8	8.9	8.7	8.9
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU74_1.5	AU74_1.75	AU74_2	AU74_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22605	P20-Ja22606	P20-Ja22607	P20-Ja22608
Date Sampled			Jan 19, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.2	7.4	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.7	8.8	8.4
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU74_2.75	AU74_3	AU75_0.25	AU75_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22609	P20-Ja22610	P20-Ja22611	P20-Ja22612
Date Sampled			Jan 19, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	7.8	8.2	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.9	8.5	8.8	9.2
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU75_1.25	AU75_1.5	AU75_1.75	AU75_2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22613	P20-Ja22614	P20-Ja22615	P20-Ja22616
Date Sampled			Jan 19, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.3	8.1	8.3	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.6	8.8	9.1
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			AU75_2.5	AU75_2.75	AU75_3	AU75_4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22617	P20-Ja22618	P20-Ja22619	P20-Ja22620
Date Sampled			Jan 19, 2020	Jan 19, 2020	Jan 19, 2020	Jan 19, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	7.5	7.4	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.2	8.7	8.7	9.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			HA08_0.25-0.5	HA08_0-0.25	QC01	QC03
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22621	P20-Ja22622	P20-Ja22623	P20-Ja22624
Date Sampled			Jan 17, 2020	Jan 17, 2020	Jan 14, 2020	Jan 18, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.9	9.7	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.5	8.8	9.9	9.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			QC05	BH05_0.2	BH05_0.6	BH05_3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ja22625	P20-Ja22626	P20-Ja22627	P20-Ja22628
Date Sampled			Not Provided	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020
Test/Reference	LOR	Unit				
Chromium (hexavalent)						
	1	mg/kg	-	< 1	< 1	< 1
Conductivity (1:5 aqueous extract at 25°C as rec.)						
	10	uS/cm	-	17000	19000	10000
Exchangeable Sodium Percentage (ESP)						
	0.1	%	-	5.9	9.3	1.3
% Moisture						
	1	%	-	21	21	14
Heavy Metals						
Arsenic	2	mg/kg	-	14	15	14
Beryllium	2	mg/kg	-	< 2	< 2	< 2
Boron	10	mg/kg	-	56	110	41
Cadmium	0.4	mg/kg	-	< 0.4	< 0.4	< 0.4
Cobalt	5	mg/kg	-	< 5	8.4	7.5
Copper	5	mg/kg	-	13	15	17
Lead	5	mg/kg	-	< 5	7.6	8.7
Manganese	5	mg/kg	-	14	590	120
Mercury	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	-	< 5	18	20
Selenium	2	mg/kg	-	< 2	< 2	< 2
Zinc	5	mg/kg	-	< 5	29	27
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	-	3.9	16	59
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	-	-	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	-	-	-
Reaction Ratings* ^{S05}		comment	4.0	-	-	-

Client Sample ID			QC06
Sample Matrix			Soil
Eurofins Sample No.			P20-Ja22634
Date Sampled			Not Provided
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3
Reaction Ratings* ^{S05}		comment	4.0

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
Chromium (hexavalent) - Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)	Melbourne	Feb 05, 2020	28 Days
Exchangeable Sodium Percentage (ESP) - Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)	Melbourne	Feb 06, 2020	28 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Perth	Jan 23, 2020	180 Days
Mercury - Method: USEPA 7470/1 Mercury	Perth	Jan 23, 2020	28 Days
Acid Sulfate Soils Field pH Test - Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests	Perth	Jan 23, 2020	7 Days
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 05, 2020	7 Days
Cation Exchange Capacity - Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage	Melbourne	Feb 06, 2020	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Feb 05, 2020	14 Days

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IANZ # 1290

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Jan 23, 2020 1:18 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	698298	Due:	Jan 29, 2020
Project Name:	K + S	Phone:	08 6222 8222	Priority:	3 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	HOLD	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Acid Sulfate Soils Field pH Test	Cation Exchange Capacity	
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X		
External Laboratory																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																		
1	AU01_0.25	Jan 14, 2020		Soil	P20-Ja22549																X		
2	AU01_0.75	Jan 14, 2020		Soil	P20-Ja22550																X		
3	AU01_1.5	Jan 14, 2020		Soil	P20-Ja22551																X		
4	AU01_1.75	Jan 14, 2020		Soil	P20-Ja22552																X		
5	AU01_2.25	Jan 14, 2020		Soil	P20-Ja22553																X		
6	AU01_2.5	Jan 14, 2020		Soil	P20-Ja22554																X		
7	AU01_2.75	Jan 14, 2020		Soil	P20-Ja22555																X		
8	AU01_3	Jan 14, 2020		Soil	P20-Ja22556																X		
9	AU02_0.25	Jan 15, 2020		Soil	P20-Ja22557																X		
10	AU02_0.5	Jan 15, 2020		Soil	P20-Ja22558																X		

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Company Name: GHD Pty Ltd WA
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Order No.:
Report #: 698298
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 23, 2020 1:18 PM
Due: Jan 29, 2020
Priority: 3 Day
Contact Name: Louise Cockerton

Project Name: K + S
Project ID: 12516706

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	HOLD	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Acid Sulfate Soils Field pH Test	Cation Exchange Capacity	
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X		
11	AU02_1.25	Jan 15, 2020		Soil	P20-Ja22559																		X
12	AU02_2.5	Jan 15, 2020		Soil	P20-Ja22560																		X
13	AU02_2.75	Jan 15, 2020		Soil	P20-Ja22561																		X
14	AU03_1	Jan 15, 2020		Soil	P20-Ja22562																		X
15	AU101_0.5	Jan 15, 2020		Soil	P20-Ja22563																		X
16	AU101_0.75	Jan 15, 2020		Soil	P20-Ja22564																		X
17	AU101_2	Jan 15, 2020		Soil	P20-Ja22565																		X
18	AU101_2.25	Jan 15, 2020		Soil	P20-Ja22566																		X
19	AU102_0.25	Jan 18, 2020		Soil	P20-Ja22567																		X
20	AU102_0.5	Jan 18, 2020		Soil	P20-Ja22568																		X
21	AU102_0.75	Jan 18, 2020		Soil	P20-Ja22569																		X
22	AU102_1	Jan 18, 2020		Soil	P20-Ja22570																		X
23	AU102_1.25	Jan 18, 2020		Soil	P20-Ja22571																		X

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Phone : 0800 856 450
IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 698298
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 23, 2020 1:18 PM
Due: Jan 29, 2020
Priority: 3 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	HOLD	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Acid Sulfate Soils Field pH Test	Cation Exchange Capacity	
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
24	AU102_1.75	Jan 18, 2020		Soil	P20-Ja22572																	X	
25	AU102_2	Jan 18, 2020		Soil	P20-Ja22573																	X	
26	AU102_2.5	Jan 18, 2020		Soil	P20-Ja22574																	X	
27	AU20_0.25	Jan 20, 2020		Soil	P20-Ja22575																	X	
28	AU20_0.5	Jan 20, 2020		Soil	P20-Ja22576																	X	
29	AU20_0.75	Jan 20, 2020		Soil	P20-Ja22577																	X	
30	AU20_1	Jan 20, 2020		Soil	P20-Ja22578																	X	
31	AU20_1.25	Jan 20, 2020		Soil	P20-Ja22579																	X	
32	AU20_1.5	Jan 20, 2020		Soil	P20-Ja22580																	X	
33	AU20_2.25	Jan 20, 2020		Soil	P20-Ja22581																	X	
34	AU20_2.5	Jan 20, 2020		Soil	P20-Ja22582																	X	
35	AU20_2.75	Jan 20, 2020		Soil	P20-Ja22583																	X	
36	AU20_3	Jan 20, 2020		Soil	P20-Ja22584																	X	

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IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 698298
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jan 23, 2020 1:18 PM
Due: Jan 29, 2020
Priority: 3 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	HOLD	Lead	Manganese	Mercury	Nickel	Selenium	Zinc	Acid Sulfate Soils Field pH Test	Cation Exchange Capacity	
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X		
37	AU60_0.25	Jan 18, 2020		Soil	P20-Ja22585																		X
38	AU60_0.5	Jan 18, 2020		Soil	P20-Ja22586																		X
39	AU60_1	Jan 18, 2020		Soil	P20-Ja22587																		X
40	AU60_1.5	Jan 18, 2020		Soil	P20-Ja22588																		X
41	AU66_0.5	Jan 18, 2020		Soil	P20-Ja22589																		X
42	AU66_0.75	Jan 18, 2020		Soil	P20-Ja22590																		X
43	AU66_1.5	Jan 18, 2020		Soil	P20-Ja22591																		X
44	AU66_1.75	Jan 18, 2020		Soil	P20-Ja22592																		X
45	AU66_2.25	Jan 18, 2020		Soil	P20-Ja22593																		X
46	AU66_3	Jan 18, 2020		Soil	P20-Ja22594																		X
47	AU70_0.25	Jan 18, 2020		Soil	P20-Ja22595																		X
48	AU70_0.5	Jan 18, 2020		Soil	P20-Ja22596																		X
49	AU70_0.75	Jan 18, 2020		Soil	P20-Ja22597																		X

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Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X		
50	AU70_1.5	Jan 18, 2020		Soil	P20-Ja22598																		X
51	AU70_2.25	Jan 18, 2020		Soil	P20-Ja22599																		X
52	AU70_2.5	Jan 18, 2020		Soil	P20-Ja22600																		X
53	AU70_3	Jan 18, 2020		Soil	P20-Ja22601																		X
54	AU74_30.75	Jan 19, 2020		Soil	P20-Ja22602																		X
55	AU74_1	Jan 19, 2020		Soil	P20-Ja22603																		X
56	AU74_1.25	Jan 19, 2020		Soil	P20-Ja22604																		X
57	AU74_1.5	Jan 19, 2020		Soil	P20-Ja22605																		X
58	AU74_1.75	Jan 19, 2020		Soil	P20-Ja22606																		X
59	AU74_2	Jan 19, 2020		Soil	P20-Ja22607																		X
60	AU74_2.5	Jan 19, 2020		Soil	P20-Ja22608																		X
61	AU74_2.75	Jan 19, 2020		Soil	P20-Ja22609																		X
62	AU74_3	Jan 19, 2020		Soil	P20-Ja22610																		X

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Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X		
63	AU75_0.25	Jan 19, 2020		Soil	P20-Ja22611																		X
64	AU75_0.75	Jan 19, 2020		Soil	P20-Ja22612																		X
65	AU75_1.25	Jan 19, 2020		Soil	P20-Ja22613																		X
66	AU75_1.5	Jan 19, 2020		Soil	P20-Ja22614																		X
67	AU75_1.75	Jan 19, 2020		Soil	P20-Ja22615																		X
68	AU75_2.25	Jan 19, 2020		Soil	P20-Ja22616																		X
69	AU75_2.5	Jan 19, 2020		Soil	P20-Ja22617																		X
70	AU75_2.75	Jan 19, 2020		Soil	P20-Ja22618																		X
71	AU75_3	Jan 19, 2020		Soil	P20-Ja22619																		X
72	AU75_4	Jan 19, 2020		Soil	P20-Ja22620																		X
73	HA08_0.25-0.5	Jan 17, 2020		Soil	P20-Ja22621																		X
74	HA08_0-0.25	Jan 17, 2020		Soil	P20-Ja22622																		X
75	QC01	Jan 14, 2020		Soil	P20-Ja22623																		X

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Melbourne Laboratory - NATA Site # 1254 & 14271										X			X									X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	
76	QC03	Jan 18, 2020		Soil	P20-Ja22624																	X	
77	QC05	Not Provided		Soil	P20-Ja22625																	X	
78	BH05_0.2	Jan 14, 2020		Soil	P20-Ja22626	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
79	BH05_0.6	Jan 14, 2020		Soil	P20-Ja22627	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
80	BH05_3.5	Jan 14, 2020		Soil	P20-Ja22628	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
81	BH02_11.45-11.75	Not Provided		Soil	P20-Ja22629									X									
82	BH02_17.45-17.8	Not Provided		Soil	P20-Ja22630									X									
83	BH03_3.4-3.4	Not Provided		Soil	P20-Ja22631									X									
84	BH03_11.45-11.75	Not Provided		Soil	P20-Ja22632									X									
85	QC06	Not Provided		Soil	P20-Ja22634																	X	
Test Counts						3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	78	3	

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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	
Method Blank								
Chromium (hexavalent)	mg/kg	< 1			1	Pass		
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass		
Exchangeable Sodium Percentage (ESP)	%	< 0.1			0.1	Pass		
Method Blank								
Heavy Metals								
Arsenic	mg/kg	< 2			2	Pass		
Beryllium	mg/kg	< 2			2	Pass		
Boron	mg/kg	< 10			10	Pass		
Cadmium	mg/kg	< 0.4			0.4	Pass		
Cobalt	mg/kg	< 5			5	Pass		
Copper	mg/kg	< 5			5	Pass		
Lead	mg/kg	< 5			5	Pass		
Manganese	mg/kg	< 5			5	Pass		
Mercury	mg/kg	< 0.1			0.1	Pass		
Nickel	mg/kg	< 5			5	Pass		
Selenium	mg/kg	< 2			2	Pass		
Zinc	mg/kg	< 5			5	Pass		
Method Blank								
Cation Exchange Capacity								
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass		
LCS - % Recovery								
Chromium (hexavalent)	%	114			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Arsenic	%	93			80-120	Pass		
Beryllium	%	96			80-120	Pass		
Boron	%	95			80-120	Pass		
Cadmium	%	96			80-120	Pass		
Cobalt	%	97			80-120	Pass		
Copper	%	96			80-120	Pass		
Lead	%	99			80-120	Pass		
Manganese	%	95			80-120	Pass		
Mercury	%	91			70-130	Pass		
Nickel	%	94			80-120	Pass		
Selenium	%	92			80-120	Pass		
Zinc	%	94			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Heavy Metals				Result 1				
Boron	P20-Ja23665	NCP	%	89		75-125	Pass	
Manganese	P20-Ja23665	NCP	%	105		75-125	Pass	
Spike - % Recovery								
				Result 1				
Chromium (hexavalent)	P20-Ja22627	CP	%	94		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Arsenic	P20-Ja22627	CP	%	97		75-125	Pass	
Beryllium	P20-Ja22627	CP	%	84		75-125	Pass	
Cadmium	P20-Ja22627	CP	%	94		75-125	Pass	
Cobalt	P20-Ja22627	CP	%	86		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Copper	P20-Ja22627	CP	%	84			75-125	Pass	
Lead	P20-Ja22627	CP	%	89			75-125	Pass	
Mercury	P20-Ja22627	CP	%	94			70-130	Pass	
Nickel	P20-Ja22627	CP	%	77			75-125	Pass	
Selenium	P20-Ja22627	CP	%	94			75-125	Pass	
Zinc	P20-Ja22627	CP	%	76			75-125	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	P20-Ja22628	CP	%	95			70-130	Pass	
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)*	P20-Ja22549	CP	pH Units	9.5	9.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22549	CP	pH Units	7.5	7.5	pass	30%	Pass	
Reaction Ratings*	P20-Ja22549	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja22558	CP	pH Units	9.5	9.4	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22558	CP	pH Units	8.0	8.0	pass	30%	Pass	
Reaction Ratings*	P20-Ja22558	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)*	P20-Ja22568	CP	pH Units	7.7	7.7	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22568	CP	pH Units	8.0	8.0	pass	30%	Pass	
Reaction Ratings*	P20-Ja22568	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja22578	CP	pH Units	8.2	8.3	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22578	CP	pH Units	7.6	7.7	pass	30%	Pass	
Reaction Ratings*	P20-Ja22578	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)*	P20-Ja22588	CP	pH Units	9.2	9.1	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22588	CP	pH Units	9.6	9.4	pass	30%	Pass	
Reaction Ratings*	P20-Ja22588	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja22598	CP	pH Units	9.6	9.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22598	CP	pH Units	9.6	9.6	pass	30%	Pass	
Reaction Ratings*	P20-Ja22598	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja22608	CP	pH Units	8.1	8.1	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22608	CP	pH Units	8.4	8.7	pass	30%	Pass	
Reaction Ratings*	P20-Ja22608	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ja22618	CP	pH Units	7.5	7.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ja22618	CP	pH Units	8.7	8.7	pass	30%	Pass	
Reaction Ratings*	P20-Ja22618	CP	comment	4.0	4.0	pass	30%	Pass	

Duplicate								
				Result 1	Result 2	RPD		
Chromium (hexavalent)	M20-Fe04520	NCP	mg/kg	< 1	< 1	<1	30%	Pass
Conductivity (1:5 aqueous extract at 25°C as rec.)	M20-Fe02951	NCP	uS/cm	67	76	13	30%	Pass
% Moisture	M20-Fe05990	NCP	%	11	11	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	P20-Ja22626	CP	mg/kg	14	14	1.0	30%	Pass
Beryllium	P20-Ja22626	CP	mg/kg	< 2	< 2	<1	30%	Pass
Boron	P20-Ja22626	CP	mg/kg	56	57	2.0	30%	Pass
Cadmium	P20-Ja22626	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Cobalt	P20-Ja22626	CP	mg/kg	< 5	< 5	<1	30%	Pass
Copper	P20-Ja22626	CP	mg/kg	13	11	15	30%	Pass
Lead	P20-Ja22626	CP	mg/kg	< 5	< 5	<1	30%	Pass
Manganese	P20-Ja22626	CP	mg/kg	14	12	15	30%	Pass
Mercury	P20-Ja22626	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	P20-Ja22626	CP	mg/kg	< 5	< 5	<1	30%	Pass
Selenium	P20-Ja22626	CP	mg/kg	< 2	< 2	<1	30%	Pass
Zinc	P20-Ja22626	CP	mg/kg	< 5	< 5	<1	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	N/A
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

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)
Rhys Thomas	Senior Analyst-SPOCAS (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**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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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PB Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S

Laboratory:
Address:
Laboratory Contact:

Eurofins MGT
2/91 Leach Hwy, Kewdale 6105

Laboratory Quote No.
Lab Quote 200121GHDW

Turnaround Time
(Standard 15 days)

Sample Receipt

Job Manager (Invoice) & GHD accounts
louise.cockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time
---------------	---------------	------	------

SED01_0

SED01_0.3-0.6

SED01_1

SED01_1.5

SED01_2

SED02_0

SED02_0.0-0.3

SED02_0.5

SED02_1

SED02_1.5

SED02_2

SED02_2.5

SED03_0

SED03_0.25

SED03_0.3-0.6

SED03_0.5

SED03_0.75

Sample Matrix	Container		Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Remarks
	Type	Preservative					
S-Soil/ SL-Sludge/ W-Water/ A-Air	B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Unpreserved/ HCl/H2SO4/HNO3/Other	No				<p>Do not dispose of samples without notifying GHD (Louise Cockerton)</p> <p>*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn</p>
S	1xGJ	unpres	1				
S	6xGJ, 1xBag	unpres	7	✓			
S	1xGJ	unpres	1				
S	1xGJ	unpres	1				
S	1xGJ	unpres	1				
S	1xBag	unpres	1				
S	6xGJ, 1xBag	unpres	7				
S	1xGJ	unpres	2				
S	1xGJ	unpres	2				
S	1xBag	unpres	2				
S	1xGJ, 1xBag	unpres	2				
S	1xGJ	unpres	2				
S	1xBag	unpres	1				
S	6xGJ, 1xBag	unpres	7	✓			
S	1xBag	unpres	1				
S	1xBag	unpres	1	✓			

Date/Time:	Relinquished by:	Date/Time:
10/2/20 15:27	R Walker	10/2
12/2/20 15:29	R Walker	10/2

74 (Val) No
109 633
12.6 8.1 8.5
16.10C

Catherine
EC

701587

Received by: Rob Johnston

Eurofins

Date/Time: 12/2/20 15:29

Relinquished by:

Date/Time:

12/2
Eurofins

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6932

Reception Ph: 08 6222 8222

Page 2 of 6

Project No. (as set up in ESdat) 12516706
Site Name (as set up in ESdat) K+S

Laboratory Quote No. Lab Quote 200121GHDW
Turnaround Time Standard (5 days)

Job Manager (Invoice) & GHD accounts
louis.cockerton@ghd.com
AP-FSS@ghd.com
Email Address (Results)
louis.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID Lab Sample ID Date Time

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/W-Water/ A-Air		Container		Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Remarks
				Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No						
SED03_1		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓		HOLD *Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED03_1.25		5-Feb-20		S	1xBag	unpres	1			✓		
SED03_1.5		5-Feb-20		S	1xBag	unpres	2			✓		
SED03_1.75		5-Feb-20		S	1xBag	unpres	1			✓		
SED03_2		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓		
SED04_0		6-Feb-20		S	1xBag	unpres	2					
SED04_0.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2					
SED04_1		6-Feb-20		S	1xBag	unpres	2					
SED04_1.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2					
SED04_2-2.2		6-Feb-20		S	6xGJ, 2xBag	unpres	8					
SED05_0		5-Feb-20		S	1xGJ	unpres	1					
SED05_0.5		5-Feb-20		S	1xGJ	unpres	1					
SED05_1-1.2		5-Feb-20		S	6xGJ, 1xBag	unpres	7					Cathreia
SED05_1.5		5-Feb-20		S	1xGJ, 1xBag	unpres	2					EF
SED05_2		5-Feb-20		S	1xGJ	unpres	1					701587
SED05_2.4		5-Feb-20		S	1xGJ	unpres	1					
SED06_0		6-Feb-20		S	1xGJ	unpres	1					

Received by: Rob Johnston Eurofins

Date/Time: 10/2/20 09:27

Relinquished by: R Walker

Date/Time: 10/2



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832
Reception Ph: 08 6222 8222
Page 3 of 6

Project No. (as set up in ESDot) 12516706
Site Name (as set up in ESDot) K+S
Laboratory: 2/91 Leach Hwy, Kewdale 6105
Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW
Turnaround Time Standard (5 days)

Job Manager (Invoice) & GHD accounts Louise.cockerton@ghd.com
Email Address (Results) louise.cockerton@ghd.com
AP-FSS@ghd.com ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix s-Soil/ Sl- Sludge/ W-Water/ A-Air	Container			Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Remarks	
					Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No						
SED06_0.5-0.7		6-Feb-20		S 6xGJ, 1xBag	unpres	7						✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED06_1		6-Feb-20		S 1xGJ	unpres	1						✓	
SED06_1.5		6-Feb-20		S 1xGJ	unpres	1						✓	
SED06_2		6-Feb-20		S 1xGJ	unpres	1						✓	
SED07_0		5-Feb-20		S 1xBag	unpres	1						✓	
SED07_0-0.4		5-Feb-20		S 1xBag	unpres	7	✓						
SED07_0.5		5-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	
SED07_1		5-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	
SED07_1.5		5-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	
SED07_2		5-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	
SED07_2.7		5-Feb-20		S 1xBag	unpres	2						✓	
SED08_0		5-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	
SED08_0.3-0.6		5-Feb-20		S 6xGJ, 1xBag	unpres	7						✓	
SED08A_0		6-Feb-20		S 1xGJ	unpres	1						✓	
SED08A_0.5		6-Feb-20		S 1xGJ	unpres	1						✓	
SED08A_1		6-Feb-20		S 1xGJ	unpres	1						✓	
SED08A_1.3		6-Feb-20		S 1xGJ, 1xBag	unpres	2						✓	

Received by: Rob Johnston Eurofinis
Date/Time: 10/12/20 15:27
Relinquished by: R Walker
Date/Time: 10/2

701587

Catherine EF

Do not dispose of samples without notifying GHD (Louise Cockerton)

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 4 of 6

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S

Laboratory: Eurofins MGT
Address: 2/91 Leach Hwy, Kewdale 6105

Laboratory Quote No.
Lab Quote 200121GHDW

Turnaround Time
Standard (5 days)

Laboratory Contact: Sample Receipt

Job Manager (Invoice) & GHD accounts
louisecockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louisecockerton@ghd.com
ryan.walker@ghd.com

Remarks
Do not dispose of samples without notifying GHD (Louise Cockerton)

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container			Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Date/Time:	Remarks
					Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No						
SED09_0-0.3		5-Feb-20		S	6xGJ, 1xBag	unpres	7					10/2/20 15:27	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED09_0.5		5-Feb-20		S	1xGJ	unpres	1						
SED09_1		5-Feb-20		S	1xGJ	unpres	1						
SED09_1.5		5-Feb-20		S	1xGJ	unpres	1						
SED09_1.7		5-Feb-20		S	1xGJ	unpres	1						
SED10_0		5-Feb-20		S	1xGJ	unpres	1						
SED10_0.5		5-Feb-20		S	1xGJ	unpres	1						
SED10_1		5-Feb-20		S	1xGJ	unpres	1						
SED10_1.5		5-Feb-20		S	1xGJ	unpres	1						
SED10_2		5-Feb-20		S	1xGJ	unpres	1						
SED10_2.1-2.4		5-Feb-20		S	1xBag	unpres	7						
SED11_0-0.3		6-Feb-20		S	6xGJ, 1xBag	unpres	7						
SED11_0.5		6-Feb-20		S	1xGJ	unpres	1						
SED11_1		6-Feb-20		S	1xGJ	unpres	1						
SED11_1.5		6-Feb-20		S	1xGJ	unpres	1						
SED11_1.9		6-Feb-20		S	1xGJ	unpres	1						
SED12_0		6-Feb-20		S	1xGJ	unpres	1						

Received by: Rob Johnston Eurofins

Date/Time: 10/2/20 15:27

Relinquished by: R Walker

Date/Time: 10/2

701594

Catharina

ET

Project No. (as set up in ESDt) 12516706 Site Name (as set up in ESDt) K+S
 Laboratory: Eurofins MGT
 Address: 2/91 Leach Hwy, Kewdale 6105
 Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW Turnaround Time Standard (5 days)
 Job Manager (Invoice) & GHD accounts Louise.cockerton@ghd.com Email Address (Results) louise.cockerton@ghd.com
 AP-FSS@ghd.com nyan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix			Container	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Remarks	
				S-Soil/ SL-Sludge/W-Water/ A-Air	Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/H2SO4/HNO3/Other								
SED12_0.5		6-Feb-20		S	1xGJ	unpres	No						✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn Do not dispose of samples without notifying GHD (Louise Cockerton)
SED12_1.2-1.4		6-Feb-20		S	6xGJ, 1xBag	unpres	7						✓	
SED12_1.5		6-Feb-20		S	1xGJ	unpres	1						✓	
SED12_2.2		6-Feb-20		S	1xGJ	unpres	1						✓	
FD1_200205		5-Feb-20		S	1xGJ	unpres	1						✓	
FS1_200205		5-Feb-20		S	1xGJ	unpres	1						✓	
FD2_200206		6-Feb-20		S	1xGJ	unpres	1						✓	
FS2_200206		6-Feb-20		S	1xGJ	unpres	1						✓	
HA01_0		6-Feb-20		S	1xBag	unpres	1						✓	
HA01_0.2		6-Feb-20		S	1xBag	unpres	1						✓	
HA02_0		6-Feb-20		S	1xBag	unpres	1						✓	
HA02_0.2		6-Feb-20		S	1xBag	unpres	1						✓	
HA03_0		6-Feb-20		S	1xBag	unpres	1						✓	
HA03_0.2		6-Feb-20		S	1xBag	unpres	1						✓	
HA04_0		6-Feb-20		S	1xBag	unpres	1						✓	
HA04_0.2		6-Feb-20		S	1xBag	unpres	1						✓	
HA05_0		6-Feb-20		S	1xBag	unpres	1						✓	

Received by: Rob Johnston Date/Time: 10/2/20 15:22 Relinquished by: R Walker Date/Time: 10/2
 Sampled by: R Walker Date/Time: 5/2 - 6/2 Relinquished by: R Walker Date/Time: 10/2
 Eurofins

701587

Callipers etc

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in Esdat)
12516706

Site Name (as set up in Esdat)
K+S

Laboratory Quote No.
Lab Quote 200121GHDW

Turnaround Time
Standard (5 days)

Laboratory:
Eurofins MGT
2/91 Leach Hwy, Kewdale 6105

Job Manager (Invoice) & GHD accounts
louise.cockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com
ryan.walker@ghd.com

Laboratory Contact:
Sample Receipt

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix		Container		Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Analyses	Remarks
				s-Soil/SL Sludge/ W-Water/ A-Air	Air	Type B-Bottle/J-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other					
HA05_0.2		6-Feb-20		S	1xBag	unpres	1			✓		*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
HA06_0		6-Feb-20		S	1xBag	unpres	1			✓		
HA06_0.5		6-Feb-20		S	1xBag	unpres	1			✓		
HA07_0		6-Feb-20		S	1xBag	unpres	1			✓		
HA07_0.5		6-Feb-20		S	1xBag	unpres	1			✓		
HA08_0-1		6-Feb-20		S	2xBags	unpres	2			✓		
HA09_0-1		6-Feb-20		S	2xBags	unpres	2			✓		
HA10_0-1		6-Feb-20		S	2xBags	unpres	2			✓		
Seawater for elutriate analysis**		6-Feb-20		W	1xBottle	unpres	1					**Use as required

HOLD

Do not dispose of samples
without notifying GHD (Louise
Cockerton)

Callista
etc.
701587

Received by: **Pat Sohrdo Eurofins** Date/Time: **10/2/20 15:27**

Sampled by: R Walker Date/Time: 5/2 - 6/2

Relinquished by: R Walker Date/Time: 10/2

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K+S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Feb 10, 2020 3:27 PM
Eurofins reference: **701587**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Sample containers for volatile analysis received with zero headspace.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

FS2 not received. 2 x FD2 received.

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: **Louise Cockerton**

Report **701587-L**
Project name **K+S**
Project ID **12516706**
Received Date **Feb 10, 2020**

Client Sample ID			SED01_0.3-0.6	SED03_0.3-0.6	SED07_0-0.4
Sample Matrix			AUS Leachate	AUS Leachate	AUS Leachate
Eurofins Sample No.			M20-Fe15107	M20-Fe15108	M20-Fe15109
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020
Test/Reference	LOR	Unit			
Heavy Metals					
Antimony	0.005	mg/L	< 0.005	< 0.005	< 0.005
Arsenic	0.01	mg/L	< 0.01	< 0.01	< 0.01
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	0.005	0.006	0.005
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	0.002	0.002	0.002
Selenium	0.001	mg/L	0.002	0.002	0.001
Zinc	0.005	mg/L	0.008	0.005	< 0.005
AUS Leaching Procedure					
Leachate Fluid ^{C01}		comment	sea water	sea water	sea water
pH (Leachate fluid)	0.1	pH Units	8.3	8.3	8.3
pH (off)	0.1	pH Units	8.2	8.3	8.2

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
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Feb 13, 2020	180 Days
AUS Leaching Procedure			
pH (Leachate fluid) - Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes	Melbourne	Feb 13, 2020	0 Days
pH (off) - Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes	Melbourne	Feb 13, 2020	0 Days

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Feb 10, 2020 3:27 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	701587	Due:	Mar 23, 2020
Project Name:	K+S	Phone:	08 6222 8222	Priority:	30 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract)*	Nickel	Nickel (1M HCl extract)	Organonics (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins Ingt Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)				
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Sydney Laboratory - NATA Site # 18217						X		X		X		X		X		X			X		X				X															
Brisbane Laboratory - NATA Site # 20794																																								
Perth Laboratory - NATA Site # 23736																																								
External Laboratory																							X	X	X															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																			
1	SED01_0.3-0.6	Feb 06, 2020		Soil	M20-Fe15077	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2	SED03_0	Feb 05, 2020		Soil	M20-Fe15078																																			
3	SED03_0.25	Feb 05, 2020		Soil	M20-Fe15079																																			
4	SED03_0.3-0.6	Feb 06, 2020		Soil	M20-Fe15080	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	SED03_0.5	Feb 05, 2020		Soil	M20-Fe15081																																			
6	SED03_0.75	Feb 05, 2020		Soil	M20-Fe15082																																			
7	SED03_1	Feb 05, 2020		Soil	M20-Fe15083																																			
8	SED03_1.25	Feb 05, 2020		Soil	M20-Fe15084																																			
9	SED03_1.5	Feb 05, 2020		Soil	M20-Fe15085																																			

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Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Feb 10, 2020 3:27 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	701587	Due:	Mar 23, 2020
Project Name:	K+S	Phone:	08 6222 8222	Priority:	30 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace)	Eurofins Inqt Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organotins (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Mercury (1M HCl extract)*	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony									
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Sydney Laboratory - NATA Site # 18217																X																																					
Brisbane Laboratory - NATA Site # 20794																																																					
Perth Laboratory - NATA Site # 23736																																																					
10	SED03_1.75	Feb 05, 2020		Soil	M20-Fe15086																																																
11	SED03_2	Feb 05, 2020		Soil	M20-Fe15087																																																
12	SED07_0-0.4	Feb 06, 2020		Soil	M20-Fe15088	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
13	HA01_0	Feb 06, 2020		Soil	M20-Fe15089																																																
14	HA01_0.2	Feb 06, 2020		Soil	M20-Fe15090																																																
15	HA02_0	Feb 06, 2020		Soil	M20-Fe15091																																																
16	HA02_0.2	Feb 06, 2020		Soil	M20-Fe15092																																																
17	HA03_0	Feb 06, 2020		Soil	M20-Fe15093																																																
18	HA03_0.2	Feb 06, 2020		Soil	M20-Fe15094																																																
19	HA04_0	Feb 06, 2020		Soil	M20-Fe15095																																																
20	HA04_0.2	Feb 06, 2020		Soil	M20-Fe15096																																																
21	HA05_0	Feb 06, 2020		Soil	M20-Fe15097																																																
22	HA05_0.2	Feb 06, 2020		Soil	M20-Fe15098																																																

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Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace)	Eurofins mg/L Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organonitros (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Mercury (1M HCl extract) *	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony							
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
Sydney Laboratory - NATA Site # 18217															X																																			
Brisbane Laboratory - NATA Site # 20794																																																		
Perth Laboratory - NATA Site # 23736																																																		
34	SED01_0	Feb 05, 2020		Soil	M20-Fe15110																																													
35	SED01_1	Feb 05, 2020		Soil	M20-Fe15111																																													
36	SED01_1.5	Feb 05, 2020		Soil	M20-Fe15112																																													
37	SED01_2	Feb 05, 2020		Soil	M20-Fe15113																																													
38	SED02_0	Feb 05, 2020		Soil	M20-Fe15114																																													
39	SED02_0.0-0.3	Feb 05, 2020		Soil	M20-Fe15115																																													
40	SED02_0.5	Feb 05, 2020		Soil	M20-Fe15116																																													
41	SED02_1	Feb 05, 2020		Soil	M20-Fe15117																																													
42	SED02_1.5	Feb 05, 2020		Soil	M20-Fe15118																																													
43	SED02_2	Feb 05, 2020		Soil	M20-Fe15119																																													
44	SED02_2.5	Feb 05, 2020		Soil	M20-Fe15120																																													
45	SED04_0	Feb 06, 2020		Soil	M20-Fe15121																																													

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Company Name: GHD Pty Ltd WA
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Project Name: K+S
Project ID: 12516706

Order No.:
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Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 10, 2020 3:27 PM
Due: Mar 23, 2020
Priority: 30 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
Sydney Laboratory - NATA Site # 18217						X										X									X																											
Brisbane Laboratory - NATA Site # 20794																																																				
Perth Laboratory - NATA Site # 23736																																																				
70	SED08A_0.5	Feb 06, 2020		Soil	M20-Fe15146																																															
71	SED08A_1	Feb 06, 2020		Soil	M20-Fe15147																																															
72	SED08A_1.3	Feb 06, 2020		Soil	M20-Fe15148																																															
73	SED09_0-0.3	Feb 05, 2020		Soil	M20-Fe15149																																															
74	SED09_0.5	Feb 05, 2020		Soil	M20-Fe15150																																															
75	SED09_1	Feb 05, 2020		Soil	M20-Fe15151																																															
76	SED09_1.5	Feb 05, 2020		Soil	M20-Fe15152																																															
77	SED09_1.7	Feb 05, 2020		Soil	M20-Fe15153																																															
78	SED10_0	Feb 05, 2020		Soil	M20-Fe15154																																															
79	SED10_0.5	Feb 05, 2020		Soil	M20-Fe15155																																															
80	SED10_1	Feb 05, 2020		Soil	M20-Fe15156																																															
81	SED10_1.5	Feb 05, 2020		Soil	M20-Fe15157																																															
82	SED10_2	Feb 05, 2020		Soil	M20-Fe15158																																															

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Phone: 08 6222 8222
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Received: Feb 10, 2020 3:27 PM
Due: Mar 23, 2020
Priority: 30 Day
Contact Name: Louise Cockerton

Project Name: K+S
Project ID: 12516706

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace)	Eurofins mg/L Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organonitros (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Mercury (1M HCl extract) *	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony						
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
Sydney Laboratory - NATA Site # 18217																X																																	
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Perth Laboratory - NATA Site # 23736																																																	
83	SED10_2.1-2.4	Feb 05, 2020		Soil	M20-Fe15159																																												
84	SED11_0-0.3	Feb 06, 2020		Soil	M20-Fe15160																																												
85	SED11_0.5	Feb 06, 2020		Soil	M20-Fe15161																																												
86	SED11_1	Feb 06, 2020		Soil	M20-Fe15162																																												
87	SED11_1.5	Feb 06, 2020		Soil	M20-Fe15163																																												
88	SED11_1.9	Feb 06, 2020		Soil	M20-Fe15164																																												
89	SED12_0	Feb 06, 2020		Soil	M20-Fe15165																																												
90	SED12_0.5	Feb 06, 2020		Soil	M20-Fe15166																																												
91	SED12_1.2-1.4	Feb 06, 2020		Soil	M20-Fe15167																																												
92	SED12_1.5	Feb 06, 2020		Soil	M20-Fe15168																																												
93	SED12_2.2	Feb 06, 2020		Soil	M20-Fe15169																																												

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Sample Detail						Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace)	Eurofins mg/L Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organonitros (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Mercury (1M HCl extract) *	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony									
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Sydney Laboratory - NATA Site # 18217															X							X																														
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94	FD1_200205	Feb 05, 2020		Soil	M20-Fe15170																																															
95	FS1_200205	Feb 05, 2020		Soil	M20-Fe15171																																															
96	FD2_200206	Feb 05, 2020		Soil	M20-Fe15172																																															
Test Counts						6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	64	6	6	6	3	3	6	6	3	6	6	3	6	6	3	6	6	3	26	3	3	3	3

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M20-Fe15109	CP	%	106			70-130	Pass	
Cadmium	M20-Fe15109	CP	%	102			70-130	Pass	
Chromium	M20-Fe15109	CP	%	107			70-130	Pass	
Copper	M20-Fe15109	CP	%	100			70-130	Pass	
Lead	M20-Fe15109	CP	%	111			70-130	Pass	
Mercury	M20-Fe15109	CP	%	106			70-130	Pass	
Nickel	M20-Fe15109	CP	%	102			70-130	Pass	
Zinc	M20-Fe15109	CP	%	94			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M20-Fe15107	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	M20-Fe15107	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cadmium	M20-Fe15107	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M20-Fe15107	CP	mg/L	0.005	0.005	13	30%	Pass	
Copper	M20-Fe15107	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	M20-Fe15107	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	M20-Fe15107	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M20-Fe15107	CP	mg/L	0.002	0.002	<1	30%	Pass	
Selenium	M20-Fe15107	CP	mg/L	0.002	0.002	26	30%	Pass	
Zinc	M20-Fe15107	CP	mg/L	0.008	0.006	29	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	Yes

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised By

Robert Johnston	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

**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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GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



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Site Number 1254

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The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Louise Cockerton**

Report **701587-S**
Project name **K+S**
Project ID **12516706**
Received Date **Feb 10, 2020**

Client Sample ID			SED01_0.3-0.6	SED03_0	SED03_0.25	SED03_0.3-0.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15077	M20-Fe15078	M20-Fe15079	M20-Fe15080
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	< 50	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	94	-	-	91
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	-	< 20
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	< 100	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 100
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	-	-	< 0.1
Total PCB*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchloroendate (surr.)	1	%	83	-	-	105
Tetrachloro-m-xylene (surr.)	1	%	51	-	-	70

Client Sample ID			SED01_0.3-0.6	SED03_0	SED03_0.25	SED03_0.3-0.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15077	M20-Fe15078	M20-Fe15079	M20-Fe15080
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (Trace level)						
Acenaphthene	0.005	mg/kg	< 0.005	-	-	< 0.005
Acenaphthylene	0.005	mg/kg	< 0.005	-	-	< 0.005
Anthracene	0.005	mg/kg	< 0.005	-	-	< 0.005
Benz(a)anthracene	0.005	mg/kg	< 0.005	-	-	< 0.005
Benzo(a)pyrene	0.005	mg/kg	< 0.005	-	-	< 0.005
Benzo(b&j)fluoranthene	0.005	mg/kg	< 0.005	-	-	< 0.005
Benzo(g,h,i)perylene	0.005	mg/kg	< 0.005	-	-	< 0.005
Benzo(k)fluoranthene	0.005	mg/kg	< 0.005	-	-	< 0.005
Chrysene	0.005	mg/kg	< 0.005	-	-	< 0.005
Dibenz(a,h)anthracene	0.005	mg/kg	< 0.005	-	-	< 0.005
Fluoranthene	0.005	mg/kg	< 0.005	-	-	< 0.005
Fluorene	0.005	mg/kg	< 0.005	-	-	< 0.005
Indeno(1.2.3-cd)pyrene	0.005	mg/kg	< 0.005	-	-	< 0.005
Naphthalene	0.005	mg/kg	< 0.005	-	-	< 0.005
Phenanthrene	0.005	mg/kg	< 0.005	-	-	< 0.005
Pyrene	0.005	mg/kg	< 0.005	-	-	< 0.005
Total PAH*	0.005	mg/kg	< 0.005	-	-	< 0.005
2-Fluorobiphenyl (surr.)	1	%	65	-	-	105
p-Terphenyl-d14 (surr.)	1	%	83	-	-	136
Organochlorine Pesticides (Trace level)						
4.4'-DDD	0.005	mg/kg	< 0.005	-	-	< 0.005
4.4'-DDE	0.005	mg/kg	< 0.005	-	-	< 0.005
4.4'-DDT	0.005	mg/kg	< 0.005	-	-	< 0.005
a-BHC	0.005	mg/kg	< 0.005	-	-	< 0.005
Aldrin	0.005	mg/kg	< 0.005	-	-	< 0.005
b-BHC	0.005	mg/kg	< 0.005	-	-	< 0.005
Chlordanes - Total	0.01	mg/kg	< 0.01	-	-	< 0.01
d-BHC	0.005	mg/kg	< 0.005	-	-	< 0.005
Dieldrin	0.005	mg/kg	< 0.005	-	-	< 0.005
Endosulfan I	0.005	mg/kg	< 0.005	-	-	< 0.005
Endosulfan II	0.005	mg/kg	< 0.005	-	-	< 0.005
Endosulfan sulphate	0.005	mg/kg	< 0.005	-	-	< 0.005
Endrin	0.005	mg/kg	< 0.005	-	-	< 0.005
Endrin aldehyde	0.005	mg/kg	< 0.005	-	-	< 0.005
Endrin ketone	0.005	mg/kg	< 0.005	-	-	< 0.005
g-BHC (Lindane)	0.005	mg/kg	< 0.005	-	-	< 0.005
Heptachlor	0.005	mg/kg	< 0.005	-	-	< 0.005
Heptachlor epoxide	0.005	mg/kg	< 0.005	-	-	< 0.005
Hexachlorobenzene	0.005	mg/kg	< 0.005	-	-	< 0.005
Methoxychlor	0.005	mg/kg	< 0.005	-	-	< 0.005
Toxaphene	0.1	mg/kg	< 0.1	-	-	< 0.1
DDT + DDE + DDD (Total)*	0.005	mg/kg	< 0.005	-	-	< 0.005
Aldrin and Dieldrin (Total)*	0.005	mg/kg	< 0.005	-	-	< 0.005
Vic EPA IWRG 621 OCP (Total)*	0.01	mg/kg	< 0.01	-	-	< 0.01
Vic EPA IWRG 621 Other OCP (Total)*	0.01	mg/kg	< 0.01	-	-	< 0.01

Client Sample ID			SED01_0.3-0.6	SED03_0	SED03_0.25	SED03_0.3-0.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15077	M20-Fe15078	M20-Fe15079	M20-Fe15080
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Loss on Ignition (550°C)	0.1	%	4.3	-	-	3.6
Total Organic Carbon	0.1	%	< 0.1	-	-	0.2
Organotins (MBT, DBT, TBT)			see attached	-	-	see attached
Radioactivity - gross Alpha & Beta			see attached	-	-	see attached
% Moisture	1	%	17	-	-	16
Particle Size Distribution by Sieve and Hydrometer			see attached	-	-	see attached
Heavy Metals						
Antimony	10	mg/kg	< 10	-	-	< 10
Arsenic	2	mg/kg	15	-	-	13
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	73	-	-	60
Copper	5	mg/kg	21	-	-	16
Lead	5	mg/kg	7.5	-	-	6.6
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	21	-	-	16
Selenium	2	mg/kg	< 2	-	-	< 2
Zinc	5	mg/kg	25	-	-	23
Heavy Metals (1M HCl Extract)						
Antimony (1M HCl Extract)	2	mg/kg	15	-	-	8.3
Arsenic (1M HCl extract)	2	mg/kg	< 2	-	-	< 2
Cadmium (1M HCl extract)	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium (1M HCl extract)	5	mg/kg	42	-	-	64
Copper (1M HCl extract)	5	mg/kg	< 5	-	-	< 5
Lead (1M HCl extract)	5	mg/kg	< 5	-	-	< 5
Mercury (1M HCl extract)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel (1M HCl extract)	5	mg/kg	< 5	-	-	< 5
Selenium (1M HCl extract)	2	mg/kg	47	-	-	82
Zinc (1M HCl extract)	5	mg/kg	< 5	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	9.2	9.1	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	7.7	7.8	-
Reaction Ratings**S05	-	comment	-	4.0	3.0	-

Client Sample ID			SED03_0.5	SED03_0.75	SED03_1	SED03_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15081	M20-Fe15082	M20-Fe15083	M20-Fe15084
Date Sampled			Feb 05, 2020	Feb 05, 2020	Feb 05, 2020	Feb 05, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	8.9	8.9	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	8.0	8.1	9.0
Reaction Ratings**S05	-	comment	4.0	3.0	3.0	4.0

Client Sample ID			SED03_1.5	SED03_1.75	SED03_2	SED07_0-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15085	M20-Fe15086	M20-Fe15087	M20-Fe15088
Date Sampled			Feb 05, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	-	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	-	-	-	< 0.5
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	-	< 20
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	< 100
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	-	-	< 0.1
Total PCB*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchloroendate (surr.)	1	%	-	-	-	111
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	66
Polycyclic Aromatic Hydrocarbons (Trace level)						
Acenaphthene	0.005	mg/kg	-	-	-	< 0.005
Acenaphthylene	0.005	mg/kg	-	-	-	< 0.005
Anthracene	0.005	mg/kg	-	-	-	< 0.005
Benz(a)anthracene	0.005	mg/kg	-	-	-	< 0.005
Benzo(a)pyrene	0.005	mg/kg	-	-	-	< 0.005
Benzo(b&j)fluoranthene	0.005	mg/kg	-	-	-	< 0.005
Benzo(g,h,i)perylene	0.005	mg/kg	-	-	-	< 0.005
Benzo(k)fluoranthene	0.005	mg/kg	-	-	-	< 0.005
Chrysene	0.005	mg/kg	-	-	-	< 0.005
Dibenz(a,h)anthracene	0.005	mg/kg	-	-	-	< 0.005
Fluoranthene	0.005	mg/kg	-	-	-	< 0.005
Fluorene	0.005	mg/kg	-	-	-	< 0.005
Indeno(1,2,3-cd)pyrene	0.005	mg/kg	-	-	-	< 0.005
Naphthalene	0.005	mg/kg	-	-	-	< 0.005
Phenanthrene	0.005	mg/kg	-	-	-	< 0.005

Client Sample ID			SED03_1.5	SED03_1.75	SED03_2	SED07_0-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15085	M20-Fe15086	M20-Fe15087	M20-Fe15088
Date Sampled			Feb 05, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (Trace level)						
Pyrene	0.005	mg/kg	-	-	-	< 0.005
Total PAH*	0.005	mg/kg	-	-	-	< 0.005
2-Fluorobiphenyl (surr.)	1	%	-	-	-	99
p-Terphenyl-d14 (surr.)	1	%	-	-	-	129
Organochlorine Pesticides (Trace level)						
4,4'-DDD	0.005	mg/kg	-	-	-	< 0.005
4,4'-DDE	0.005	mg/kg	-	-	-	< 0.005
4,4'-DDT	0.005	mg/kg	-	-	-	< 0.005
a-BHC	0.005	mg/kg	-	-	-	< 0.005
Aldrin	0.005	mg/kg	-	-	-	< 0.005
b-BHC	0.005	mg/kg	-	-	-	< 0.005
Chlordanes - Total	0.01	mg/kg	-	-	-	< 0.01
d-BHC	0.005	mg/kg	-	-	-	< 0.005
Dieldrin	0.005	mg/kg	-	-	-	< 0.005
Endosulfan I	0.005	mg/kg	-	-	-	< 0.005
Endosulfan II	0.005	mg/kg	-	-	-	< 0.005
Endosulfan sulphate	0.005	mg/kg	-	-	-	< 0.005
Endrin	0.005	mg/kg	-	-	-	< 0.005
Endrin aldehyde	0.005	mg/kg	-	-	-	< 0.005
Endrin ketone	0.005	mg/kg	-	-	-	< 0.005
g-BHC (Lindane)	0.005	mg/kg	-	-	-	< 0.005
Heptachlor	0.005	mg/kg	-	-	-	< 0.005
Heptachlor epoxide	0.005	mg/kg	-	-	-	< 0.005
Hexachlorobenzene	0.005	mg/kg	-	-	-	< 0.005
Methoxychlor	0.005	mg/kg	-	-	-	< 0.005
Toxaphene	0.1	mg/kg	-	-	-	< 0.1
DDT + DDE + DDD (Total)*	0.005	mg/kg	-	-	-	< 0.005
Aldrin and Dieldrin (Total)*	0.005	mg/kg	-	-	-	< 0.005
Vic EPA IWRG 621 OCP (Total)*	0.01	mg/kg	-	-	-	< 0.01
Vic EPA IWRG 621 Other OCP (Total)*	0.01	mg/kg	-	-	-	< 0.01
Loss on Ignition (550°C)	0.1	%	-	-	-	4.1
Total Organic Carbon	0.1	%	-	-	-	< 0.1
Organotins (MBT, DBT, TBT)			-	-	-	see attached
Radioactivity - gross Alpha & Beta			-	-	-	see attached
% Moisture	1	%	-	-	-	21
Particle Size Distribution by Sieve and Hydrometer			-	-	-	see attached
Heavy Metals						
Antimony	10	mg/kg	-	-	-	< 10
Arsenic	2	mg/kg	-	-	-	23
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	50
Copper	5	mg/kg	-	-	-	10
Lead	5	mg/kg	-	-	-	5.2
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	13
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	23

Client Sample ID			SED03_1.5	SED03_1.75	SED03_2	SED07_0-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15085	M20-Fe15086	M20-Fe15087	M20-Fe15088
Date Sampled			Feb 05, 2020	Feb 05, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Heavy Metals (1M HCl Extract)						
Antimony (1M HCl Extract)	2	mg/kg	-	-	-	2.7
Arsenic (1M HCl extract)	2	mg/kg	-	-	-	< 2
Cadmium (1M HCl extract)	0.4	mg/kg	-	-	-	< 0.4
Chromium (1M HCl extract)	5	mg/kg	-	-	-	230
Copper (1M HCl extract)	5	mg/kg	-	-	-	< 5
Lead (1M HCl extract)	5	mg/kg	-	-	-	< 5
Mercury (1M HCl extract)*	0.1	mg/kg	-	-	-	< 0.1
Nickel (1M HCl extract)	5	mg/kg	-	-	-	< 5
Selenium (1M HCl extract)	2	mg/kg	-	-	-	440
Zinc (1M HCl extract)	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	5.1	4.6	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.1	9.2	9.1	-
Reaction Ratings* ^{S05}	-	comment	3.0	4.0	4.0	-

Client Sample ID			HA01_0	HA01_0.2	HA02_0	HA02_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15089	M20-Fe15090	M20-Fe15091	M20-Fe15092
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	8.8	8.7	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.5	7.7	8.1
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			HA03_0	HA03_0.2	HA04_0	HA04_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15093	M20-Fe15094	M20-Fe15095	M20-Fe15096
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	8.9	8.9	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	8.2	7.3	7.5
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			HA05_0	HA05_0.2	HA06_0	HA06_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15097	M20-Fe15098	M20-Fe15099	M20-Fe15100
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	9.0	8.6	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.4	8.0	7.8	7.7
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			HA07_0	HA07_0.5	HA08_0-1	HA09_0-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M20-Fe15101	M20-Fe15102	M20-Fe15103	M20-Fe15104
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	8.7	8.8	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	7.8	7.5	7.8
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			HA10_0-1
Sample Matrix			Soil
Eurofins Sample No.			M20-Fe15105
Date Sampled			Feb 06, 2020
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6
Reaction Ratings* ^{S05}	-	comment	3.0

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
Eurofins mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 13, 2020	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 13, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 13, 2020	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Feb 13, 2020	
Polychlorinated Biphenyls - Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082)	Melbourne	Feb 25, 2020	28 Days
Polycyclic Aromatic Hydrocarbons (Trace level) - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water (trace)	Melbourne	Feb 13, 2020	0 Days
Organochlorine Pesticides (Trace level) - Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)	Melbourne	Feb 13, 2020	0 Days
Loss on Ignition (550°C) - Method: APHA 2540E Fixed and Volatile Soils Ignited at 550C	Melbourne	Feb 17, 2020	7 Days
Total Organic Carbon - Method: LTM-INO-4060 Total Organic Carbon in water and soil	Melbourne	Feb 17, 2020	28 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Feb 13, 2020	180 Days
Heavy Metals (1M HCl Extract) - Method: USEPA 6010/6020 Heavy Metals - 1M HCl Extract	Melbourne	Feb 13, 2020	180 Days
Acid Sulfate Soils Field pH Test - Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests	Perth	Feb 12, 2020	7 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Feb 12, 2020	14 Days

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
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Order No.:
Report #: 701587
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 10, 2020 3:27 PM
Due: Mar 23, 2020
Priority: 30 Day
Contact Name: Louise Cockerton

Project Name: K+S
Project ID: 12516706

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract)*	Nickel	Nickel (1M HCl extract)	Organonics (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins Ingt Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)				
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Sydney Laboratory - NATA Site # 18217						X		X		X		X		X		X				X		X				X														
Brisbane Laboratory - NATA Site # 20794																																								
Perth Laboratory - NATA Site # 23736																																								
External Laboratory																								X	X	X														
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																			
1	SED01_0.3-0.6	Feb 06, 2020		Soil	M20-Fe15077	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2	SED03_0	Feb 05, 2020		Soil	M20-Fe15078																																			
3	SED03_0.25	Feb 05, 2020		Soil	M20-Fe15079																																			
4	SED03_0.3-0.6	Feb 06, 2020		Soil	M20-Fe15080	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	SED03_0.5	Feb 05, 2020		Soil	M20-Fe15081																																			
6	SED03_0.75	Feb 05, 2020		Soil	M20-Fe15082																																			
7	SED03_1	Feb 05, 2020		Soil	M20-Fe15083																																			
8	SED03_1.25	Feb 05, 2020		Soil	M20-Fe15084																																			
9	SED03_1.5	Feb 05, 2020		Soil	M20-Fe15085																																			

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Priority: 30 Day
Contact Name: Louise Cockerton

Project Name: K+S
Project ID: 12516706

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract)*	Nickel	Nickel (1M HCl extract)	Organonitrus (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins mg/L Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)				
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X		
Sydney Laboratory - NATA Site # 18217						X		X		X		X		X		X				X		X				X														
Brisbane Laboratory - NATA Site # 20794																																								
Perth Laboratory - NATA Site # 23736																																								
23	HA06_0	Feb 06, 2020		Soil	M20-Fe15099																																			
24	HA06_0.5	Feb 06, 2020		Soil	M20-Fe15100																																			
25	HA07_0	Feb 06, 2020		Soil	M20-Fe15101																																			
26	HA07_0.5	Feb 06, 2020		Soil	M20-Fe15102																																			
27	HA08_0-1	Feb 06, 2020		Soil	M20-Fe15103																																			
28	HA09_0-1	Feb 06, 2020		Soil	M20-Fe15104																																			
29	HA10_0-1	Feb 06, 2020		Soil	M20-Fe15105																																			
30	SEAWATER	Feb 06, 2020		Seawater	M20-Fe15106										X																									
31	SED01_0.3-0.6	Feb 06, 2020		AUS Leachate	M20-Fe15107	X		X		X		X		X		X			X		X	X			X			X												
32	SED03_0.3-0.6	Feb 05, 2020		AUS Leachate	M20-Fe15108	X		X		X		X		X		X			X		X	X			X			X												
33	SED07_0-0.4	Feb 05, 2020		AUS Leachate	M20-Fe15109	X		X		X		X		X		X			X		X	X			X			X												

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Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Feb 10, 2020 3:27 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	701587	Due:	Mar 23, 2020
Project Name:	K+S	Phone:	08 6222 8222	Priority:	30 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace level)	Eurofins mg/L Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organonitros (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Nickel	Mercury (1M HCl extract) *	Mercury	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony										
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X											
Sydney Laboratory - NATA Site # 18217																X																																												
Brisbane Laboratory - NATA Site # 20794																																																												
Perth Laboratory - NATA Site # 23736																																																												
34	SED01_0	Feb 05, 2020		Soil	M20-Fe15110																																																							
35	SED01_1	Feb 05, 2020		Soil	M20-Fe15111																																																							
36	SED01_1.5	Feb 05, 2020		Soil	M20-Fe15112																																																							
37	SED01_2	Feb 05, 2020		Soil	M20-Fe15113																																																							
38	SED02_0	Feb 05, 2020		Soil	M20-Fe15114																																																							
39	SED02_0.0-0.3	Feb 05, 2020		Soil	M20-Fe15115																																																							
40	SED02_0.5	Feb 05, 2020		Soil	M20-Fe15116																																																							
41	SED02_1	Feb 05, 2020		Soil	M20-Fe15117																																																							
42	SED02_1.5	Feb 05, 2020		Soil	M20-Fe15118																																																							
43	SED02_2	Feb 05, 2020		Soil	M20-Fe15119																																																							
44	SED02_2.5	Feb 05, 2020		Soil	M20-Fe15120																																																							
45	SED04_0	Feb 06, 2020		Soil	M20-Fe15121																																																							

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
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Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 701587
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 10, 2020 3:27 PM
Due: Mar 23, 2020
Priority: 30 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail			Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract) *	Nickel	Nickel (1M HCl extract)	Organonitros (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins mg/t Suite B1	Organochlorine Pesticides (Trace level)		
Melbourne Laboratory - NATA Site # 1254 & 14271			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217			X		X		X		X		X		X			X		X				X											
Brisbane Laboratory - NATA Site # 20794																																	
Perth Laboratory - NATA Site # 23736																											X						
46	SED04_0.5	Feb 06, 2020											X																				
47	SED04_1	Feb 06, 2020										X																					
48	SED04_1.5	Feb 06, 2020										X																					
49	SED04_2-2.2	Feb 06, 2020										X																					
50	SED05_0	Feb 05, 2020										X																					
51	SED05_0.5	Feb 05, 2020										X																					
52	SED05_1-1.2	Feb 05, 2020										X																					
53	SED05_1.5	Feb 05, 2020										X																					
54	SED05_2	Feb 05, 2020										X																					
55	SED05_2.4	Feb 05, 2020										X																					
56	SED06_0	Feb 06, 2020										X																					
57	SED06_0.5-0.7	Feb 06, 2020										X																					

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Eurofins Analytical Services Manager : Robert Johnston
Sample Detail

			Anthony	Antimony	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract)*	Nickel	Nickel (1M HCl extract)	Organonins (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins mg/L Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)			
Melbourne Laboratory - NATA Site # 1254 & 14271			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217			X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
Brisbane Laboratory - NATA Site # 20794																																					
Perth Laboratory - NATA Site # 23736																																					
58	SED06_1	Feb 06, 2020											X																								
59	SED06_1.5	Feb 06, 2020										X																									
60	SED06_2	Feb 06, 2020										X																									
61	SED07_0	Feb 05, 2020										X																									
62	SED07_0.5	Feb 05, 2020										X																									
63	SED07_1	Feb 05, 2020										X																									
64	SED07_1.5	Feb 05, 2020										X																									
65	SED07_2	Feb 05, 2020										X																									
66	SED07_2.7	Feb 05, 2020										X																									
67	SED08_0	Feb 05, 2020										X																									
68	SED08_0.3-0.6	Feb 05, 2020										X																									
69	SED08A_0	Feb 06, 2020										X																									

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Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract) *	Nickel	Nickel (1M HCl extract)	Organonitros (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins mg/L Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)					
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Sydney Laboratory - NATA Site # 18217						X		X		X		X		X		X				X		X				X															
Brisbane Laboratory - NATA Site # 20794																																									
Perth Laboratory - NATA Site # 23736																																									
70	SED08A_0.5	Feb 06, 2020		Soil	M20-Fe15146											X																									
71	SED08A_1	Feb 06, 2020		Soil	M20-Fe15147										X																										
72	SED08A_1.3	Feb 06, 2020		Soil	M20-Fe15148										X																										
73	SED09_0-0.3	Feb 05, 2020		Soil	M20-Fe15149										X																										
74	SED09_0.5	Feb 05, 2020		Soil	M20-Fe15150										X																										
75	SED09_1	Feb 05, 2020		Soil	M20-Fe15151										X																										
76	SED09_1.5	Feb 05, 2020		Soil	M20-Fe15152										X																										
77	SED09_1.7	Feb 05, 2020		Soil	M20-Fe15153										X																										
78	SED10_0	Feb 05, 2020		Soil	M20-Fe15154										X																										
79	SED10_0.5	Feb 05, 2020		Soil	M20-Fe15155										X																										
80	SED10_1	Feb 05, 2020		Soil	M20-Fe15156										X																										
81	SED10_1.5	Feb 05, 2020		Soil	M20-Fe15157										X																										
82	SED10_2	Feb 05, 2020		Soil	M20-Fe15158										X																										

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Company Name: GHD Pty Ltd WA
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Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 701587
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 10, 2020 3:27 PM
Due: Mar 23, 2020
Priority: 30 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail					Organochlorine Pesticides (Trace level)	Polycyclic Aromatic Hydrocarbons (Trace)	Eurofins ngmt Suite B1	Moisture Set	AUS Leaching Procedure	Acid Sulfate Soils Field pH Test	Polychlorinated Biphenyls	Zinc (1M HCl extract)	Zinc	Total Organic Carbon	Selenium (1M HCl extract)	Selenium	Radioactivity - gross Alpha & Beta	Particle Size Distribution by Sieve and	Organotins (MBT, DBT, TBT)	Nickel (1M HCl extract)	Nickel	Mercury (1M HCl extract)*	Mercury	Loss on Ignition (550°C)	Lead (1M HCl extract)	Lead	Lead	HOLD	Copper (1M HCl extract)	Copper	Copper	Chromium (1M HCl extract)	Chromium	Chromium	Cadmium (1M HCl extract)	Cadmium	Cadmium	Arsenic (1M HCl extract)	Arsenic	Antimony (1M HCl Extract)	Antimony	Antimony								
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
Sydney Laboratory - NATA Site # 18217														X											X																									
Brisbane Laboratory - NATA Site # 20794																																																		
Perth Laboratory - NATA Site # 23736																																																		
83	SED10_2.1-2.4	Feb 05, 2020		Soil	M20-Fe15159																																													
84	SED11_0-0.3	Feb 06, 2020		Soil	M20-Fe15160																																													
85	SED11_0.5	Feb 06, 2020		Soil	M20-Fe15161																																													
86	SED11_1	Feb 06, 2020		Soil	M20-Fe15162																																													
87	SED11_1.5	Feb 06, 2020		Soil	M20-Fe15163																																													
88	SED11_1.9	Feb 06, 2020		Soil	M20-Fe15164																																													
89	SED12_0	Feb 06, 2020		Soil	M20-Fe15165																																													
90	SED12_0.5	Feb 06, 2020		Soil	M20-Fe15166																																													
91	SED12_1.2-1.4	Feb 06, 2020		Soil	M20-Fe15167																																													
92	SED12_1.5	Feb 06, 2020		Soil	M20-Fe15168																																													
93	SED12_2.2	Feb 06, 2020		Soil	M20-Fe15169																																													

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Sample Detail						Antimony	Antimony (1M HCl Extract)	Arsenic	Arsenic (1M HCl extract)	Cadmium	Cadmium (1M HCl extract)	Chromium	Chromium (1M HCl extract)	Copper	Copper (1M HCl extract)	Lead	Lead (1M HCl extract)	Loss on Ignition (550°C)	Mercury	Mercury (1M HCl extract) *	Nickel	Nickel (1M HCl extract)	Organonins (MBT, DBT, TBT)	Particle Size Distribution by Sieve and Radioactivity - gross Alpha & Beta	Selenium	Selenium (1M HCl extract)	Total Organic Carbon	Zinc	Zinc (1M HCl extract)	Polychlorinated Biphenyls	Acid Sulfate Soils Field pH Test	AUS Leaching Procedure	Moisture Set	Eurofins mg/L Suite B1	Polycyclic Aromatic Hydrocarbons (Trace level)	Organochlorine Pesticides (Trace level)				
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Sydney Laboratory - NATA Site # 18217						X		X		X		X		X		X			X		X					X														
Brisbane Laboratory - NATA Site # 20794																																								
Perth Laboratory - NATA Site # 23736																																								
94	FD1_200205	Feb 05, 2020		Soil	M20-Fe15170											X																								
95	FS1_200205	Feb 05, 2020		Soil	M20-Fe15171											X																								
96	FD2_200206	Feb 05, 2020		Soil	M20-Fe15172											X																								
Test Counts						6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	6	6	3	6	3	3	6	6	3	3	6	6	3	3	6	6	3	3	3	3

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (Trace level)							
Total PAH*	mg/kg	< 0			0.005	Pass	
Method Blank							
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	88			70-130	Pass	
TRH C10-C14	%	109			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
LCS - % Recovery								
BTEX								
Benzene	%	96			70-130	Pass		
Toluene	%	110			70-130	Pass		
Ethylbenzene	%	109			70-130	Pass		
m&p-Xylenes	%	107			70-130	Pass		
Xylenes - Total*	%	108			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	120			70-130	Pass		
TRH C6-C10	%	86			70-130	Pass		
TRH >C10-C16	%	111			70-130	Pass		
LCS - % Recovery								
Polychlorinated Biphenyls								
Aroclor-1260	%	105			70-130	Pass		
LCS - % Recovery								
Total Organic Carbon	%	95			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Antimony	%	116			80-120	Pass		
Arsenic	%	110			80-120	Pass		
Cadmium	%	102			80-120	Pass		
Chromium	%	94			80-120	Pass		
Copper	%	100			80-120	Pass		
Lead	%	111			80-120	Pass		
Mercury	%	113			75-125	Pass		
Nickel	%	111			80-120	Pass		
Selenium	%	113			80-120	Pass		
Zinc	%	111			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1				
TRH C6-C9	M20-Fe14866	NCP	%	77		70-130	Pass	
TRH C10-C14	M20-Fe17426	NCP	%	77		70-130	Pass	
Spike - % Recovery								
BTEX				Result 1				
Benzene	M20-Fe14866	NCP	%	90		70-130	Pass	
Toluene	M20-Fe14866	NCP	%	100		70-130	Pass	
Ethylbenzene	M20-Fe14866	NCP	%	92		70-130	Pass	
m&p-Xylenes	M20-Fe14866	NCP	%	90		70-130	Pass	
o-Xylene	M20-Fe14866	NCP	%	95		70-130	Pass	
Xylenes - Total*	M20-Fe14866	NCP	%	92		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
Naphthalene	M20-Fe14866	NCP	%	114		70-130	Pass	
TRH C6-C10	M20-Fe14866	NCP	%	73		70-130	Pass	
TRH >C10-C16	M20-Fe17426	NCP	%	81		70-130	Pass	
Spike - % Recovery								
Polychlorinated Biphenyls				Result 1				
Aroclor-1016	M20-Fe19816	NCP	%	117		70-130	Pass	
Aroclor-1260	M20-Fe19816	NCP	%	108		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Antimony	M20-Fe14164	NCP	%	101		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic	M20-Fe14164	NCP	%	98			75-125	Pass	
Cadmium	M20-Fe14164	NCP	%	111			75-125	Pass	
Chromium	M20-Fe14164	NCP	%	112			75-125	Pass	
Copper	M20-Fe14164	NCP	%	105			75-125	Pass	
Lead	M20-Fe14164	NCP	%	96			75-125	Pass	
Mercury	M20-Fe14164	NCP	%	102			70-130	Pass	
Nickel	M20-Fe14164	NCP	%	84			75-125	Pass	
Selenium	M20-Fe14164	NCP	%	99			75-125	Pass	
Zinc	M20-Fe14164	NCP	%	91			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M20-Fe14281	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M20-Fe14631	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M20-Fe14631	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M20-Fe14631	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M20-Fe14281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M20-Fe14281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M20-Fe14281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M20-Fe14281	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M20-Fe14281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M20-Fe14281	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M20-Fe14281	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M20-Fe14281	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M20-Fe14631	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M20-Fe14631	NCP	mg/kg	< 100		<1	30%	Pass	
TRH >C34-C40	M20-Fe14631	NCP	mg/kg	< 100		<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	M20-Fe15077	CP	%	< 0.1	< 0.1	<1	30%	Pass	
% Moisture	M20-Fe15035	NCP	%	9.1	9.1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	B20-Fe12463	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	B20-Fe12463	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	B20-Fe12463	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	B20-Fe12463	NCP	mg/kg	23	22	<1	30%	Pass	
Copper	B20-Fe12463	NCP	mg/kg	8.3	8.5	1.0	30%	Pass	
Lead	B20-Fe12463	NCP	mg/kg	28	35	2.0	30%	Pass	
Mercury	B20-Fe12463	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	B20-Fe12463	NCP	mg/kg	5.1	5.6	1.0	30%	Pass	
Selenium	B20-Fe12463	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	B20-Fe12463	NCP	mg/kg	60	72	1.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M20-Fe15078	CP	pH Units	9.2	9.4	Pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	M20-Fe15078	CP	pH Units	7.7	7.8	pass	30%	Pass	
Reaction Ratings*	M20-Fe15078	CP	comment	4.0	4.0	pass	30%	Pass	

Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	M20-Fe15090	CP	pH Units	8.8	8.8	pass	30%	Pass
pH-FOX (Field pH Peroxide test)*	M20-Fe15090	CP	pH Units	7.5	7.6	pass	30%	Pass
Reaction Ratings*	M20-Fe15090	CP	comment	4.0	4.0	pass	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	M20-Fe15100	CP	pH Units	8.8	9.0	pass	30%	Pass
pH-FOX (Field pH Peroxide test)*	M20-Fe15100	CP	pH Units	7.7	7.7	pass	30%	Pass
Reaction Ratings*	M20-Fe15100	CP	comment	4.0	4.0	pass	30%	Pass

Comments

Particle size distribution analysed by: SESL Australia, report reference 56483

Tributyl tin analysed by: Eurofins GfA Lab Services GmbH, DAkkS Accreditation number D-PL-14629-01-00, report reference

Radionuclides analysed by: Eurofins Eichrom Radioactivité, cofrac essais accreditation number 1-6490, report reference 20-00758

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	Yes

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
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

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Rhys Thomas	Senior Analyst-SPOCAS (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**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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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706
Site Name (as set up in ESdat) K+S
Laboratory: Eurofins MGT
Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Contact: Sample Receipt

Laboratory Quote No. National GHD Price List
Turnaround Time Standard (5 days)
Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com
AP-FSS@ghd.com
Email Address (Results) louise.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL- Sludge/ W-Water/ A-Air	Container				Analyses										Remarks					
					Type B-Bottle/L-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No	ASS Screening pH & pHFOX	Exchangeable cations	Exchangeable sodium percentage	Silica	Metals*												
BH09_0.25		23-Jan-20		S	B	unpres	1	✓																<p style="text-align: center; color: red; font-weight: bold;">Do not dispose of samples without notifying GHD (Louise Cockerton)</p> <p style="text-align: center; font-size: 24px; font-weight: bold;">701828</p> <p>*As, Be, B, Cd, Co, Cu, Hg, Pb, Ni, Mn, Se, Zn, Cr6+</p>
BH09_0.5		23-Jan-20		S	B	unpres	1	✓																
BH09_0.75		23-Jan-20		S	B	unpres	1	✓																
BH09_1.25		23-Jan-20		S	B	unpres	1	✓																
BH09_1.5		23-Jan-20		S	B	unpres	1	✓																
BH09_1.75		23-Jan-20		S	B	unpres	1	✓																
BH09_2		23-Jan-20		S	B	unpres	1	✓																
BH09_2.25		23-Jan-20		S	B	unpres	1	✓																
BH09_2.5		23-Jan-20		S	B	unpres	1	✓																
BH09_2.75		23-Jan-20		S	B	unpres	1	✓																
BH09_3		23-Jan-20		S	B	unpres	1	✓																
BH09_3.5		23-Jan-20		S	B	unpres	1	✓																
BH09_3.75		23-Jan-20		S	B	unpres	1	✓																
BH09_4		23-Jan-20		S	B	unpres	1	✓																
BH09_4.25		23-Jan-20		S	B	unpres	1	✓																
BH09_4.5		23-Jan-20		S	B	unpres	1	✓																
BH09_4.75		23-Jan-20		S	B	unpres	1	✓																
Sampled by: D Osti				Date/Time: 23/1 - 31/1				Relinquished by: R Walker				Date/Time: 10/2												
Received by: <i>Rob Johnston Eurofins</i>				Date/Time: <i>11/2/20 16:31</i>				Relinquished by:				Date/Time:												



Date/Time: *11/2/20 16:31*
 Checked: *(initials)*
 Temp: *15.9*
2.1
 Correction: *+3.3*
 Final Temp: *11.7°C*

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 4 of 4

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S

Laboratory: Eurofins MGT
Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Contact: Sample Receipt

Laboratory Quote No.
National GHD Price List

Turnaround Time
Standard (5 days)

Job Manager (Invoice) & GHD accounts
louise.cockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID Lab Sample ID Date Time

Sample Matrix s-Sol/ SL-Sludge/ W-Water/ A-Air	Container			No	ASS Screening pH & pHFOX	Exchangeable cations	Exchangeable sodium percentage	Analyses							HOLD				
	Type B-Bottle/Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/H2SO4/HNO3/Other						Silica	Metals*										
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														
S	B	unpres		1	✓														

Remarks

Do not dispose of samples without notifying GHD (Louise Cockerton)

701828

*As, Be, B, Cd, Co, Cu, Hg, Pb, Ni, Mn, Se, Zn, Cr6+

Sampled by: D Osti

Date/Time: 23/1 - 31/1

Relinquished by: R Walker

Date/Time: 10/2

Received by: *Rob Johnston Eurofins*

Date/Time: *11/2/20 16:31*

Relinquished by:

Date/Time:

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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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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

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Ryan Walker
Project name: K+S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Feb 11, 2020 4:31 PM
Eurofins reference: **701828**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Ryan Walker - ryan.walker@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Ryan Walker**

Report **701828-S**
 Project name **K+S**
 Project ID **12516706**
 Received Date **Feb 11, 2020**

Client Sample ID			BH09_0.25	BH09_0.5	BH09_0.75	BH09_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16908	P20-Fe16909	P20-Fe16910	P20-Fe16911
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	8.2	9.1	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.0	7.8	9.3	9.6
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH09_1.5	BH09_1.75	BH09_2	BH09_2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16912	P20-Fe16913	P20-Fe16914	P20-Fe16915
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.1	9.4	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.4	9.1	9.5	9.1
Reaction Ratings* ^{S05}		comment	2.0	4.0	4.0	2.0

Client Sample ID			BH09_2.5	BH09_2.75	BH09_3	BH09_3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16916	P20-Fe16917	P20-Fe16918	P20-Fe16919
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.4	9.0	8.8	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.1	8.8	8.9	9.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH09_3.75	BH09_4	BH09_4.25	BH09_4.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16920	P20-Fe16921	P20-Fe16922	P20-Fe16923
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	9.1	6.5	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	8.8	7.8	7.4
Reaction Ratings* ^{S05}		comment	3.0	4.0	3.0	2.0

Client Sample ID			BH09_4.75	BH09_5	QA05	BH09_1.5-2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16924	P20-Fe16925	P20-Fe16926	P20-Fe16927
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Chromium (hexavalent)	1	mg/kg	-	-	-	
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	-	
Exchangeable Sodium Percentage (ESP)	0.1	%	-	-	-	
Magnesium (exchangeable)	0.1	meq/100g	-	-	-	
Potassium (exchangeable)	0.1	meq/100g	-	-	-	
Silicon (Aqua regia extractable)	5	mg/kg	-	-	-	
Sodium (exchangeable)	0.1	meq/100g	-	-	-	
% Moisture	1	%	-	-	-	14
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	10
Beryllium	2	mg/kg	-	-	-	< 2
Boron	10	mg/kg	-	-	-	13
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Cobalt	5	mg/kg	-	-	-	5.8
Copper	5	mg/kg	-	-	-	13
Lead	5	mg/kg	-	-	-	5.7
Manganese	5	mg/kg	-	-	-	230
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	12
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	15
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	-	-	-	
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	8.2	9.1	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.5	7.4	9.5	-
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	-

Client Sample ID			BH10_0.25	BH10_0.5	BH10_0.75	BH10_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16928	P20-Fe16929	P20-Fe16930	P20-Fe16931
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	7.9	8.5	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	8.7	8.9	8.9
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	2.0

Client Sample ID			BH10_1.5	BH10_1.75	BH10_2	BH10_2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16932	P20-Fe16933	P20-Fe16934	P20-Fe16935
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.0	8.2	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.7	8.3	8.4
Reaction Ratings* ^{S05}		comment	2.0	4.0	4.0	4.0

Client Sample ID			BH10_2.5	BH10_2.75	BH10_3	BH10_3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16936	P20-Fe16937	P20-Fe16938	P20-Fe16939
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.8	8.1	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.5	7.0	8.8	7.7
Reaction Ratings* ^{S05}		comment	2.0	2.0	4.0	4.0

Client Sample ID			BH10_3.5	BH10_3.75	BH10_4	BH10_4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16940	P20-Fe16941	P20-Fe16942	P20-Fe16943
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.0	7.0	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.0	8.4	8.8
Reaction Ratings* ^{S05}		comment	4.0	2.0	4.0	4.0

Client Sample ID			BH10_4.5	BH10_4.75	BH10_5	QA05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16944	P20-Fe16945	P20-Fe16946	P20-Fe16947
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	6.6	7.5	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.9	8.0	8.4
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH15_0.25	BH15_0.5	BH15_0.75	BH15_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16948	P20-Fe16949	P20-Fe16950	P20-Fe16951
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	7.7	9.0	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.2	8.7	9.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	3.0	3.0

Client Sample ID			BH15_1.25	BH15_1.5	BH15_1.75	BH15_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16952	P20-Fe16953	P20-Fe16954	P20-Fe16955
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	8.6	7.3	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.1	9.0	8.7	8.8
Reaction Ratings* ^{S05}		comment	3.0	3.0	3.0	4.0

Client Sample ID			BH15_2.25	BH15_2.5	BH15_2.75	BH15_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16956	P20-Fe16957	P20-Fe16958	P20-Fe16959
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	7.3	8.4	7.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.9	8.8	9.0	8.8
Reaction Ratings* ^{S05}		comment	3.0	4.0	4.0	3.0

Client Sample ID			BH15_3.25	BH15_3.5	BH15_3.75	BH15_4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16960	P20-Fe16961	P20-Fe16962	P20-Fe16963
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.2	8.6	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.6	8.8	8.6
Reaction Ratings* ^{S05}		comment	3.0	4.0	4.0	4.0

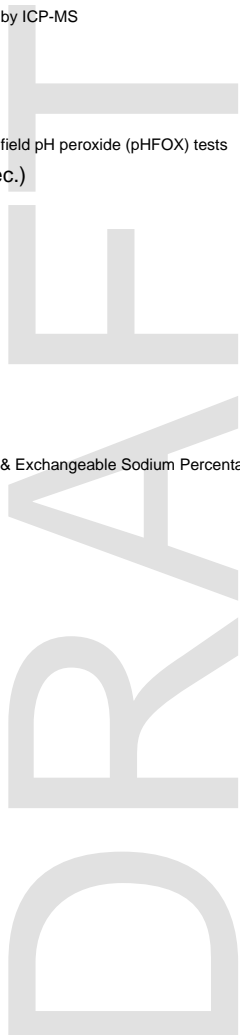
Client Sample ID			BH15_4.25	BH15_4.5	QA10
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			P20-Fe16964	P20-Fe16965	P20-Fe16966
Date Sampled			Jan 23, 2020	Jan 23, 2020	Jan 23, 2020
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	8.4	7.3	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.8	8.4	8.6
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0

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
Chromium (hexavalent) - Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)	Melbourne	Feb 14, 2020	28 Days
Exchangeable Sodium Percentage (ESP) - Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)	Melbourne	Feb 14, 2020	28 Days
Silicon (Aqua regia extractable) - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES	Melbourne	Feb 14, 2020	180 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Perth	Feb 13, 2020	180 Days
Mercury - Method: USEPA 7470/1 Mercury	Perth	Feb 13, 2020	28 Days
Acid Sulfate Soils Field pH Test - Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests	Perth	Feb 13, 2020	7 Days
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 14, 2020	7 Days
Magnesium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 14, 2020	180 Days
Potassium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 14, 2020	180 Days
Sodium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 14, 2020	180 Days
Cation Exchange Capacity - Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage	Melbourne	Feb 14, 2020	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Perth	Feb 13, 2020	14 Days



Australia

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NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Feb 11, 2020 4:31 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	701828	Due:	Feb 18, 2020
Project Name:	K+S	Phone:	08 6222 8222	Priority:	5 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Ryan Walker

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	Lead	Manganese	Mercury	Nickel	Selenium	Silicon (Aqua regia extractable)	Zinc	Acid Sulfate Soils Field pH Test	Exchangeable Cations	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X						X			X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X		X	X	X	X
External Laboratory																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																		
1	BH09_0.25	Jan 23, 2020		Soil	P20-Fe16908																X		
2	BH09_0.5	Jan 23, 2020		Soil	P20-Fe16909																X		
3	BH09_0.75	Jan 23, 2020		Soil	P20-Fe16910																X		
4	BH09_1.25	Jan 23, 2020		Soil	P20-Fe16911																X		
5	BH09_1.5	Jan 23, 2020		Soil	P20-Fe16912																X		
6	BH09_1.75	Jan 23, 2020		Soil	P20-Fe16913																X		
7	BH09_2	Jan 23, 2020		Soil	P20-Fe16914																X		
8	BH09_2.25	Jan 23, 2020		Soil	P20-Fe16915																X		
9	BH09_2.5	Jan 23, 2020		Soil	P20-Fe16916																X		
10	BH09_2.75	Jan 23, 2020		Soil	P20-Fe16917																X		

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
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Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
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Brisbane
1/21 Smallwood Place
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Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
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Phone: 08 6222 8222
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Melbourne Laboratory - NATA Site # 1254 & 14271								X			X						X			X		
Sydney Laboratory - NATA Site # 18217																						
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736				X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	
11	BH09_3	Jan 23, 2020	Soil																X			
12	BH09_3.5	Jan 23, 2020	Soil																X			
13	BH09_3.75	Jan 23, 2020	Soil																X			
14	BH09_4	Jan 23, 2020	Soil																X			
15	BH09_4.25	Jan 23, 2020	Soil																X			
16	BH09_4.5	Jan 23, 2020	Soil																X			
17	BH09_4.75	Jan 23, 2020	Soil																X			
18	BH09_5	Jan 23, 2020	Soil																X			
19	QA05	Jan 23, 2020	Soil																X			
20	BH09_1.5-2.5	Jan 23, 2020	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21	BH10_0.25	Jan 23, 2020	Soil																X			
22	BH10_0.5	Jan 23, 2020	Soil																X			
23	BH10_0.75	Jan 23, 2020	Soil																X			

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Project Name: K+S
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Melbourne Laboratory - NATA Site # 1254 & 14271								X			X						X			X		
Sydney Laboratory - NATA Site # 18217																						
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736				X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	
24	BH10_1.25	Jan 23, 2020	Soil																X			
25	BH10_1.5	Jan 23, 2020	Soil																X			
26	BH10_1.75	Jan 23, 2020	Soil																X			
27	BH10_2	Jan 23, 2020	Soil																X			
28	BH10_2.25	Jan 23, 2020	Soil																X			
29	BH10_2.5	Jan 23, 2020	Soil																X			
30	BH10_2.75	Jan 23, 2020	Soil																X			
31	BH10_3	Jan 23, 2020	Soil																X			
32	BH10_3.25	Jan 23, 2020	Soil																X			
33	BH10_3.5	Jan 23, 2020	Soil																X			
34	BH10_3.75	Jan 23, 2020	Soil																X			
35	BH10_4	Jan 23, 2020	Soil																X			
36	BH10_4.25	Jan 23, 2020	Soil																X			

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Melbourne Laboratory - NATA Site # 1254 & 14271								X			X						X			X		
Sydney Laboratory - NATA Site # 18217																						
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736				X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	
37	BH10_4.5	Jan 23, 2020	Soil																X			
38	BH10_4.75	Jan 23, 2020	Soil																X			
39	BH10_5	Jan 23, 2020	Soil																X			
40	QA05	Jan 23, 2020	Soil																X			
41	BH15_0.25	Jan 23, 2020	Soil																X			
42	BH15_0.5	Jan 23, 2020	Soil																X			
43	BH15_0.75	Jan 23, 2020	Soil																X			
44	BH15_1	Jan 23, 2020	Soil																X			
45	BH15_1.25	Jan 23, 2020	Soil																X			
46	BH15_1.5	Jan 23, 2020	Soil																X			
47	BH15_1.75	Jan 23, 2020	Soil																X			
48	BH15_2	Jan 23, 2020	Soil																X			
49	BH15_2.25	Jan 23, 2020	Soil																X			

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Melbourne Laboratory - NATA Site # 1254 & 14271										X			X						X			X		
Sydney Laboratory - NATA Site # 18217																								
Brisbane Laboratory - NATA Site # 20794																								
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	X
50	BH15_2.5	Jan 23, 2020		Soil	P20-Fe16957																X			
51	BH15_2.75	Jan 23, 2020		Soil	P20-Fe16958																X			
52	BH15_3	Jan 23, 2020		Soil	P20-Fe16959																X			
53	BH15_3.25	Jan 23, 2020		Soil	P20-Fe16960																X			
54	BH15_3.5	Jan 23, 2020		Soil	P20-Fe16961																X			
55	BH15_3.75	Jan 23, 2020		Soil	P20-Fe16962																X			
56	BH15_4	Jan 23, 2020		Soil	P20-Fe16963																X			
57	BH15_4.25	Jan 23, 2020		Soil	P20-Fe16964																X			
58	BH15_4.5	Jan 23, 2020		Soil	P20-Fe16965																X			
59	QA10	Jan 23, 2020		Soil	P20-Fe16966																X			
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	58	1	1	

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
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.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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	N/A
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

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)
Rhys Thomas	Senior Analyst-SPOCAS (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

**Glenn Jackson
General Manager**

- 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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 1

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S

Laboratory: Eurofins MGT
Address: 2/91 Leach Hwy, Kewdale 6105
Laboratory Contact: Sample Receipt

Laboratory Quote No.
National Price List for GHD

Turnaround Time
Standard (5 days)

Job Manager (Invoice) & GHD accounts
louise.cockerton@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com
ryan.walker@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil / SL- Sludge / W-Water / A-Air	Container			No	pH screening (pHr and pHFOX)	Exchangeable cations	Exchangeable sodium percentage	Analyses						HOLD	Remarks
					Type B-Bottle / Jar / V- Vial / Bag / G-Glass / P-Plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / Other						Silica	Metals*						
BH12_0.25		14-Feb-20		S	B	unpres.	1	✓											*As, Be, B, Cd, Co, Cu, Hg, Pb, Ni, Mn, Se, Zn, Cr6+
BH12_0.5		14-Feb-20		S	B	unpres.	1	✓											
BH12_1.25		14-Feb-20		S	B	unpres.	1	✓											
BH12_1.5		14-Feb-20		S	B	unpres.	1	✓											
BH12_1.75		14-Feb-20		S	B	unpres.	1	✓											
BH12_3		14-Feb-20		S	B	unpres.	1	✓											
BH12_3.25		14-Feb-20		S	B	unpres.	1	✓											
BH12_1.2-1.5		10-Feb-20		S	GJ	unpres.	2		✓		✓	✓	✓	✓					
BH13_1.3-1.5		10-Feb-20		S	GJ	unpres.	2		✓		✓	✓	✓	✓					
BH13_3.3-3.5		10-Feb-20		S	GJ	unpres.	2		✓		✓	✓	✓	✓					
BH13_4.0-4.2		10-Feb-20		S	GJ	unpres.	2		✓		✓	✓	✓	✓					
																			#703226



Date/Time: 19/2/20 2:14
 Checked: Yes / No
 Temp: 6.9
 14.7
 3.7
 +8.5
 12.0°C

Sampled by: SG

Date/Time: 10/2 & 14/2

Relinquished by: R Walker

Date/Time: 19/02/2020

Received by: *Courtlyn A. Besen*

Date/Time: 19/2/20 2:44

Relinquished by:

Date/Time:

Melbourne

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NATA # 1261 Site # 23736

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K+S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Feb 19, 2020 2:14 PM
Eurofins reference: **703226**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Louise Cockerton**

Report **703226-S**
 Project name **K+S**
 Project ID **12516706**
 Received Date **Feb 19, 2020**

Client Sample ID			BH12_0.25	BH12_0.5	BH12_1.25	BH12_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe27602	P20-Fe27603	P20-Fe27604	P20-Fe27605
Date Sampled			Feb 14, 2020	Feb 14, 2020	Feb 14, 2020	Feb 14, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.8	8.1	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	6.0	7.3	7.2
Reaction Ratings* ^{S05}		comment	3.0	4.0	4.0	2.0

Client Sample ID			BH12_1.75	BH12_3.0	BH12_3.25	BH12_1.2-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe27606	P20-Fe27607	P20-Fe27608	P20-Fe27609
Date Sampled			Feb 14, 2020	Feb 14, 2020	Feb 14, 2020	Feb 10, 2020
Test/Reference	LOR	Unit				
Chromium (hexavalent)	1	mg/kg	-	-	-	
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	-	
Exchangeable Sodium Percentage (ESP)	0.1	%	-	-	-	
Magnesium (exchangeable)	0.1	meq/100g	-	-	-	
Potassium (exchangeable)	0.1	meq/100g	-	-	-	
Silicon (Aqua regia extractable)	5	mg/kg	-	-	-	
Sodium (exchangeable)	0.1	meq/100g	-	-	-	
% Moisture	1	%	-	-	-	15
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	5.9
Beryllium	2	mg/kg	-	-	-	< 2
Boron	10	mg/kg	-	-	-	< 10
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Cobalt	5	mg/kg	-	-	-	< 5
Copper	5	mg/kg	-	-	-	7.3
Lead	5	mg/kg	-	-	-	< 5
Manganese	5	mg/kg	-	-	-	100
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	9.7
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	13
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	-	-	-	

Client Sample ID			BH12_1.75	BH12_3.0	BH12_3.25	BH12_1.2-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Fe27606	P20-Fe27607	P20-Fe27608	P20-Fe27609
Date Sampled			Feb 14, 2020	Feb 14, 2020	Feb 14, 2020	Feb 10, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	9.5	9.4	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3	9.6	9.6	-
Reaction Ratings* ^{S05}		comment	3.0	4.0	3.0	-

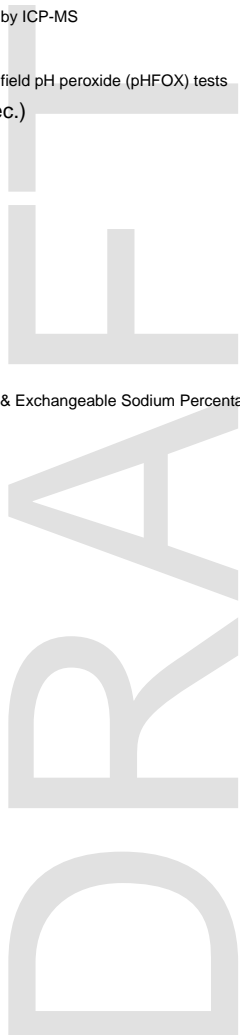
Client Sample ID			BH13_1.3-1.5	BH13_3.3-3.5	BH13_4.0-4.2	
Sample Matrix			Soil	Soil	Soil	
Eurofins Sample No.			P20-Fe27610	P20-Fe27611	P20-Fe27612	
Date Sampled			Feb 10, 2020	Feb 10, 2020	Feb 10, 2020	
Test/Reference	LOR	Unit				
Chromium (hexavalent)	1	mg/kg				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm				
Exchangeable Sodium Percentage (ESP)	0.1	%				
Magnesium (exchangeable)	0.1	meq/100g				
Potassium (exchangeable)	0.1	meq/100g				
Silicon (Aqua regia extractable)	5	mg/kg				
Sodium (exchangeable)	0.1	meq/100g				
% Moisture	1	%	10	17	15	
Heavy Metals						
Arsenic	2	mg/kg	7.0	7.6	5.2	
Beryllium	2	mg/kg	< 2	< 2	< 2	
Boron	10	mg/kg	< 10	< 10	< 10	
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	
Cobalt	5	mg/kg	20	14	6.2	
Copper	5	mg/kg	33	31	15	
Lead	5	mg/kg	12	11	6.6	
Manganese	5	mg/kg	880	520	250	
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	
Nickel	5	mg/kg	32	28	15	
Selenium	2	mg/kg	< 2	< 2	< 2	
Zinc	5	mg/kg	54	46	22	
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g				

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 (hexavalent) - Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)	Melbourne	Feb 20, 2020	28 Days
Exchangeable Sodium Percentage (ESP) - Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)	Melbourne	Feb 20, 2020	28 Days
Silicon (Aqua regia extractable) - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES	Melbourne	Feb 20, 2020	180 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Perth	Feb 20, 2020	180 Days
Acid Sulfate Soils Field pH Test - Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests	Perth	Feb 20, 2020	7 Days
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 20, 2020	7 Days
Magnesium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 20, 2020	180 Days
Potassium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 20, 2020	180 Days
Sodium (exchangeable) - Method: LTM-MET-3060 Cation Exchange Capacity and ESP	Melbourne	Feb 20, 2020	180 Days
Cation Exchange Capacity - Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage	Melbourne	Feb 20, 2020	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Perth	Feb 20, 2020	14 Days



Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 703226
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 19, 2020 2:14 PM
Due: Feb 26, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	Lead	Manganese	Mercury	Nickel	Selenium	Silicon (Aqua regia extractable)	Zinc	Acid Sulfate Soils Field pH Test	Exchangeable Cations	Moisture Set	
Melbourne Laboratory - NATA Site # 1254 & 14271										X			X						X			X		
Sydney Laboratory - NATA Site # 18217																								
Brisbane Laboratory - NATA Site # 20794																								
Perth Laboratory - NATA Site # 23736						X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	X
External Laboratory																								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																			
1	BH12_0.25	Feb 14, 2020		Soil	P20-Fe27602																X			
2	BH12_0.5	Feb 14, 2020		Soil	P20-Fe27603																X			
3	BH12_1.25	Feb 14, 2020		Soil	P20-Fe27604																X			
4	BH12_1.5	Feb 14, 2020		Soil	P20-Fe27605																X			
5	BH12_1.75	Feb 14, 2020		Soil	P20-Fe27606																X			
6	BH12_3.0	Feb 14, 2020		Soil	P20-Fe27607																X			
7	BH12_3.25	Feb 14, 2020		Soil	P20-Fe27608																X			
8	BH12_1.2-1.5	Feb 10, 2020		Soil	P20-Fe27609	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
9	BH13_1.3-1.5	Feb 10, 2020		Soil	P20-Fe27610	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
10	BH13_3.3-3.5	Feb 10, 2020		Soil	P20-Fe27611	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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NATA # 1261
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1/21 Smallwood Place
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Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 703226
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 19, 2020 2:14 PM
Due: Feb 26, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail				Arsenic	Beryllium	Boron	Cadmium	Chromium (hexavalent)	Cobalt	Copper	Exchangeable Sodium Percentage (ESP)	Lead	Manganese	Mercury	Nickel	Selenium	Silicon (Aqua regia extractable)	Zinc	Acid Sulfate Soils Field pH Test	Exchangeable Cations	Moisture Set	
Melbourne Laboratory - NATA Site # 1254 & 14271								X			X						X			X		
Sydney Laboratory - NATA Site # 18217																						
Brisbane Laboratory - NATA Site # 20794																						
Perth Laboratory - NATA Site # 23736				X	X	X	X		X	X		X	X	X	X	X		X	X	X	X	
11	BH13_4.0-4.2	Feb 10, 2020	Soil		P20-Fe27612	X	X	X	X	X	X	X	X	X	X	X	X		X	X		
Test Counts				4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	7	4	4	

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Rhys Thomas	Senior Analyst-SPOCAS (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

**Glenn Jackson
General Manager**

- 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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat)
12516706

Site Name
K + S Salt Phase 2 Investigations

Laboratory: Eurofins | mgt

Address: 2/91 Leach Hwy, Kewdale WA 6105

Laboratory Contact: Robert Johnston (08 9251 9605)

Laboratory Quote No.
200121GHDW

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Laura.Clayson@ghd.com
Louise.Cockerton@ghd.com

Email Address (Results)
Louise.Cockerton@ghd.com

Container		Analyses										Remarks				
Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Type B-bottle/J-jar/V-Vial/Bag/G-Glass/P-plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	pH Field Screen												
BH12_5.0	S	Bag	1	X												
BH12A_0.75	S	Bag	1	X												
BH12A_1.0	S	Bag	1	X												
BH12A_2.0	S	Bag	1	X												
BH12A_2.5	S	Bag	1	X												
BH12A_2.75	S	Bag	1	X												
BH12A_3.75	S	Bag	1	X												
BH14_0.75	S	Bag	1	X												
BH14_2.0	S	Bag	1	X												
BH14_2.25	S	Bag	1	X												
BH14_3.0	S	Bag	1	X												
BH14_3.5	S	Bag	1	X												
BH14_3.75	S	Bag	1	X												
BH14_4.0	S	Bag	1	X												
BH14_4.25	S	Bag	1	X												
BH14_4.75	S	Bag	1	X												
BH14_5.0	S	Bag	1	X												

All samples frozen

HOLD

GHD Sample ID	Lab Sample ID	Date	Time
BH12_5.0		-	
BH12A_0.75		-	
BH12A_1.0		-	
BH12A_2.0		-	
BH12A_2.5		-	
BH12A_2.75		-	
BH12A_3.75		-	
BH14_0.75		-	
BH14_2.0		-	
BH14_2.25		-	
BH14_3.0		-	
BH14_3.5		-	
BH14_3.75		-	
BH14_4.0		-	
BH14_4.25		-	
BH14_4.75		-	
BH14_5.0		-	



Date/Time: 17/3/20 2:00
 Chilled: Yes/No
 Temp: 12.0
11.4
7.2
 Correction: +3.5
 Final Temp: 13.7°C

Sampled by: Atash Tabarestani <Atash.Tabarestani@ghd.com>

Date/Time:

Relinquished by: L. Cockerton

Date/Time: 17/03/2020

Received by: *Gertlyn Aabsa CA*

Date/Time: 17/3/20 2:10

Relinquished by:

Date/Time:

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD

Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 2 of 4

Project No. (as set up in ESdat)
12516706

Site Name
K + S Salt Phase 2 Investigations

Laboratory: Eurofins | mgt
Address: 2/91 Leach Hwy, Kewdale WA 6105
Laboratory Contact: Robert Johnston (08 9251 9605)

Laboratory Quote No.
200121GHDW

Turnaround Time
Standard

Job Manager (Invoice) & GHD accounts
Laura.Clayson@ghd.com
Louise.Cockerton@ghd.com

Email Address (Results)
Louise.Cockerton@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL- Sludge/ W-Water/ A-Air	Container			pH Field Screen	Analyses												Remarks
					Type B-Bottle/J-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No														
QA12		-		S	Bag		1	X													
QA14		-		S	Bag		1	X													
BH11_0.25		-		S	Bag		1	X													
BH11_0.5		-		S	Bag		1	X													
BH11_1.0		-		S	Bag		1	X													
BH11_1.25		-		S	Bag		1	X													
BH11_1.5		-		S	Bag		1	X													
BH11_1.75		-		S	Bag		1	X													
BH11_2.0		-		S	Bag		1	X													
BH11_2.25		-		S	Bag		1	X													
BH11_2.75		-		S	Bag		1	X													
BH11_3.0		-		S	Bag		1	X													
BH11_3.5		-		S	Bag		1	X													
BH11_3.75		-		S	Bag		1	X													
BH11_4.0		-		S	Bag		1	X													
BH11_4.5		-		S	Bag		1	X													
BH11_4.75		-		S	Bag		1	X													

HOLD

Sampled by: Atash Tabarestani <Atash.Tabarestani@ghd.com>

Date/Time:

Relinquished by: L. Cockerton

Date/Time: 17/03/2020

Received by: **Rob Johnston Eurofins**

Date/Time: **17/3/20 14:16**

Relinquished by:

Date/Time:

Melbourne

6 Monterey Road
Dandenong South Vic 3175
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

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K + S SALT PHASE 2 INVESTIGATIONS
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Mar 17, 2020 2:10 PM
Eurofins reference: **708420**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
 - All samples have been received as described on the above COC.
 - COC has been completed correctly.
 - Attempt to chill was evident.
 - Appropriately preserved sample containers have been used.
 - All samples were received in good condition.
 - Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
 - Appropriate sample containers have been used.
 - Split sample sent to requested external lab.
 - Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Louise Cockerton**

Report **708420-S**
 Project name **K + S SALT PHASE 2 INVESTIGATIONS**
 Project ID **12516706**
 Received Date **Mar 17, 2020**

Client Sample ID			BH12_5.0	BH12A_0.75	BH12A_1.0	BH12A_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26118	P20-Ma26119	P20-Ma26120	P20-Ma26121
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.9	8.2	7.0	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	10	7.1	5.8	8.5
Reaction Ratings* ^{S05}		comment	4.0	4.0	3.0	4.0

Client Sample ID			BH12A_2.5	BH12A_2.75	BH12A_3.75	BH14_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26122	P20-Ma26123	P20-Ma26124	P20-Ma26125
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	8.9	9.0	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	9.2	9.5	7.4
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	3.0

Client Sample ID			BH14_2.0	BH14_2.25	BH14_3.0	BH14_3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26126	P20-Ma26127	P20-Ma26128	P20-Ma26129
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	8.3	8.3	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.3	8.8	8.7
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH14_3.75	BH14_4.0	BH14_4.25	BH14_4.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26130	P20-Ma26131	P20-Ma26132	P20-Ma26133
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	9.0	8.4	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.5	8.2	8.4
Reaction Ratings* ^{S05}		comment	4.0	4.0	2.0	3.0

Client Sample ID			BH14_5.0	QA12	QA14	BH11_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26134	P20-Ma26135	P20-Ma26136	P20-Ma26137
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	9.5	8.3	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	9.8	8.3	8.3
Reaction Ratings* ^{S05}		comment	2.0	4.0	2.0	2.0

Client Sample ID			BH11_0.5	BH11_1.0	BH11_1.25	BH11_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26138	P20-Ma26139	P20-Ma26140	P20-Ma26141
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.9	8.9	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.2	8.2	8.4
Reaction Ratings* ^{S05}		comment	2.0	2.0	2.0	2.0

Client Sample ID			BH11_1.75	BH11_2.0	BH11_2.25	BH11_2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26142	P20-Ma26143	P20-Ma26144	P20-Ma26145
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.6	9.1	9.0	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.7	8.2	8.2
Reaction Ratings* ^{S05}		comment	2.0	3.0	3.0	2.0

Client Sample ID			BH11_3.0	BH11_3.5	BH11_3.75	BH11_4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26146	P20-Ma26147	P20-Ma26148	P20-Ma26149
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	9.1	9.0	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3	8.3	8.4	8.3
Reaction Ratings* ^{S05}		comment	2.0	3.0	3.0	3.0

Client Sample ID			BH11_4.5	BH11_4.75	BH11_5.0	BH12_4.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26150	P20-Ma26151	P20-Ma26152	P20-Ma26153
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	9.0	8.9	9.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	8.8	8.8	9.2
Reaction Ratings* ^{S05}		comment	3.0	3.0	3.0	4.0

Client Sample ID			BH14_1.0	BH14_1.25	BH14_2.5	BH14_2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26154	P20-Ma26155	P20-Ma26156	P20-Ma26157
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.2	7.3	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	8.0	8.3	8.6
Reaction Ratings* ^{S05}		comment	3.0	2.0	4.0	4.0

Client Sample ID			QA11	BH11_0.75	BH11_2.5	BH11_3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26158	P20-Ma26159	P20-Ma26160	P20-Ma26161
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.0	8.9	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.1	8.2	8.3
Reaction Ratings* ^{S05}		comment	3.0	2.0	3.0	3.0

Client Sample ID			BH12_4.25	BH12_4.5	BH12A_3.5	BH14_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26162	P20-Ma26163	P20-Ma26164	P20-Ma26165
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.5	9.7	9.0	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.5	10.0	8.9	7.0
Reaction Ratings* ^{S05}		comment	4.0	4.0	4.0	3.0

Client Sample ID			BH14_0.5	BH14_1.5	BH14_1.75	BH14_3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26166	P20-Ma26167	P20-Ma26168	P20-Ma26169
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	7.7	6.8	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.7	8.2	8.9
Reaction Ratings* ^{S05}		comment	3.0	4.0	3.0	3.0

Client Sample ID			BH14_4.5	HA30_0.25	HA30_0.5	HA30_0.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26170	P20-Ma26171	P20-Ma26172	P20-Ma26173
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	5.2	5.6	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	3.2	2.4	8.3
Reaction Ratings* ^{S05}		comment	3.0	3.0	4.0	4.0

Client Sample ID			QA16	BH11_4.25	BH12_2.25	BH12_4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Ma26174	P20-Ma26175	P20-Ma26176	P20-Ma26177
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	8.5	8.9	9.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	8.2	8.8	8.7
Reaction Ratings* ^{S05}		comment	4.0	3.0	3.0	3.0

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

Acid Sulfate Soils Field pH Test

Testing Site

Perth

Extracted

Mar 18, 2020

Holding Time

7 Days

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

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Melbourne
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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S SALT PHASE 2 INVESTIGATIONS
Project ID: 12516706

Order No.:
Report #: 708420
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Mar 17, 2020 2:10 PM
Due: Mar 24, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	Acid Sulfate Soils Field pH Test
---------------	----------------------------------

Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	BH12_5.0	Not Provided		Soil	P20-Ma26118	X
2	BH12A_0.75	Not Provided		Soil	P20-Ma26119	X
3	BH12A_1.0	Not Provided		Soil	P20-Ma26120	X
4	BH12A_2.0	Not Provided		Soil	P20-Ma26121	X
5	BH12A_2.5	Not Provided		Soil	P20-Ma26122	X
6	BH12A_2.75	Not Provided		Soil	P20-Ma26123	X
7	BH12A_3.75	Not Provided		Soil	P20-Ma26124	X
8	BH14_0.75	Not Provided		Soil	P20-Ma26125	X
9	BH14_2.0	Not Provided		Soil	P20-Ma26126	X
10	BH14_2.25	Not Provided		Soil	P20-Ma26127	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
11	BH14_3.0	Not Provided		Soil	P20-Ma26128	X
12	BH14_3.5	Not Provided		Soil	P20-Ma26129	X
13	BH14_3.75	Not Provided		Soil	P20-Ma26130	X
14	BH14_4.0	Not Provided		Soil	P20-Ma26131	X
15	BH14_4.25	Not Provided		Soil	P20-Ma26132	X
16	BH14_4.75	Not Provided		Soil	P20-Ma26133	X
17	BH14_5.0	Not Provided		Soil	P20-Ma26134	X
18	QA12	Not Provided		Soil	P20-Ma26135	X
19	QA14	Not Provided		Soil	P20-Ma26136	X
20	BH11_0.25	Not Provided		Soil	P20-Ma26137	X
21	BH11_0.5	Not Provided		Soil	P20-Ma26138	X
22	BH11_1.0	Not Provided		Soil	P20-Ma26139	X
23	BH11_1.25	Not Provided		Soil	P20-Ma26140	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
24	BH11_1.5	Not Provided		Soil	P20-Ma26141	X
25	BH11_1.75	Not Provided		Soil	P20-Ma26142	X
26	BH11_2.0	Not Provided		Soil	P20-Ma26143	X
27	BH11_2.25	Not Provided		Soil	P20-Ma26144	X
28	BH11_2.75	Not Provided		Soil	P20-Ma26145	X
29	BH11_3.0	Not Provided		Soil	P20-Ma26146	X
30	BH11_3.5	Not Provided		Soil	P20-Ma26147	X
31	BH11_3.75	Not Provided		Soil	P20-Ma26148	X
32	BH11_4.0	Not Provided		Soil	P20-Ma26149	X
33	BH11_4.5	Not Provided		Soil	P20-Ma26150	X
34	BH11_4.75	Not Provided		Soil	P20-Ma26151	X
35	BH11_5.0	Not Provided		Soil	P20-Ma26152	X
36	BH12_4.75	Not Provided		Soil	P20-Ma26153	X

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Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
37	BH14_1.0	Not Provided		Soil	P20-Ma26154	X
38	BH14_1.25	Not Provided		Soil	P20-Ma26155	X
39	BH14_2.5	Not Provided		Soil	P20-Ma26156	X
40	BH14_2.75	Not Provided		Soil	P20-Ma26157	X
41	QA11	Not Provided		Soil	P20-Ma26158	X
42	BH11_0.75	Not Provided		Soil	P20-Ma26159	X
43	BH11_2.5	Not Provided		Soil	P20-Ma26160	X
44	BH11_3.25	Not Provided		Soil	P20-Ma26161	X
45	BH12_4.25	Not Provided		Soil	P20-Ma26162	X
46	BH12_4.5	Not Provided		Soil	P20-Ma26163	X
47	BH12A_3.5	Not Provided		Soil	P20-Ma26164	X
48	BH14_0.25	Not Provided		Soil	P20-Ma26165	X
49	BH14_0.5	Not Provided		Soil	P20-Ma26166	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
50	BH14_1.5	Not Provided		Soil	P20-Ma26167	X
51	BH14_1.75	Not Provided		Soil	P20-Ma26168	X
52	BH14_3.25	Not Provided		Soil	P20-Ma26169	X
53	BH14_4.5	Not Provided		Soil	P20-Ma26170	X
54	HA30_0.25	Not Provided		Soil	P20-Ma26171	X
55	HA30_0.5	Not Provided		Soil	P20-Ma26172	X
56	HA30_0.75	Not Provided		Soil	P20-Ma26173	X
57	QA16	Not Provided		Soil	P20-Ma26174	X
58	BH11_4.25	Not Provided		Soil	P20-Ma26175	X
59	BH12_2.25	Not Provided		Soil	P20-Ma26176	X
60	BH12_4.0	Not Provided		Soil	P20-Ma26177	X
Test Counts						60

Internal Quality Control Review and Glossary
General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
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.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ma26118	CP	pH Units	9.9	10	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26118	CP	pH Units	10	10	pass	30%	Pass	
Reaction Ratings*	P20-Ma26118	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ma26128	CP	pH Units	8.3	8.3	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26128	CP	pH Units	8.8	8.9	pass	30%	Pass	
Reaction Ratings*	P20-Ma26128	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Ma26138	CP	pH Units	8.5	8.6	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26138	CP	pH Units	8.1	8.1	pass	30%	Pass	
Reaction Ratings*	P20-Ma26138	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)*	P20-Ma26148	CP	pH Units	9.0	9.0	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26148	CP	pH Units	8.4	8.5	pass	30%	Pass	
Reaction Ratings*	P20-Ma26148	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)*	P20-Ma26158	CP	pH Units	9.1	8.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26158	CP	pH Units	8.2	8.2	pass	30%	Pass	
Reaction Ratings*	P20-Ma26158	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)*	P20-Ma26168	CP	pH Units	6.8	6.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Ma26168	CP	pH Units	8.2	8.1	pass	30%	Pass	
Reaction Ratings*	P20-Ma26168	CP	comment	3.0	3.0	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	N/A
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

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)


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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Project ID (as per Esdat set up; no spaces) 12516706 **PO Number (to be Invoiced)** 12516706

Laboratory Quote No. 20032SGHDW **Turnaround Time** Standard

Job Manager (Invoice) & GHD accounts Adam.Osbalderton@ghd.com **Email Address (Results)** Adam.Osbalderton@ghd.com

Laboratory Contact:

Sample Matrix S-Soil/ SL-
 Sludge/ W-Water/ A-Air

Container B-Bottle/J-Jar/V-
 Vial/Bag/G-Glass/P-Plastic

Preservative Unpreserved/ HCl/
 H2SO4/HNO3/Other

GHD Sample ID	Lab Sample ID	Date	Time	Container		Analyses								Remarks						
				Type	Preservative	No	Total metals	Dissolved metals	pH	Conductivity (EC)	Suite B11E	Alkali Metals	Suite B19E		TDS	Silica				
BH03d						X	X	X	X	X	X	X	X	X						
BH03s						X	X	X	X	X	X	X	X	X	X	X				
BH04						X	X	X	X	X	X	X	X	X	X	X				
BH10s						X	X	X	X	X	X	X	X	X	X	X				
BH10s						X	X	X	X	X	X	X	X	X	X	X				
BH15d						X	X	X	X	X	X	X	X	X	X	X				
BH09s						X	X	X	X	X	X	X	X	X	X	X				
BH02d						X	X	X	X	X	X	X	X	X	X	X				
BH15s						X	X	X	X	X	X	X	X	X	X	X				
BH09d						X	X	X	X	X	X	X	X	X	X	X				
BH11d						X	X	X	X	X	X	X	X	X	X	X				
BH11s						X	X	X	X	X	X	X	X	X	X	X				
BH14s						X	X	X	X	X	X	X	X	X	X	X				
BH14d						X	X	X	X	X	X	X	X	X	X	X				
BH13						X	X	X	X	X	X	X	X	X	X	X				
BH12						X	X	X	X	X	X	X	X	X	X	X				
BH07d						X	X	X	X	X	X	X	X	X	X	X				

Received by: Rob Johnston

Date/Time: 26/4/20 9:50

Relinquished by: Darcy Bott

Date/Time:

Relinquished by:

Date/Time:

26/4/20
 706307
 Cathers
 Et

HOLD

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID (as per Esdot set up; no spaces) **12516706**

PO Number (to be invoiced) **12516706**

Address:

Laboratory Quote No. 200326GHDW

Turnaround Time Standard

Laboratory Contact:

Job Manager (Invoice) & GHD accounts Adam.Osbaldston@ghd.com

Email Address (Results) Adam.Osbaldston@ghd.com

GHD Sample ID

Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air

Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic

Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other

Lab Sample ID

Container

No

Analyses

Date

Total metals

Dissolved metals

pH

Time

Conductivity (EC)

Suite B11E

Alkali Metals

BH05d

BH07s

BH08

BH07s

BH05s

Sampled by: Darcy Bott

Date/Time: 20/04/2020

Relinquished by: Darcy Bott

Date/Time:

Received by: Rob Johnston

Date/Time: 26/4/2020 15:50

Relinquished by:

Date/Time:

716307

26/4 9.30

Cairns
EF

HOLD

Robert Johnston

From: Darcy Bott <Darcy.Bott@ghd.com>
Sent: Sunday, 26 April 2020 9:30
To: #AU06_EnviroSampleWA
Subject: RE: K+S samples received without COC
Attachments: 200326GHDW.pdf; 12516706 COC.xlsx

Hi Rob,

Sorry for the delay in getting this to you!

Samples to be analysed for the following:

Table 2-1 Proposal groundwater quality baseline suite

Parameters
Total metals (Fe, Al) dissolved metals (Al, As, Cr, Cd, Fe, Mn, Ni, Se, Zn), pH, EC, sulfate, chloride, total alkalinity, sodium, ammonia, TDS, total nitrogen, total phosphorous, filterable reactive phosphorous and silica

Thanks very much, and again apologies for the delay!

Kind regards,

Darcy Bott
Hydrogeologist

Hydrogeology - Environmental Services Group

GHD
T: +61 8 6222 8513 | V: 618513 | M: +61 4 3907 6982 | E: Darcy.Bott@ghd.com
999 Hay Street, Perth WA 6000 Australia | www.ghd.com

Connect



WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Please consider our environment before printing **this email**

From: EnviroSampleWA@eurofins.com <EnviroSampleWA@eurofins.com>
Sent: Wednesday, 22 April 2020 2:45 PM
To: Darcy Bott <Darcy.Bott@ghd.com>
Subject: K+S samples received without COC

Hi Darcy,

We have received two eskies sent via TOLL, which contained these water samples without a COC. Can you please provide us with the COC?

Kind Regards,
Rob



Date/Time: 26/4/20 9:30
Chilled: Yes No
Temp: 22.5
21.3
Correction: -0.2
Final Temp: 21.6°C

Rob Johnston
Eurofins

Melbourne

6 Monterey Road
Dandenong South Vic 3175
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
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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

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Adam Osbaldeston
Project name: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Apr 26, 2020 9:30 AM
Eurofins reference: **716307**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Sample containers for volatile analysis received with zero headspace.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

ANALYSIS LOGGED IN AS PER THE EMAIL. SAMPLES BH07, BH10 & BH02S RECEIVED EXTRA AND LOGGED IN FOR ANALYSIS.

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Adam Osbaldeston - adam.osbaldeston@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Adam Osbaldeston

Report 716307-W
Project name 12516706
Received Date Apr 26, 2020

Client Sample ID			G01 BH03D	G01 BH03S	G01 BH04	G01 BH10S
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42408	M20-Ap42409	M20-Ap42410	M20-Ap42411
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.02	0.19	0.04	0.76
Chloride	1	mg/L	18000	11000	59000	170000
Conductivity (at 25°C)	10	uS/cm	44000	33000	110000	150000
pH (at 25°C)	0.1	pH Units	7.7	7.7	7.2	6.7
Phosphate total (as P)	0.01	mg/L	0.03	0.16	0.12	0.04
Phosphorus filterable reactive (as P)	0.01	mg/L	0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	2800	1700	7800	12000
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	33000	21000	400000	280000
Total Nitrogen (as N)	0.2	mg/L	1.1	0.5	3.9	0.8
Silica (calculation from Si as SiO2)	0.5	mg/L	17	16	16	12
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	160	250	89	160
Heavy Metals						
Aluminium	0.05	mg/L	0.96	2.0	11	0.65
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.1
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	< 0.002	< 0.002	< 0.002	0.0031
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	0.024	< 0.01
Iron	0.05	mg/L	1.9	11	29	1.2
Iron (filtered)	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.1
Manganese (filtered)	0.005	mg/L	1.2	0.13	< 0.05	16
Nickel (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.021
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	0.004
Zinc (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05	0.10
Alkali Metals						
Sodium	0.5	mg/L	10000	5900	29000	77000

Client Sample ID			G01 BH15D	G01 BH09S	G01 BH02D	G01 BH15S
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42412	M20-Ap42413	M20-Ap42414	M20-Ap42415
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.1	0.12	0.26	0.04
Chloride	1	mg/L	150000	51000	43000	95000
Conductivity (at 25°C)	10	uS/cm	94000	99000	92000	150000
pH (at 25°C)	0.1	pH Units	7.0	7.1	6.9	7.0
Phosphate total (as P)	0.01	mg/L	0.06	0.05	0.06	0.15
Phosphorus filterable reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.02
Sulphate (as SO4)	5	mg/L	6000	3500	8500	6700
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	220000	86000	68000	130000
Total Nitrogen (as N)	0.2	mg/L	6.7	2.7	1.0	11
Silica (calculation from Si as SiO2)	0.5	mg/L	16	37	20	82
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	110	510	140	77
Heavy Metals						
Aluminium	0.05	mg/L	< 0.1	200	1.6	11
Aluminium (filtered)	0.05	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	0.0067	0.0009	< 0.002	0.0040
Chromium (filtered)	0.001	mg/L	< 0.01	0.021	< 0.01	0.12
Iron	0.05	mg/L	< 0.1	490	3.5	28
Iron (filtered)	0.05	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Manganese (filtered)	0.005	mg/L	1.1	0.007	0.026	0.21
Nickel (filtered)	0.001	mg/L	0.013	< 0.01	< 0.01	0.013
Selenium (filtered)	0.001	mg/L	0.011	0.009	< 0.01	0.015
Zinc (filtered)	0.005	mg/L	0.093	< 0.05	< 0.05	< 0.05
Alkali Metals						
Sodium	0.5	mg/L	68000	23000	22000	35000

Client Sample ID			G01 BH09D	G01 BH11D	G01 BH11S	G01 BH14S
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42416	M20-Ap42417	M20-Ap42418	M20-Ap42419
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.35	0.53	0.07	0.26
Chloride	1	mg/L	93000	130000	130000	160000
Conductivity (at 25°C)	10	uS/cm	130000	150000	150000	160000
pH (at 25°C)	0.1	pH Units	7.1	7.3	7.2	6.9
Phosphate total (as P)	0.01	mg/L	0.05	0.08	0.11	0.07
Phosphorus filterable reactive (as P)	0.01	mg/L	0.01	0.02	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	4100	9200	10000	11000
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	150000	200000	200000	260000
Total Nitrogen (as N)	0.2	mg/L	1.9	1.0	5.4	0.6
Silica (calculation from Si as SiO2)	0.5	mg/L	24	9.4	48	8.5
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	86	120	150	140

Client Sample ID			G01 BH09D	G01 BH11D	G01 BH11S	G01 BH14S
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42416	M20-Ap42417	M20-Ap42418	M20-Ap42419
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	0.05	mg/L	9.2	1.0	4.3	0.92
Aluminium (filtered)	0.05	mg/L	< 0.1	< 0.1	0.12	0.17
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	0.0023	0.0024	0.0022	0.0033
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Iron	0.05	mg/L	21	2.1	9.5	8.5
Iron (filtered)	0.05	mg/L	< 0.1	< 0.1	0.13	0.28
Manganese (filtered)	0.005	mg/L	0.68	2.9	6.4	2.1
Nickel (filtered)	0.001	mg/L	< 0.01	0.026	0.029	0.013
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	< 0.05	0.18	0.14	0.13
Alkali Metals						
Sodium	0.5	mg/L	30000	49000	45000	53000

Client Sample ID			G01 BH14D	G01 BH13	G01 BH12	G01 BH07D
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42420	M20-Ap42421	M20-Ap42422	M20-Ap42423
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.14	0.89	6.0	0.30
Chloride	1	mg/L	190000	37000	56000	120000
Conductivity (at 25°C)	10	uS/cm	170000	67000	100000	160000
pH (at 25°C)	0.1	pH Units	6.7	7.2	7.3	7.1
Phosphate total (as P)	0.01	mg/L	0.03	0.10	0.11	0.17
Phosphorus filterable reactive (as P)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	11000	2700	3200	8600
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	130000	40000	220000	240000
Total Nitrogen (as N)	0.2	mg/L	0.4	1.2	6.0	0.7
Silica (calculation from Si as SiO2)	0.5	mg/L	15	31	61	11
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	150	290	690	160
Heavy Metals						
Aluminium	0.05	mg/L	0.99	3.6	9.0	2.6
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Iron	0.05	mg/L	1.9	25	53	5.3
Iron (filtered)	0.05	mg/L	1.4	< 0.5	< 0.5	< 0.5
Manganese (filtered)	0.005	mg/L	5.2	41	8.1	3.8
Nickel (filtered)	0.001	mg/L	0.011	0.054	0.017	< 0.01
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	0.057	< 0.05	< 0.05	0.061
Alkali Metals						
Sodium	0.5	mg/L	55000	12000	29000	51000

Client Sample ID			G01 BH05D	G01 BH07S	G01 BH08	G01 BH05S
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M20-Ap42424	M20-Ap42425	M20-Ap42426	M20-Ap42427
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	5.2	0.23	0.65	2.0
Chloride	1	mg/L	130000	96000	76000	120000
Conductivity (at 25°C)	10	uS/cm	170000	160000	140000	160000
pH (at 25°C)	0.1	pH Units	7.0	6.9	7.2	7.0
Phosphate total (as P)	0.01	mg/L	0.09	0.14	0.11	0.11
Phosphorus filterable reactive (as P)	0.01	mg/L	0.01	< 0.01	< 0.01	< 0.01
Sulphate (as SO4)	5	mg/L	9800	18000	7300	11000
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	180000	140000	230000	240000
Total Nitrogen (as N)	0.2	mg/L	4.0	1.1	2.6	2.0
Silica (calculation from Si as SiO2)	0.5	mg/L	11	18	21	15
Alkalinity (speciated)						
Total Alkalinity (as CaCO3)	20	mg/L	220	160	110	170
Heavy Metals						
Aluminium	0.05	mg/L	1.5	3.3	2.9	6.7
Aluminium (filtered)	0.05	mg/L	< 0.5	< 0.5	0.10	< 0.5
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Iron	0.05	mg/L	2.9	5.7	5.4	22
Iron (filtered)	0.05	mg/L	< 0.5	< 0.5	0.25	0.13
Manganese (filtered)	0.005	mg/L	6.1	0.39	0.97	2.9
Nickel (filtered)	0.001	mg/L	0.013	< 0.01	0.040	< 0.01
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	0.090	0.025	0.057	0.062
Alkali Metals						
Sodium	0.5	mg/L	57000	41000	43000	72000

Client Sample ID			G01 BH10	G01 BH02S	G01 BH07
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M20-Ap42428	M20-Ap42429	M20-Ap42476
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit			
Ammonia (as N)	0.01	mg/L	2.3	0.09	0.05
Chloride	1	mg/L	150000	30000	100000
Conductivity (at 25°C)	10	uS/cm	170000	81000	150000
pH (at 25°C)	0.1	pH Units	6.7	7.4	7.1
Phosphate total (as P)	0.01	mg/L	0.09	0.06	0.12
Phosphorus filterable reactive (as P)	0.01	mg/L	< 0.01	0.02	< 0.01
Sulphate (as SO4)	5	mg/L	13000	8400	7200
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	300000	67000	190000
Total Nitrogen (as N)	0.2	mg/L	1.7	0.4	3.2
Silica (calculation from Si as SiO2)	0.5	mg/L	11	43	15
Alkalinity (speciated)					
Total Alkalinity (as CaCO3)	20	mg/L	160	200	150

Client Sample ID			G01 BH10	G01 BH02S	G01 BH07
Sample Matrix			Water	Water	Water
Eurofins Sample No.			M20-Ap42428	M20-Ap42429	M20-Ap42476
Date Sampled			Apr 13, 2020	Apr 13, 2020	Apr 13, 2020
Test/Reference	LOR	Unit			
Heavy Metals					
Aluminium	0.05	mg/L	< 0.5	8.0	1.6
Aluminium (filtered)	0.05	mg/L	< 0.5	0.13	0.11
Arsenic (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01
Cadmium (filtered)	0.0002	mg/L	0.0021	< 0.002	< 0.002
Chromium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01
Iron	0.05	mg/L	< 0.05	22	2.4
Iron (filtered)	0.05	mg/L	0.07	0.18	0.13
Manganese (filtered)	0.005	mg/L	3.6	0.082	0.23
Nickel (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01
Selenium (filtered)	0.001	mg/L	< 0.01	< 0.01	< 0.01
Zinc (filtered)	0.005	mg/L	< 0.05	< 0.05	< 0.05
Alkali Metals					
Sodium	0.5	mg/L	94000	18000	57000

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
Ammonia (as N) - Method: LTM-INO-4200 Ammonia by Discrete Analyser	Melbourne	Apr 29, 2020	28 Days
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Apr 29, 2020	28 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Apr 29, 2020	28 Days
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Apr 29, 2020	0 Hours
Phosphate total (as P) - Method: APHA 4500-P E. Phosphorus	Melbourne	Apr 29, 2020	28 Days
Phosphorus filterable reactive (as P) - Method: APHA 4500-P Phosphate (filterable reactive)	Melbourne	Apr 29, 2020	2 Days
Sulphate (as SO₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Apr 29, 2020	28 Days
Silica (calculation from Si as SiO₂) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Apr 30, 2020	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Apr 29, 2020	14 Days
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Apr 30, 2020	180 Days
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Apr 30, 2020	180 Days
Alkali Metals - Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES	Melbourne	Apr 29, 2020	180 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Apr 29, 2020	7 Days

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Rolleston, Christchurch 7675
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IANZ # 1290

Company Name:	GHD Pty Ltd WA	Order No.:	12516706	Received:	Apr 26, 2020 9:30 AM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	716307	Due:	May 4, 2020
Project Name:	12516706	Phone:	08 6222 8222	Priority:	5 Day
		Fax:	08 9429 6555	Contact Name:	Adam Osbaldeston

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Aluminium	Aluminium (filtered)	Ammonia (as N)	Arsenic (filtered)	Cadmium (filtered)	Chloride	Chromium (filtered)	Conductivity (at 25°C)	Iron	Iron (filtered)	Manganese (filtered)	Nickel (filtered)	pH (at 25°C)	Phosphate total (as P)	Phosphorus filterable reactive (as P)	Selenium (filtered)	Silica (calculation from Si as SiO2)	Sodium	Sulphate (as SO4)	Total Alkalinity (as CaCO3)	Total Nitrogen (as N)	Zinc (filtered)	Total Dissolved Solids Dried at 180°C ± 2°C		
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217																														
Brisbane Laboratory - NATA Site # 20794																														
Perth Laboratory - NATA Site # 23736																														
External Laboratory																														
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																									
1	BH03D	Apr 13, 2020		Water	M20-Ap42408	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
2	BH03S	Apr 13, 2020		Water	M20-Ap42409	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
3	BH04	Apr 13, 2020		Water	M20-Ap42410	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
4	BH10S	Apr 13, 2020		Water	M20-Ap42411	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
5	BH15D	Apr 13, 2020		Water	M20-Ap42412	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
6	BH09S	Apr 13, 2020		Water	M20-Ap42413	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
7	BH02D	Apr 13, 2020		Water	M20-Ap42414	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
8	BH15S	Apr 13, 2020		Water	M20-Ap42415	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
9	BH09D	Apr 13, 2020		Water	M20-Ap42416	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
10	BH11D	Apr 13, 2020		Water	M20-Ap42417	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
11	BH11S	Apr 13, 2020		Water	M20-Ap42418	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

Australia

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		Fax:	08 9429 6555	Contact Name:	Adam Osbaldeston

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail					Aluminium	Aluminium (filtered)	Ammonia (as N)	Arsenic (filtered)	Cadmium (filtered)	Chloride	Chromium (filtered)	Conductivity (at 25°C)	Iron	Iron (filtered)	Manganese (filtered)	Nickel (filtered)	pH (at 25°C)	Phosphate total (as P)	Phosphorus filterable reactive (as P)	Selenium (filtered)	Silica (calculation from Si as SiO2)	Sodium	Sulphate (as SO4)	Total Alkalinity (as CaCO3)	Total Nitrogen (as N)	Zinc (filtered)	Total Dissolved Solids Dried at 180°C ± 2°C	
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																												
Brisbane Laboratory - NATA Site # 20794																												
Perth Laboratory - NATA Site # 23736																												
12	BH14S	Apr 13, 2020	Water	M20-Ap42419	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	BH14D	Apr 13, 2020	Water	M20-Ap42420	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14	BH13	Apr 13, 2020	Water	M20-Ap42421	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	BH12	Apr 13, 2020	Water	M20-Ap42422	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
16	BH07D	Apr 13, 2020	Water	M20-Ap42423	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
17	BH05D	Apr 13, 2020	Water	M20-Ap42424	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18	BH07S	Apr 13, 2020	Water	M20-Ap42425	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	BH08	Apr 13, 2020	Water	M20-Ap42426	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
20	BH05S	Apr 13, 2020	Water	M20-Ap42427	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21	BH10	Apr 13, 2020	Water	M20-Ap42428	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
22	BH02S	Apr 13, 2020	Water	M20-Ap42429	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
23	BH07	Apr 13, 2020	Water	M20-Ap42476	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Test Counts					23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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	
Method Blank								
Ammonia (as N)	mg/L	< 0.01			0.01	Pass		
Chloride	mg/L	< 1			1	Pass		
Conductivity (at 25°C)	uS/cm	< 10			10	Pass		
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass		
Phosphorus filterable reactive (as P)	mg/L	< 0.01			0.01	Pass		
Sulphate (as SO4)	mg/L	< 5			5	Pass		
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass		
Total Nitrogen (as N)	mg/L	< 0.2			0.2	Pass		
Silica (calculation from Si as SiO2)	mg/L	< 0.5			0.5	Pass		
Method Blank								
Alkalinity (speciated)								
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass		
Method Blank								
Heavy Metals								
Aluminium	mg/L	< 0.05			0.05	Pass		
Iron	mg/L	< 0.05			0.05	Pass		
Method Blank								
Alkali Metals								
Sodium	mg/L	< 0.5			0.5	Pass		
LCS - % Recovery								
Ammonia (as N)	%	104			70-130	Pass		
Chloride	%	102			70-130	Pass		
Conductivity (at 25°C)	%	99			70-130	Pass		
Phosphate total (as P)	%	105			70-130	Pass		
Sulphate (as SO4)	%	106			70-130	Pass		
Total Dissolved Solids Dried at 180°C ± 2°C	%	90			70-130	Pass		
Total Nitrogen (as N)	%	92			70-130	Pass		
Silica (calculation from Si as SiO2)	%	97			70-130	Pass		
LCS - % Recovery								
Alkalinity (speciated)								
Total Alkalinity (as CaCO3)	%	73			70-130	Pass		
LCS - % Recovery								
Heavy Metals								
Aluminium	%	92			80-120	Pass		
Iron	%	97			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Chloride	M20-Ap40797	NCP	%	88		70-130	Pass	
Sulphate (as SO4)	M20-Ap40791	NCP	%	92		70-130	Pass	
Total Nitrogen (as N)	M20-Ap41614	NCP	%	73		70-130	Pass	
Silica (calculation from Si as SiO2)	M20-Ap42408	CP	%	92		70-130	Pass	
Spike - % Recovery								
Alkali Metals								
				Result 1				
Sodium	M20-Ap44351	NCP	%	93		70-130	Pass	
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M20-Ap42410	CP	%	91		70-130	Pass	
Spike - % Recovery								
				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphate total (as P)	M20-Ap42412	CP	%	109			70-130	Pass	
Spike - % Recovery									
				Result 1					
Silica (calculation from Si as SiO ₂)	M20-Ap42418	CP	%	89			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	M20-Ap42422	CP	%	93			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	M20-Ap43960	NCP	%	123			75-125	Pass	
Iron	M20-Ap43960	NCP	%	94			75-125	Pass	
Spike - % Recovery									
				Result 1					
Silica (calculation from Si as SiO ₂)	M20-Ap42428	CP	%	103			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO ₃)	M20-Ap42428	CP	%	111			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
pH (at 25°C)	M20-Ap42408	CP	pH Units	7.7	7.7	pass	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M20-Ap42408	CP	mg/L	33000	34000	2.0	30%	Pass	
Silica (calculation from Si as SiO ₂)	M20-Ap42408	CP	mg/L	17	16	8.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Total Alkalinity (as CaCO ₃)	M20-Ap42408	CP	mg/L	160	180	14	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Sodium	M20-Ap42408	CP	mg/L	10000	8800	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M20-Ap42409	CP	mg/L	11000	11000	4.0	30%	Pass	
Sulphate (as SO ₄)	M20-Ap42409	CP	mg/L	1700	1800	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphate total (as P)	M20-Ap42413	CP	mg/L	0.05	0.05	4.0	30%	Pass	
Total Nitrogen (as N)	M20-Ap42413	CP	mg/L	2.7	2.5	5.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphate total (as P)	M20-Ap42416	CP	mg/L	0.05	0.06	3.0	30%	Pass	
Total Nitrogen (as N)	M20-Ap42416	CP	mg/L	1.9	2.3	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (at 25°C)	M20-Ap42418	CP	pH Units	7.2	7.2	pass	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	M20-Ap42418	CP	mg/L	200000	260000	25	30%	Pass	
Silica (calculation from Si as SiO ₂)	M20-Ap42418	CP	mg/L	48	51	6.0	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Sodium	M20-Ap42418	CP	mg/L	45000	47000	5.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M20-Ap42419	CP	mg/L	160000	170000	4.0	30%	Pass	
Sulphate (as SO ₄)	M20-Ap42419	CP	mg/L	11000	11000	4.0	30%	Pass	

Duplicate				Result 1	Result 2	RPD		
pH (at 25°C)	M20-Ap42423	CP	pH Units	7.1	7.1	pass	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Alkalinity (speciated)				Result 1	Result 2	RPD		
Total Alkalinity (as CaCO ₃)	M20-Ap42423	CP	mg/L	160	130	19	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Heavy Metals				Result 1	Result 2	RPD		
Aluminium	M20-Ap43960	NCP	mg/L	0.71	0.76	7.0	30%	Pass
Iron	M20-Ap43960	NCP	mg/L	1.6	1.7	4.0	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Phosphate total (as P)	M20-Ap42427	CP	mg/L	0.11	0.11	2.0	30%	Pass
Total Nitrogen (as N)	M20-Ap42427	CP	mg/L	2.0	1.9	7.0	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Ammonia (as N)	M20-Ap42428	CP	mg/L	2.3	2.7	20	30%	Pass
Total Dissolved Solids Dried at 180°C ± 2°C	M20-Ap42428	CP	mg/L	300000	290000	3.0	30%	Pass
Silica (calculation from Si as SiO ₂)	M20-Ap42428	CP	mg/L	11	10	7.0	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Alkali Metals				Result 1	Result 2	RPD		
Sodium	M20-Ap42428	CP	mg/L	94000	97000	3.0	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Chloride	M20-Ap42429	CP	mg/L	30000	32000	6.0	30%	Pass
Sulphate (as SO ₄)	M20-Ap42429	CP	mg/L	8400	8800	5.0	30%	Pass
Duplicate				Result 1	Result 2	RPD		
Ammonia (as N)	M20-Ap42476	CP	mg/L	0.05	0.05	11	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
G01	The LORs have been raised due to matrix interference

Authorised By

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**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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Robert Johnston

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Monday, 8 June 2020 8:51
To: #AU06_EnviroSampleWA
Cc: Robert Johnston
Subject: K+S Addiotanl analysis
Attachments: 12516706_Additional Analysis 08.06.2020.pdf

Carlyn Gibson
Eurofins
#724405

Eurofins

Additional analysis request attached.
Further analysis will be requested early this week for the sediments etc.

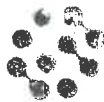
Once we have all the pH testing complete il start to schedule the further ass testing.

If they are any batches of samples in your storage which have not been allocated to date, can you let me know, as im picking this up from Ryan's departure.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD
Proudly employee owned
T: +61 8 6222 8212 | M: +61 (0)422 993 607 | E: louise.cockerton@ghd.com
Level 10, 999 Hay Street, Perth WA 6000 Australia | www.ghd.com



Date/Time: _____
Chilled: Yes / No
Temp: 8.6
12.9
9.9
Correction: -1.4
Final Temp: 9.0°C



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Please note, the majority of our team members are working remotely but available at any time should you want to get in contact. GHD's commitment to delivering for our clients remains strong, and we understand that through these uncertain times our clients need our support more than ever. We look forward to continuing our work, together.

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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S Salt	Laboratory: Eurofins I mg†	
		Address: 2/91 Leach Hwy, Kewdale 6105	
		Laboratory Contact:	Sample Receipt

Laboratory Quote No. 200121GHDW		Turnaround Time Standard (5 days)		Sample Matrix s-soil/ sl- Sludge/ W-Water/ A-Air	Container			Analyses										Remarks						
Job Manager (Invoice) & GHD accounts Paul.Baker@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com			Type B-Bottle/Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	pH Field Screen Non NATA																
GHD Sample ID	Lab Sample ID	Date	Time																					
BH10 4.1-5.0	722027			S	B	Un-Pre	1	X																
BH11	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH11	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH11	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH12	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH12	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH14	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH14	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH14	-			S	B	Un-Pre	1	X															SAU06PRT002200490112090	
BH01 1.0	-			S	B	Un-Pre	1	X															Eurofins storage email dated 16/04/2020	
BH01 6.5	-			S	B	Un-Pre	1	X																
BH07 0.25	-			S	B	Un-Pre	1	X																
BH07 0.50	-			S	B	Un-Pre	1	X																
BH07 0.75	-			S	B	Un-Pre	1	X																
BH07 1.0	-			S	B	Un-Pre	1	X																
BH07 1.25	-			S	B	Un-Pre	1	X																
BH07 1.50	-			S	B	Un-Pre	1	X																

Sampled by: A. Tabarestani	Date/Time:	Relinquished by: A. Tabarestani	Date/Time:
Requested by: L Cockerton	Date/Time: 5/06/2020	Relinquished by:	Date/Time:

Carlye Gibbs at Eurofins #724405

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706		Site Name (as set up in ESdat) K+S Salt		Laboratory: Eurofins I mgt												Remarks				
Laboratory Quote No. 200121GHDW		Turnaround Time Standard (5 days)		Address: 2/91 Leach Hwy, Kewdale 6105																
Job Manager (Invoice) & GHD accounts Paul.Baker@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com		Laboratory Contact: Sample Receipt																
GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/SL- Sludge/ W-Water/ A-Air	Container Type B-Bottle/Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	No	pH Field Screen Non NATA												
BH07 1.75				S	B	Un-Pre	1	X												
BH07 2.0				S	B	Un-Pre	1	X												
BH07 2.25				S	B	Un-Pre	1	X												
BH07 2.50				S	B	Un-Pre	1	X												
BH07 2.75				S	B	Un-Pre	1	X												
BH07 3.0				S	B	Un-Pre	1	X												
BH07 3.25				S	B	Un-Pre	1	X												
BH07 3.50				S	B	Un-Pre	1	X												
BH07 3.75				S	B	Un-Pre	1	X												
BH07 4.0				S	B	Un-Pre	1	X												
BH07 4.25				S	B	Un-Pre	1	X												
BH07 4.50				S	B	Un-Pre	1	X												
BH07 4.75				S	B	Un-Pre	1	X												
BH07 5.0				S	B	Un-Pre	1	X												
BH08 0.25				S	B	Un-Pre	1	X												
BH08 0.5				S	B	Un-Pre	1	X												
BH08 0.75				S	B	Un-Pre	1	X												
Sampled by: A. Tabarestani				Date/Time:				Relinquished by: A. Tabarestani						Date/Time:						
Requested by: L Cockerton				Date/Time: 5/06/2020				Relinquished by:						Date/Time:						

Carlye Gibson Ch Auditor #724405

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 3 of 6

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S Salt	Laboratory: Eurofins I mgf
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. 200121GHDW	Turnaround Time Standard (5 days)	Sample Matrix S-Soil/ SL- Sludge/ W-Water/ A-Air	Container Type B-Bottle/-Jar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	pH Field Screen Non NATA	Analyses							Remarks
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Job Manager (Invoice) & GHD accounts Paul.Baker@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com										
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GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Container	Preservative	No	pH Field Screen	Analyses							Remarks	
BH08 1.0				S	B	Un-Pre	1	X									
BH08 1.25				S	B	Un-Pre	1	X									
BH08 1.50				S	B	Un-Pre	1	X									
BH08 1.75				S	B	Un-Pre	1	X									
BH08 2.0				S	B	Un-Pre	1	X									
BH08 2.25				S	B	Un-Pre	1	X									
BH08 2.50				S	B	Un-Pre	1	X									
BH08 2.75				S	B	Un-Pre	1	X									
BH08 3.0				S	B	Un-Pre	1	X									
BH08 3.25				S	B	Un-Pre	1	X									
BH08 3.50				S	B	Un-Pre	1	X									
BH08 3.75				S	B	Un-Pre	1	X									
BH08 4.0				S	B	Un-Pre	1	X									
BH08 4.25				S	B	Un-Pre	1	X									
BH08 4.50				S	B	Un-Pre	1	X									
BH08 4.75				S	B	Un-Pre	1	X									
BH08 5.0				S	B	Un-Pre	1	X									

Sampled by: A. Tabarestani	Date/Time:	Relinquished by: A. Tabarestani	Date/Time:
Requested by: L Cockerton	Date/Time: 5/06/2020	Relinquished by:	Date/Time:

Caitlyn Gibson of Eurofins #724405

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
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Perth WA 6000

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Perth WA 6832

Reception Ph: 08 6222 8222

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Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S Salt	Laboratory:	Eurofins I mgt
		Address:	2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact:	Sample Receipt

Laboratory Quote No. 200121GHDW	Turnaround Time Standard (5 days)	Analyses										Remarks
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Job Manager (Invoice) & GHD accounts Paul.Baker@ghd.com AP-FSS@ghd.com	Email Address (Results) louise.cockerton@ghd.com	Sample Matrix S-Soil/SL- Sludges/W-Water/A-Air	Container			No	pH Field Screen Non NATA											Remarks
			Type B Bottle/Jar/V- Via/Bag/G-Glass/P-Plastic	Preservative Unpreserved/HCl/ H2SO4/HNO3/Other														

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	pH Field Screen											Remarks
BH08 5.2				S	B	Un-Pre	1	X											
BH09 13.25-14.5				S	B	Un-Pre	1	X											
BH09 15.77-16.7				S	B	Un-Pre	1	X											
BH10 17.0-17.8				S	B	Un-Pre	1	X											
BH10 4.1-5.0				S	B	Un-Pre	1	X											
BH15				S	B	Un-Pre	1	X											Depth 2.5-3.5
HA12 0.25				S	B	Un-Pre	1	X											
HA12 0.5				S	B	Un-Pre	1	X											
HA12 0.75				S	B	Un-Pre	1	X											
HA12 1.0				S	B	Un-Pre	1	X											
HA14 0.25				S	B	Un-Pre	1	X											
HA14 0.4				S	B	Un-Pre	1	X											
HA14 0.5				S	B	Un-Pre	1	X											
HA14 0.75				S	B	Un-Pre	1	X											
HA14 1.0				S	B	Un-Pre	1	X											
HA19 0.25				S	B	Un-Pre	1	X											
QA04				S	B	Un-Pre	1	X											

Sampled by: A. Tabarestani	Date/Time:	Relinquished by: A. Tabarestani	Date/Time:
Requested by: I. Cockerton	Date/Time: 5/06/2020	Relinquished by:	Date/Time:

Carlynn Gibson Of Eurofins #724405

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat)
12516706

Site Name (as set up in ESdat)
K+S Salt

Laboratory: Eurofins I mgt

Address: 2/91 Leach Hwy, Kewdale 6105

Laboratory Contact: Sample Receipt

Laboratory Quote No.
200121GHDW

Turnaround Time
Standard (5 days)

Job Manager (Invoice) & GHD accounts
Paul.Baker@ghd.com
AP-FSS@ghd.com

Email Address (Results)
louise.cockerton@ghd.com

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil / SL- Sludge / W-Water / A-Air	Container				pH Field Screen Non NATA	Analyses								Remarks	
					Type B-Bottle / Jar / V- Vial / Bag / G-Glass / P-Plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / Other	No												
BH15 2.5-3.5		17-Mar-20		S	B	Un-Pre	1	X											
BH15 2.5-3.5		17-Mar-20		S	B	Un-Pre	1	X											
BH11 2.0-2.5		17-Mar-20		S	B	Un-Pre	1	X											
BH11 2.0-2.5		17-Mar-20		S	B	Un-Pre	1	X											
BH11 5.0-5.5		17-Mar-20		S	B	Un-Pre	1	X											
BH12 6.5-7.2		17-Mar-20		S	B	Un-Pre	1	X											
BH12 6.5-7.2		17-Mar-20		S	B	Un-Pre	1	X											
BH14 8.0-8.5		17-Mar-20		S	B	Un-Pre	1	X											
BH14 8.0-8.5		17-Mar-20		S	B	Un-Pre	1	X											
BH14 5.0-5.5		17-Mar-20		S	B	Un-Pre	1	X											
BH14 1.0-1.5		17-Mar-20		S	B	Un-Pre	1	X											
BH14 8.0-8.5		17-Mar-20		S	B	Un-Pre	1	X											
BH14 1.0-1.5		18-Mar-20		S	B	Un-Pre	1	X											
BH12 12.5-13.0		19-Mar-20		S	B	Un-Pre	1	X											
BH12_4.0		19-Mar-20		S	B	Un-Pre	1	X											
				S	B	Un-Pre	1	X											
				S	B	Un-Pre	1	X											

Sampled by: A. Tabarestani

Date/Time:

Relinquished by: A. Tabarestani

Date/Time:

Requested by: L Cockerton

Date/Time: 5/06/2020

Relinquished by:

Date/Time:

Caitlyn Gibson CR Eurofins # > 24405

#AU06_EnviroSampleWA

From: Robert Johnston
Sent: Wednesday, 10 June 2020 10:46 AM
To: #AU06_EnviroSampleWA
Subject: FW: ATTENTION: Eurofins Sample Receipt Advice - Report 724405 : Site K + S SALT (12516706)

FYI

Kind Regards,

Robert Johnston
Analytical Services Manager, WA

Eurofins

Phone: +61 (0)8 9251 9605

Mobile: +61 (0)4 2357 9286



Eurofins Fast TAT Comes to Perth
Eurofins Perth has expanded the locally
accredited Fast TAT services on offer.

*Cathryn Gibson @
Eurofins
724405*

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Wednesday, 10 June 2020 10:05
To: Robert Johnston <RobertJohnston@eurofins.com>
Subject: RE: ATTENTION: Eurofins Sample Receipt Advice - Report 724405 : Site K + S SALT (12516706)

EXTERNAL EMAIL*

Rob

Hold on the duplicate samples, il get some clarification re: sample depths and re-issue a work order.
Analyse the extra samples HA12 0.2 and HA19 0.5

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

Proudly employee owned

T: +61 8 6222 8212 | M: +61 (0)422 993 607 | E: louise.cockerton@ghd.com
Level 10, 999 Hay Street, Perth WA 6000 Australia | www.ghd.com

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Caitlyn Gibson
eurofins
724405

From: RobertJohnston@eurofins.com <RobertJohnston@eurofins.com>
Sent: Wednesday, 10 June 2020 9:49 AM
To: Louise Cockerton <Louise.Cockerton@ghd.com>
Cc: Atash Tabarestani <Atash.Tabarestani@ghd.com>
Subject: ATTENTION: Eurofins Sample Receipt Advice - Report 724405 : Site K + S SALT (12516706)

ATTENTION: Missing Sample QA04. Extra samples HA12 0.2 and HA19 0.5. Please advise. Several sample on COC were repeated.

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins Analytical Services Manager as soon as possible to make certain that they get changed.

Robert Johnston
Analytical Services Manager, WA

Eurofins | Environment Testing
Unit 2, 91 Leach Highway
KEWDALE WA 6105
AUSTRALIA
Phone: +61 (0)8 9251 9605
Mobile: +61 (0)4 2357 9286

Email: RobertJohnston@Eurofins.com
Website: environment.eurofins.com.au

[EnviroNote 1098 - Melbourne PFAS Accreditation](#)
[EnviroNote 1103 - NATA Accreditation for Dioxins](#)

Melbourne

6 Monterey Road
Dandenong South Vic 3175
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

ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K + S SALT
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jun 8, 2020 8:51 AM
Eurofins reference: **724405**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Missing Sample QA04. Several sample on COC were repeated. Client advised to proceed with analysis on extra samples HA12 0.2 and HA19 0.5.

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Louise Cockerton**

Report **724405-S**
 Project name **K + S SALT**
 Project ID **12516706**
 Received Date **Jun 08, 2020**

Client Sample ID			BH10 4.5-5.0	BH11 1.0-1.5	BH11 2.0-2.5	BH11 3.8-4.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12787	P20-Jn12788	P20-Jn12789	P20-Jn12790
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	9.2	8.6	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	7.8	7.7	7.8
Reaction Ratings* ^{S05}	-	comment	4.0	2.0	2.0	2.0

Client Sample ID			BH12 6.5-7.2	BH12 12.5-13	BH14 1.0-1.5	BH14 5.0-5.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12791	P20-Jn12792	P20-Jn12793	P20-Jn12794
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.5	7.4	7.6	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.5	7.2	7.2	7.4
Reaction Ratings* ^{S05}	-	comment	4.0	2.0	2.0	2.0

Client Sample ID			BH14 8.0-8.5	BH01 1.0	BH01 6.5	BH07 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12795	P20-Jn12796	P20-Jn12797	P20-Jn12798
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	8.1	7.1	9.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	8.2	7.6	9.2
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH07 0.5	BH07 0.75	BH07 1.0	BH07 1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12799	P20-Jn12800	P20-Jn12801	P20-Jn12802
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.1	9.3	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.6	9.2	7.8	7.7
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	2.0	2.0

Client Sample ID			BH07 1.5	BH07 1.75	BH07 2.0	BH07 2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12803	P20-Jn12804	P20-Jn12805	P20-Jn12806
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.5	8.9	9.0	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	7.8	7.7	7.6
Reaction Ratings* ^{S05}	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH07 2.5	BH07 2.75	BH07 3.0	BH07 3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12807	P20-Jn12808	P20-Jn12809	P20-Jn12810
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	9.1	7.4	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.7	7.6	7.7
Reaction Ratings* ^{S05}	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH07 3.5	BH07 3.75	BH07 4.0	BH07 4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12811	P20-Jn12812	P20-Jn12813	P20-Jn12815
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.9	8.6	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	7.7	7.7	7.7
Reaction Ratings* ^{S05}	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH07 4.5	BH07 4.75	BH07 5.0	BH08 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12816	P20-Jn12817	P20-Jn12818	P20-Jn12819
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	9.3	8.7	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	8.4	7.4	7.3
Reaction Ratings* ^{S05}	-	comment	2.0	2.0	2.0	3.0

Client Sample ID			BH08 0.5	BH08 0.75	BH08 1.0	BH08 1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12820	P20-Jn12821	P20-Jn12822	P20-Jn12823
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	8.8	9.1	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.6	7.7	7.6
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH08 1.5	BH08 1.75	BH08 2.0	BH08 2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12824	P20-Jn12825	P20-Jn12826	P20-Jn12827
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.8	9.1	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.7	7.4	7.9	7.8
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH08 2.5	BH08 2.75	BH08 3.0	BH08 3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12828	P20-Jn12829	P20-Jn12830	P20-Jn12831
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.2	9.3	9.0	9.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.9	8.1	9.3	9.0
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH08 3.5	BH08 3.75	BH08 4.0	BH08 4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12832	P20-Jn12833	P20-Jn12834	P20-Jn12835
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.1	9.0	9.1	9.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.7	9.8	10	9.8
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH08 4.5	BH08 4.75	BH08 5.0	BH08 5.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12836	P20-Jn12837	P20-Jn12838	P20-Jn12839
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	9.0	9.0	9.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.8	7.8	7.8	7.7
Reaction Ratings* ^{S05}	-	comment	4.0	2.0	2.0	2.0

Client Sample ID			BH09 13.25-14.5	BH09 15.77-16.77	BH10 17.0-17.8	BH15 2.5-3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12840	P20-Jn12841	P20-Jn12842	P20-Jn12843
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	9.2	8.7	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	8.1	7.7	8.3
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	2.0	4.0

Client Sample ID			HA12 0.25	HA12 0.5	HA12 0.75	HA12 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12844	P20-Jn12845	P20-Jn12846	P20-Jn12847
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	6.5	6.8	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.0	3.0	3.9	7.5
Reaction Ratings* ^{S05}	-	comment	3.0	4.0	4.0	4.0

Client Sample ID			HA14 0.25	HA14 0.5	HA14 0.75	HA14 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12848	P20-Jn12849	P20-Jn12850	P20-Jn12851
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.8	8.7	8.9	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	7.4	7.2	7.2
Reaction Ratings* ^{S05}	-	comment	4.0	2.0	2.0	2.0

Client Sample ID			HA12 0.2	HA19 0.5	HA19 0.25	HA14 0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn12853	P20-Jn12854	P20-Jn12860	P20-Jn12881
Date Sampled			Not Provided¹²	Not Provided¹²	Not Provided¹²	Not Provided¹²
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	8.4	8.1	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	8.2	8.0	7.2
Reaction Ratings* ^{S05}	-	comment	3.0	4.0	4.0	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

Acid Sulfate Soils Field pH Test

Testing Site

Perth

Extracted

Jun 10, 2020

Holding Time

7 Days

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

Australia

Melbourne
6 Monterey Road
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Site # 1254 & 14271

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S SALT
Project ID: 12516706

Order No.:
Report #: 724405
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jun 8, 2020 8:51 AM
Due: Jun 15, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test
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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	BH10 4.5-5.0	Not Provided		Soil	P20-Jn12787	X
2	BH11 1.0-1.5	Not Provided		Soil	P20-Jn12788	X
3	BH11 2.0-2.5	Not Provided		Soil	P20-Jn12789	X
4	BH11 3.8-4.5	Not Provided		Soil	P20-Jn12790	X
5	BH12 6.5-7.2	Not Provided		Soil	P20-Jn12791	X
6	BH12 12.5-13	Not Provided		Soil	P20-Jn12792	X
7	BH14 1.0-1.5	Not Provided		Soil	P20-Jn12793	X
8	BH14 5.0-5.5	Not Provided		Soil	P20-Jn12794	X
9	BH14 8.0-8.5	Not Provided		Soil	P20-Jn12795	X
10	BH01 1.0	Not Provided		Soil	P20-Jn12796	X

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Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
11	BH01 6.5	Not Provided		Soil	P20-Jn12797	X
12	BH07 0.25	Not Provided		Soil	P20-Jn12798	X
13	BH07 0.5	Not Provided		Soil	P20-Jn12799	X
14	BH07 0.75	Not Provided		Soil	P20-Jn12800	X
15	BH07 1.0	Not Provided		Soil	P20-Jn12801	X
16	BH07 1.25	Not Provided		Soil	P20-Jn12802	X
17	BH07 1.5	Not Provided		Soil	P20-Jn12803	X
18	BH07 1.75	Not Provided		Soil	P20-Jn12804	X
19	BH07 2.0	Not Provided		Soil	P20-Jn12805	X
20	BH07 2.25	Not Provided		Soil	P20-Jn12806	X
21	BH07 2.5	Not Provided		Soil	P20-Jn12807	X
22	BH07 2.75	Not Provided		Soil	P20-Jn12808	X
23	BH07 3.0	Not Provided		Soil	P20-Jn12809	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
24	BH07 3.25	Not Provided		Soil	P20-Jn12810	X
25	BH07 3.5	Not Provided		Soil	P20-Jn12811	X
26	BH07 3.75	Not Provided		Soil	P20-Jn12812	X
27	BH07 4.0	Not Provided		Soil	P20-Jn12813	X
28	BH07 4.25	Not Provided		Soil	P20-Jn12815	X
29	BH07 4.5	Not Provided		Soil	P20-Jn12816	X
30	BH07 4.75	Not Provided		Soil	P20-Jn12817	X
31	BH07 5.0	Not Provided		Soil	P20-Jn12818	X
32	BH08 0.25	Not Provided		Soil	P20-Jn12819	X
33	BH08 0.5	Not Provided		Soil	P20-Jn12820	X
34	BH08 0.75	Not Provided		Soil	P20-Jn12821	X
35	BH08 1.0	Not Provided		Soil	P20-Jn12822	X
36	BH08 1.25	Not Provided		Soil	P20-Jn12823	X

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Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
37	BH08 1.5	Not Provided		Soil	P20-Jn12824	X
38	BH08 1.75	Not Provided		Soil	P20-Jn12825	X
39	BH08 2.0	Not Provided		Soil	P20-Jn12826	X
40	BH08 2.25	Not Provided		Soil	P20-Jn12827	X
41	BH08 2.5	Not Provided		Soil	P20-Jn12828	X
42	BH08 2.75	Not Provided		Soil	P20-Jn12829	X
43	BH08 3.0	Not Provided		Soil	P20-Jn12830	X
44	BH08 3.25	Not Provided		Soil	P20-Jn12831	X
45	BH08 3.5	Not Provided		Soil	P20-Jn12832	X
46	BH08 3.75	Not Provided		Soil	P20-Jn12833	X
47	BH08 4.0	Not Provided		Soil	P20-Jn12834	X
48	BH08 4.25	Not Provided		Soil	P20-Jn12835	X
49	BH08 4.5	Not Provided		Soil	P20-Jn12836	X

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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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Jun 8, 2020 8:51 AM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	724405	Due:	Jun 15, 2020
Project Name:	K + S SALT	Phone:	08 6222 8222	Priority:	5 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
50	BH08 4.75	Not Provided		Soil	P20-Jn12837	X
51	BH08 5.0	Not Provided		Soil	P20-Jn12838	X
52	BH08 5.2	Not Provided		Soil	P20-Jn12839	X
53	BH09 13.25-14.5	Not Provided		Soil	P20-Jn12840	X
54	BH09 15.77-16.77	Not Provided		Soil	P20-Jn12841	X
55	BH10 17.0-17.8	Not Provided		Soil	P20-Jn12842	X
56	BH15 2.5-3.5	Not Provided		Soil	P20-Jn12843	X
57	HA12 0.25	Not Provided		Soil	P20-Jn12844	X
58	HA12 0.5	Not Provided		Soil	P20-Jn12845	X
59	HA12 0.75	Not Provided		Soil	P20-Jn12846	X
60	HA12 1.0	Not Provided		Soil	P20-Jn12847	X

Australia

Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 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

New Zealand

Auckland
 35 O'Rorke Road
 Penrose, Auckland 1061
 Phone : +64 9 526 45 51
 IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
 Perth
 WA 6004

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Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
61	HA14 0.25	Not Provided		Soil	P20-Jn12848	X
62	HA14 0.5	Not Provided		Soil	P20-Jn12849	X
63	HA14 0.75	Not Provided		Soil	P20-Jn12850	X
64	HA14 1.0	Not Provided		Soil	P20-Jn12851	X
65	HA12 0.2	Not Provided		Soil	P20-Jn12853	X
66	HA19 0.5	Not Provided		Soil	P20-Jn12854	X
67	HA19 0.25	Not Provided		Soil	P20-Jn12860	X
68	HA14 0.4	Not Provided		Soil	P20-Jn12881	X
Test Counts						68

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
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.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Jn12787	CP	pH Units	7.6	7.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12787	CP	pH Units	8.4	8.4	pass	30%	Pass	
Reaction Ratings*	P20-Jn12787	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Jn12797	CP	pH Units	7.1	7.0	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12797	CP	pH Units	7.6	7.4	pass	30%	Pass	
Reaction Ratings*	P20-Jn12797	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Jn12807	CP	pH Units	8.3	8.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12807	CP	pH Units	7.6	7.6	pass	30%	Pass	
Reaction Ratings*	P20-Jn12807	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)*	P20-Jn12817	CP	pH Units	9.3	9.3	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12817	CP	pH Units	8.4	8.4	pass	30%	Pass	
Reaction Ratings*	P20-Jn12817	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)*	P20-Jn12830	CP	pH Units	9.0	9.1	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12830	CP	pH Units	9.3	9.1	pass	30%	Pass	
Reaction Ratings*	P20-Jn12830	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Jn12840	CP	pH Units	8.5	8.4	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12840	CP	pH Units	7.6	7.6	pass	30%	Pass	
Reaction Ratings*	P20-Jn12840	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P20-Jn12850	CP	pH Units	8.9	8.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P20-Jn12850	CP	pH Units	7.2	7.1	pass	30%	Pass	
Reaction Ratings*	P20-Jn12850	CP	comment	2.0	2.0	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	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins Environment Testing is not able to determine whether analysis has been performed within recommended holding times.
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

Robert Johnston	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)



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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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	Sample Matrix S: Soil / SL- Sludge / W: Water / A-Air	Container				Analyses							Remarks		
Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com			Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com		Type B-Bottle / L-Lar / V- Vial / Bag / G-Glass / P-plastic	Preservative Unpreserved / HC / H2SO4 / HNO3 / Other	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)				

Do not dispose of samples without notifying GHD (Louise Cockerton)

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	Sediment Suite in	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)							HOLD	Remarks	
SED01_0		6-Feb-20		S	1xGJ	unpres	1													✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED01_0.3-0.6		6-Feb-20		S	6xGJ, 1xBag	unpres	7	✓				✓									
SED01_1		6-Feb-20		S	1xGJ	unpres	1														✓
SED01_1.5		6-Feb-20		S	1xGJ	unpres	1														✓
SED01_2		6-Feb-20		S	1xGJ	unpres	1														✓
SED02_0		6-Feb-20		S	1xBag	unpres	1				✓	✓									✓
SED02_0.0-0.3		6-Feb-20		S	6xGJ, 1xBag	unpres	7														✓
SED02_0.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓
SED02_1		6-Feb-20		S	1xGJ, 1xBag	unpres	2				✓	✓									✓
SED02_1.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2				✓	✓									✓
SED02_2		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓
SED02_2.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓
SED03_0		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓											
SED03_0.25		5-Feb-20		S	1xBag	unpres	1			✓											
SED03_0.3-0.6		5-Feb-20		S	6xGJ, 1xBag	unpres	7	✓				✓									
SED03_0.5		5-Feb-20		S	1xBag	unpres	1			✓											
SED03_0.75		5-Feb-20		S	1xBag	unpres	1			✓											

Sampled by: R Walker	Date/Time: 5/2 - 6/2	Relinquished by: R Walker	Date/Time: 10/2
Requested by: L Cockerton	Date/Time: 8/06/2020	Relinquished by:	Date/Time:

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	Sample Matrix S: Soil / SL- Sludge / W: Water / A-Air	Container					Analyses						Remarks				
Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com			Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com		Type B-Bottle/L-Iar/V- Vial/Bag/G-Glass/P-Plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)						

**Do not dispose of samples
without notifying GHD (Louise
Cockerton)**

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	Sediment Suite in	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)								HOLD	Remarks	
SED03_1		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓	✓	✓										*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED03_1.25		5-Feb-20		S	1xBag	unpres	1			✓												
SED03_1.5		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓		✓										
SED03_1.75		5-Feb-20		S	1xBag	unpres	1			✓												
SED03_2		5-Feb-20		S	1xGJ, 1xBag	unpres	2			✓												
SED04_0		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED04_0.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2				✓	✓									✓	
SED04_1		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED04_1.5		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED04_2-2.2		6-Feb-20		S	6xGJ, 2xBag	unpres	8				✓	✓									✓	
SED05_0		5-Feb-20		S	1xGJ	unpres	1														✓	
SED05_0.5		5-Feb-20		S	1xGJ	unpres	1														✓	
SED05_1-1.2		5-Feb-20		S	6xGJ, 1xBag	unpres	7				✓										✓	
SED05_1.5		5-Feb-20		S	1xGJ, 1xBag	unpres	2					✓									✓	
SED05_2		5-Feb-20		S	1xGJ	unpres	1														✓	
SED05_2.4		5-Feb-20		S	1xGJ	unpres	1														✓	
SED06_0		6-Feb-20		S	1xGJ	unpres	1														✓	

Sampled by: R Walker	Date/Time: 5/2 - 6/2	Relinquished by: R Walker	Date/Time: 10/2
Requested by: L Cockerton	Date/Time: 8/06/2020	Relinquished by:	Date/Time:

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 3 of 6

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	<table border="1"> <thead> <tr> <th rowspan="2">Sample Matrix S: Soil / SL- Sludge / W: Water / A-Air</th> <th colspan="3">Container</th> <th colspan="8">Analyses</th> <th rowspan="2">HOLD</th> <th rowspan="2">Remarks</th> </tr> <tr> <th>Type B-Bottle/L-Iar/V- Vial/Bag/G-Glass/P-plastic</th> <th>Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other</th> <th>No</th> <th>Sediment Suite in Quote 200121GHDW</th> <th>Metals*</th> <th>ASS Screening pHF & pHFOX</th> <th>Metals*</th> <th>ASS Super Suite (SPOCAS & CRS)</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>SED06_0.5-0.7</td> <td>6xGJ, 1xBag</td> <td>unpres</td> <td>7</td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn</td> </tr> <tr> <td>SED06_1</td> <td>1xGJ</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SED06_1.5</td> <td>1xGJ</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SED06_2</td> <td>1xGJ</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SED07_0</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SED07_0-0.4</td> <td>6xGJ, 1xBag</td> <td>unpres</td> <td>7</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SED07_0.5</td> <td>1xGJ, 1xBag</td> <td>unpres</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> 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1xBag	unpres	7													SED08A_0	1xGJ	unpres	1													SED08A_0.5	1xGJ	unpres	1													SED08A_1	1xGJ	unpres	1													SED08A_1.3	1xGJ, 1xBag	unpres	2												
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**Do not dispose of samples
without notifying GHD (Louise
Cockerton)**

Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com	Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com
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GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	Sediment Suite in Quote	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)							HOLD	Remarks		
SED06_0.5-0.7		6-Feb-20		S	6xGJ, 1xBag	unpres	7				✓	✓								✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn	
SED06_1		6-Feb-20		S	1xGJ	unpres	1													✓		
SED06_1.5		6-Feb-20		S	1xGJ	unpres	1													✓		
SED06_2		6-Feb-20		S	1xGJ	unpres	1													✓		
SED07_0		5-Feb-20		S	1xBag	unpres	1													✓		
SED07_0-0.4		5-Feb-20		S	6xGJ, 1xBag	unpres	7	✓														
SED07_0.5		5-Feb-20		S	1xGJ, 1xBag	unpres	2					✓									✓	
SED07_1		5-Feb-20		S	1xGJ, 1xBag	unpres	2				✓	✓									✓	
SED07_1.5		5-Feb-20		S	1xGJ, 1xBag	unpres	2				✓	✓									✓	
SED07_2		5-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED07_2.7		5-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED08_0		5-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
SED08_0.3-0.6		5-Feb-20		S	6xGJ, 1xBag	unpres	7														✓	
SED08A_0		6-Feb-20		S	1xGJ	unpres	1														✓	
SED08A_0.5		6-Feb-20		S	1xGJ	unpres	1														✓	
SED08A_1		6-Feb-20		S	1xGJ	unpres	1														✓	
SED08A_1.3		6-Feb-20		S	1xGJ, 1xBag	unpres	2														✓	
Sampled by: R Walker				Date/Time: 5/2 - 6/2				Relinquished by: R Walker				Date/Time: 10/2										
Requested by: L Cockerton				Date/Time: 8/06/2020				Relinquished by:				Date/Time:										

**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

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Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	Analyses													Remarks
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Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com				Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com		Sample Matrix S: Soil / SL- Sludge / W: Water / A-Air	Container				Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)					HOLD	Do not dispose of samples without notifying GHD (Louise Cockerton)
GHD Sample ID	Lab Sample ID	Date	Time	Type B-Bottle/L-Iar/V- Vial/Bag/G-Glass/P-plastic	Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other		No														

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	Sediment Suite in Quote	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)							HOLD	Remarks
SED09_0-0.3		5-Feb-20		S	6xGJ, 1xBag	unpres	7				✓	✓							✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED09_0.5		5-Feb-20		S	1xGJ	unpres	1												✓	
SED09_1		5-Feb-20		S	1xGJ	unpres	1												✓	
SED09_1.5		5-Feb-20		S	1xGJ	unpres	1												✓	
SED09_1.7		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_0		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_0.5		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_1		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_1.5		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_2		5-Feb-20		S	1xGJ	unpres	1												✓	
SED10_2.1-2.4		5-Feb-20		S	6xGJ, 1xBag	unpres	7												✓	
SED11_0-0.3		6-Feb-20		S	6xGJ, 1xBag	unpres	7				✓	✓							✓	
SED11_0.5		6-Feb-20		S	1xGJ	unpres	1												✓	
SED11_1		6-Feb-20		S	1xGJ	unpres	1												✓	
SED11_1.5		6-Feb-20		S	1xGJ	unpres	1												✓	
SED11_1.9		6-Feb-20		S	1xGJ	unpres	1												✓	
SED12_0		6-Feb-20		S	1xGJ	unpres	1												✓	

Sampled by: R Walker	Date/Time: 5/2 - 6/2	Relinquished by: R Walker	Date/Time: 10/2
Requested by: L Cockerton	Date/Time: 8/06/2020	Relinquished by:	Date/Time:

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GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832

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Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	Sample Matrix S: Soil / SL- Sludge / W: Water / A-Air	Container				Analyses							Remarks	
Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com	Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com		Type B-Bottle / L-Iar / V- Vial / Bag / G-Glass / P-Plastic	Preservative Unpreserved / HCl / H2SO4 / HNO3 / Other	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)					

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix	Type	Preservative	No	Sediment Suite in	Metals*	ASS Screening pHF &	Metals*	ASS Super Suite							HOLD	Remarks
SED12_0.5		6-Feb-20		S	1xGJ	unpres	1				✓	✓							✓	*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
SED12_1.2-1.4		6-Feb-20		S	6xGJ, 1xBag	unpres	7												✓	
SED12_1.5		6-Feb-20		S	1xGJ	unpres	1												✓	
SED12_2.2		6-Feb-20		S	1xGJ	unpres	1												✓	
FD1_200205		5-Feb-20		S	1xGJ	unpres	1												✓	
FS1_200205		5-Feb-20		S	1xGJ	unpres	1												✓	
FD2_200206		6-Feb-20		S	1xGJ	unpres	1												✓	2 x FD2 received (12/02/2020)
HA01_0		6-Feb-20		S	1xBag	unpres	1			✓										
HA01_0.2		6-Feb-20		S	1xBag	unpres	1			✓		✓								
HA02_0		6-Feb-20		S	1xBag	unpres	1			✓										
HA02_0.2		6-Feb-20		S	1xBag	unpres	1			✓										
HA03_0		6-Feb-20		S	1xBag	unpres	1			✓										
HA03_0.2		6-Feb-20		S	1xBag	unpres	1			✓		✓								
HA04_0		6-Feb-20		S	1xBag	unpres	1			✓										
HA04_0.2		6-Feb-20		S	1xBag	unpres	1			✓										
HA05_0		6-Feb-20		S	1xBag	unpres	1			✓										

Sampled by: R Walker	Date/Time: 5/2 - 6/2	Relinquished by: R Walker	Date/Time: 10/2
Requested by: L Cockerton	Date/Time: 8/06/2020	Relinquished by:	Date/Time:

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Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S	Laboratory: Eurofins MGT
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No. Lab Quote 200121GHDW	Turnaround Time Standard (5 days)	<table border="1"> <thead> <tr> <th rowspan="2">Sample Matrix: s-Soil/ SL- Sludge/ W-Water/ A-Air</th> <th colspan="4">Container</th> <th colspan="6">Analyses</th> <th rowspan="2">REMARKS</th> </tr> <tr> <th>Type: B-Bottle/J-Iar/V-Vial/Bag/G-Glass/P-Plastic</th> <th>Preservative: Unpreserved/ HCl/ H2SO4/HNO3/Other</th> <th>No</th> <th>Sediment Suite in Quote 200121GHDW</th> <th>Metals*</th> <th>ASS Screening pHF & pHFOX</th> <th>Metals*</th> <th>ASS Super Suite (SPOCAS & CRS)</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>HA05_0.2</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td>*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn</td> </tr> <tr> <td>HA06_0</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA06_0.5</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA07_0</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA07_0.5</td> <td>1xBag</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA08_0-1</td> <td>2xBags</td> <td>unpres</td> <td>2</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA09_0-1</td> <td>2xBags</td> <td>unpres</td> <td>2</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>HA10_0-1</td> <td>2xBags</td> <td>unpres</td> <td>2</td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seawater for elutriate analysis**</td> <td>1xBottle</td> <td>unpres</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>**Use as required</td> </tr> </tbody> </table>	Sample Matrix: s-Soil/ SL- Sludge/ W-Water/ A-Air	Container				Analyses						REMARKS	Type: B-Bottle/J-Iar/V-Vial/Bag/G-Glass/P-Plastic	Preservative: Unpreserved/ HCl/ H2SO4/HNO3/Other	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)					HA05_0.2	1xBag	unpres	1			✓		✓					*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn	HA06_0	1xBag	unpres	1			✓								HA06_0.5	1xBag	unpres	1			✓		✓						HA07_0	1xBag	unpres	1			✓								HA07_0.5	1xBag	unpres	1			✓								HA08_0-1	2xBags	unpres	2			✓		✓						HA09_0-1	2xBags	unpres	2			✓								HA10_0-1	2xBags	unpres	2			✓		✓						Seawater for elutriate analysis**	1xBottle	unpres	1										**Use as required
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Job Manager (Invoice) & GHD accounts louise.cockerton@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com ryan.walker@ghd.com	
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GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix: s-Soil/ SL- Sludge/ W-Water/ A-Air	Type: B-Bottle/J-Iar/V-Vial/Bag/G-Glass/P-Plastic	Preservative: Unpreserved/ HCl/ H2SO4/HNO3/Other	No	Sediment Suite in Quote 200121GHDW	Metals*	ASS Screening pHF & pHFOX	Metals*	ASS Super Suite (SPOCAS & CRS)						REMARKS
HA05_0.2		6-Feb-20		S	1xBag	unpres	1			✓		✓						*Metals: As, Sb, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn
HA06_0		6-Feb-20		S	1xBag	unpres	1			✓								
HA06_0.5		6-Feb-20		S	1xBag	unpres	1			✓		✓						
HA07_0		6-Feb-20		S	1xBag	unpres	1			✓								
HA07_0.5		6-Feb-20		S	1xBag	unpres	1			✓								
HA08_0-1		6-Feb-20		S	2xBags	unpres	2			✓		✓						
HA09_0-1		6-Feb-20		S	2xBags	unpres	2			✓								
HA10_0-1		6-Feb-20		S	2xBags	unpres	2			✓		✓						
Seawater for elutriate analysis**		6-Feb-20		W	1xBottle	unpres	1											**Use as required

Sampled by: R Walker	Date/Time: 5/2 - 6/2	Relinquished by: R Walker	Date/Time: 10/2
Requested by: L Cockerton	Date/Time: 8/06/2020	Relinquished by:	Date/Time:

Rhys Thomas

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Thursday, 25 June 2020 5:11 PM
To: Rhys Thomas
Subject: RE: K+S Material Characterisation
Attachments: 12516706-Dredge Pocket additional analysis 25.06.2020.pdf

EXTERNAL EMAIL*

Rhys

Can't say I'm very happy with the outcome considering the holding times for metals are 6 mths and the CoC repeatedly says DND.

Amended CoC is attached. Appreciate it's not your issue, so don't worry 😊 We have a large number of projects coming up which would automatically fall to Eurofins but now we might have to re-consider or look at a way of preserving our samples – maybe return of large projects to GHD storage if I have a think.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

Proudly employee owned

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Level 10, 999 Hay Street, Perth WA 6000 Australia | www.ghd.com

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From: Rhys Thomas <RhysThomas@eurofins.com>
Sent: Thursday, 25 June 2020 3:08 PM
To: Louise Cockerton <Louise.Cockerton@ghd.com>
Subject: RE: K+S Material Characterisation

Hi Louise,

I've heard back from the Melbourne lab today and unfortunately it appears the jars have been discarded as they were outside routine holding time. Are there any samples with bags we can analyse in their place? CoC and SRN attached for the analysis as it currently stands.

Regards,

Rhys Thomas
Laboratory Supervisor

Eurofins

Unit 2, 91 Leach Highway
KEWDALE WA 6105
Australia
Phone: +61 (0)8 9251 9602
Email: RhysThomas@Eurofins.com
Website: www.eurofins.com.au/environmental-testing

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Thursday, 25 June 2020 12:09 PM
To: Rhys Thomas <RhysThomas@eurofins.com>
Subject: RE: K+S Material Characterisation

EXTERNAL EMAIL *

Rhys

Actually could yo send me the amended SRN and processed CoC, ive got quite a few for this project and im trying to keep track.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

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From: Louise Cockerton
Sent: Thursday, 25 June 2020 12:07 PM

To: Rhys Thomas <RhysThomas@eurofins.com>

Subject: RE: K+S Material Characterisation

Rhys

Yes did think that, please proceed based on the proviso that they were in chilled storage.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

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From: Rhys Thomas <RhysThomas@eurofins.com>

Sent: Tuesday, 23 June 2020 6:30 PM

To: Louise Cockerton <Louise.Cockerton@ghd.com>

Subject: RE: K+S Material Characterisation

Thanks for the additional info Louise, I wasn't clear that some of these samples were submitted as a jar only. It appears the hold samples I couldn't locate are being held in Melbourne. I have scheduled these for the analysis you requested, although as all of these hold samples were submitted as a jar only it is unlikely they have been kept frozen. Do you still want to proceed with the ASS analysis given that? I'll arrange for an amended SRA to be sent out once MEL has confirmed they have all the samples.

Regards,

Rhys Thomas
Laboratory Supervisor

Eurofins

Unit 2, 91 Leach Highway

KEWDALE WA 6105

Australia

Phone: +61 (0)8 9251 9602

Email: RhysThomas@Eurofins.com

Website: www.eurofins.com.au/environmental-testing

From: Louise Cockerton <Louise.Cockerton@ghd.com>

Sent: Friday, 19 June 2020 5:59 PM

To: Rhys Thomas <RhysThomas@eurofins.com>; #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>; Robert Johnston <RobertJohnston@eurofins.com>

Cc: Matthew Deaves <MatthewDeaves@eurofins.com>

Subject: RE: K+S Material Characterisation

EXTERNAL EMAIL *

Rhys

Original COC attached. Samples were sent across to Eurofins and received – note there seems to be a theme with glass jars – are they stored elsewhere?

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

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From: Rhys Thomas <RhysThomas@eurofins.com>

Sent: Friday, 19 June 2020 12:39 PM

To: Louise Cockerton <Louise.Cockerton@ghd.com>; EnviroSampleWA@eurofins.com; Robert Johnston <RobertJohnston@eurofins.com>

Cc: Matthew Deaves <MatthewDeaves@eurofins.com>

Subject: RE: K+S Material Characterisation

Hi Louise,

It looks like the rebatch request mentioned in item 2 was missed initially. Regarding this request;

- The following samples have been located
 - SED02_0.0-0.3
 - SED02_1
 - SED03_0
 - SED03_0.3-0.6
 - SED03_1
 - SED03_1.5
 - SED04_0.5
 - SED05_1-1.2
 - SED05_1.5
 - SED07_0.5
 - SED07_1
 - SED07_1.5
 - HA01_0.2
 - HA03_0.2
 - HA05_0.2
 - HA06_0.5
 - HA08_0.1
- The following sample could not be located
 - HA10_0-1
- The following samples could not be located, although I am unsure as to whether they were ever received, are you able to confirm?
 - SED01_0 (Fe15110)
 - SED01_1 (Fe15111)
 - SED01_1.5 (Fe15112)
 - SED05_0.5 (Fe15127)
 - SED05_2.4 (Fe15131)
 - SED09_0.5 (Fe15150)
 - SED11_0.5 (Fe15161)
 - SED11_1 (Fe15162)
 - FD2_200206 (Fe15172)

We'll get the samples we do have logged in for analysis asap, apologies for the delay.

Regards,

Rhys Thomas
Laboratory Supervisor, WA

Eurofins

Unit 2, 91 Leach Highway
 KEWDALE WA 6105
 AUSTRALIA

Phone: +61 (0)8 9251 9602
 Mobile: +61 (0)418 856 576

Email: RhysThomas@Eurofins.com
 Website: environment.eurofins.com.au
 LinkedIn: www.linkedin.com/in/rhysjthomas



From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Friday, 19 June 2020 10:32 AM
To: #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>; Robert Johnston <RobertJohnston@eurofins.com>
Cc: Matthew Deaves <MatthewDeaves@eurofins.com>
Subject: FW: K+S Material Characterisation

Matt,

What's happening – can we hurry up? I need to get these sorted so I can move onto the next greatest/ latest project. Also need to rebatch them all and I can't do that until I know what we have. Previous work order for the CoC attached was 701587 - I need to know if we can do the metals and ASS analysis.

Thanks

Louise Cockerton
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Senior Environmental Scientist

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From: Louise Cockerton
Sent: Tuesday, 16 June 2020 3:15 PM
To: Matthew Deaves <MatthewDeaves@eurofins.com>
Cc: Rhys Thomas <RhysThomas@eurofins.com>
Subject: RE: K+S Material Characterisation

Thanks for looking, I have a hunt around myself, or select some alternatives to the ones not present.

1. If you can let me know about the silicate when you find out then I can just send a final version through.
2. Also not seen the SRN for the rebatch I sent through (attached) – sent it across on the 8/06.
3. Could you send me across the final results for work order 701587 – K+S results.

Also I'll be rebatching all samples this week, I think we have an allowance of 100 ish just FYI.

Thanks, appreciate this one's a right pain.

From: Matthew Deaves <MatthewDeaves@eurofins.com>

Sent: Tuesday, 16 June 2020 2:25 PM

To: Louise Cockerton <Louise.Cockerton@ghd.com>

Cc: Rhys Thomas <RhysThomas@eurofins.com>

Subject: RE: K+S Material Characterisation

Hi Louise, fruits of our endeavours:

- AU03 – have found all 9 samples starting with this prefix, not sure if you want analysis on all of them or a specific one.
- BH03_3.0-3.4 – could not locate
- BH11_5.0-5.5 – could not locate, nor see on any CoC for K+S
- BH15_1.0 – could not locate bag – possibly re-batched for additional analysis already?
- BH15_2.5-3.5 – five samples, could not locate (as above, re-batched for additional?)

Matt Deaves

State Manager, WA

Eurofins | Environment Testing AU/NZ

Phone: +61 (0)8 9251 9601

Mobile: +61 (0)4 2816 8083



From: Louise Cockerton <Louise.Cockerton@ghd.com>

Sent: Tuesday, 16 June 2020 13:12

To: Matthew Deaves <MatthewDeaves@eurofins.com>

Cc: #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>; Robert Johnston <RobertJohnston@eurofins.com>

Subject: RE: K+S Material Characterisation

EXTERNAL EMAIL *

Let me hunt around the folders 😊 I'll get back to you.

From: Matthew Deaves <MatthewDeaves@eurofins.com>

Sent: Tuesday, 16 June 2020 1:07 PM

To: Louise Cockerton <Louise.Cockerton@ghd.com>

Cc: EnviroSampleWA@eurofins.com; Robert Johnston <RobertJohnston@eurofins.com>

Subject: RE: K+S Material Characterisation

Hi Louise

There's sparing few of these samples we can find "in the system" so we're suspecting they're perhaps DND-Holds? To help us narrow the search, are you able to give us some indication of which CoC's these came in on, or even just a submission date?

Matt Deaves

State Manager, WA

Eurofins | Environment Testing AU/NZ

Phone: +61 (0)8 9251 9601

Mobile: +61 (0)4 2816 8083



From: Louise Cockerton <Louise.Cockerton@ghd.com>

Sent: Monday, 15 June 2020 15:13

To: Robert Johnston <RobertJohnston@eurofins.com>; Matthew Deaves <MatthewDeaves@eurofins.com>

Subject: K+S Material Characterisation

Importance: High

EXTERNAL EMAIL*

Guys

Having trouble with this project mainly due to the nature that samples have arrived or not arrived at the laboratory. I'm trying to piece together what samples we have and what are suitable for analysis.

Attached is a DRAFT schedule. Can you please check the viability of the samples in the spreadsheet before proceeding or let me know what can or cannot be obtained and if I try to amend.

Thanks

Louise Cockerton

Technical Lead Acid Sulfate Soil

Senior Environmental Scientist

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Murarrie QLD 4172
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NATA # 1261 Site # 20794

Perth

2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K + S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jun 19, 2020 12:39 PM
Eurofins reference: **726720**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

HA10, SED01, SED01_1, SED01_1.5, SED05_0.5, SED05_2.4, SED09_0.5, SED11_0.5, SED11_1, FD2_200206 not logged for analysis as samples previously discarded.

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



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Accreditation Number 1261
Site Number 23736

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

Attention: **Louise Cockerton**

Report **726720-S**
Project name **K + S**
Project ID **12516706**
Received Date **Jun 19, 2020**

Client Sample ID			SED01_0.3-0.6	SED03_0.3_0.6	SED03_1	SED03_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33421	P20-Jn33424	P20-Jn33425	P20-Jn33426
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Feb 05, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
pH-KCL	0.1	pH Units	8.3	9.4	9.2	9.3
pH-OX	0.1	pH Units	7.3	7.6	8.8	8.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.02	0.04	0.08	0.03
Sulfur - Peroxide	0.02	% S	0.03	0.13	0.42	0.04
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	0.09	0.35	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	55	220	< 10
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	0.06	0.16	0.20	0.18
Calcium - Peroxide	0.02	% Ca	0.07	2.0	1.2	5.1
Acid Reacted Calcium	0.02	% Ca	< 0.02	1.8	0.96	5.0
acidity - Acid Reacted Calcium	10	mol H+/t	< 10	900	480	2500
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	< 0.02	1.4	0.76	4.0
Magnesium - KCl Extractable	0.02	% Mg	0.06	0.05	0.06	0.05
Magnesium - Peroxide	0.02	% Mg	0.09	0.14	0.13	0.13
Acid Reacted Magnesium	0.02	% Mg	0.04	0.09	0.07	0.08
acidity - Acid Reacted Magnesium	10	mol H+/t	29	75	60	67
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.05	0.12	0.10	0.11
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	0.32	4.8	1.7	13
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	64	960	350	2700
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	0.10	1.5	0.56	4.3
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	< 0.02	0.09	0.35	< 0.02

Client Sample ID			SED01_0.3-0.6	SED03_0.3_0.6	SED03_1	SED03_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33421	P20-Jn33424	P20-Jn33425	P20-Jn33426
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Feb 05, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	5.1	55	220	8.8
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO ₃ /t	< 1	4.1	16	1.0
Extraneous Material						
<2mm Fraction	0.005	g	50	64	42	24
>2mm Fraction	0.005	g	< 0.005	3.9	< 0.005	2.8
Analysed Material	0.1	%	100	94	100	89
Extraneous Material	0.1	%	< 0.1	5.7	< 0.1	11
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	3.5	14	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	46	190	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.07	0.30	< 0.02
pH-KCL	0.1	pH Units	8.3	9.4	9.2	9.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	0.074	0.30	0.010
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	46	190	6.4
Sulfur - KCl Extractable	0.02	% S	0.02	0.04	0.08	0.03
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	0.69	7.9	4.1	14
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	140	1600	810	2800
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.22	2.5	1.3	4.5
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
Heavy Metals						
Antimony	10	mg/kg	-	-	< 10	-
Arsenic	2	mg/kg	-	-	17	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	52	-
Copper	5	mg/kg	-	-	15	-
Lead	5	mg/kg	-	-	8.0	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	-	17	-
Selenium	2	mg/kg	-	-	< 2	-
Zinc	5	mg/kg	-	-	20	-

Client Sample ID			SED04_0.5	SED05_1-1.2	SED05_1.5	SED07_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33427	P20-Jn33428	P20-Jn33429	P20-Jn33430
Date Sampled			Feb 05, 2020	Feb 06, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
pH-KCL	0.1	pH Units	-	-	9.3	9.2
pH-OX	0.1	pH Units	-	-	9.0	8.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	-	-	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	-	-	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	-	-	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	-	-	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	-	-	0.05	0.05
Sulfur - Peroxide	0.02	% S	-	-	0.20	0.17
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	-	-	0.15	0.12
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	-	-	94	77
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	2.0
HCl Extractable Sulfur	0.02	% S	-	-	n/a	n/a
Net Acid soluble sulfur	0.02	% S	-	-	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	-	-	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	-	-	0.16	0.16
Calcium - Peroxide	0.02	% Ca	-	-	2.3	1.1
Acid Reacted Calcium	0.02	% Ca	-	-	2.1	0.91
acidity - Acid Reacted Calcium	10	mol H+/t	-	-	1100	460
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	-	-	1.7	0.73
Magnesium - KCl Extractable	0.02	% Mg	-	-	0.05	0.06
Magnesium - Peroxide	0.02	% Mg	-	-	0.10	0.11
Acid Reacted Magnesium	0.02	% Mg	-	-	0.05	0.05
acidity - Acid Reacted Magnesium	10	mol H+/t	-	-	44	41
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	-	-	0.07	0.07
Acid Neutralising Capacity (ANCE)	0.02	% CaCO ₃	-	-	5.9	2.4
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	-	-	1200	480
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	-	-	1.9	0.77
ANC Fineness Factor		factor	-	-	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO ₃ /t	-	-	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	-	-	0.15	0.12
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	-	-	94	77
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO ₃ /t	-	-	7.0	5.8
Extraneous Material						
<2mm Fraction	0.005	g	-	-	55	57
>2mm Fraction	0.005	g	-	-	9.8	1.6
Analysed Material	0.1	%	-	-	85	97
Extraneous Material	0.1	%	-	-	15	2.7
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	-	-	7.2	5.8
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	-	-	96	77
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.15	0.12
pH-KCL	0.1	pH Units	-	-	9.3	9.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	< 2

Client Sample ID			SED04_0.5	SED05_1-1.2	SED05_1.5	SED07_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33427	P20-Jn33428	P20-Jn33429	P20-Jn33430
Date Sampled			Feb 05, 2020	Feb 06, 2020	Feb 05, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	-	-	0.15	0.12
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	96	77
Sulfur - KCl Extractable	0.02	% S	-	-	0.05	0.05
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	2.0
HCl Extractable Sulfur	0.02	% S	-	-	n/a	n/a
Net Acid soluble sulfur	0.02	% S	-	-	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	-	-	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	7.3	4.5
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	1500	890
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	-	-	2.4	1.4
ANC Fineness Factor		factor	-	-	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	-	-	< 1	< 1
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	-	-
Arsenic	2	mg/kg	9.7	12	-	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	-
Chromium	5	mg/kg	40	41	-	-
Copper	5	mg/kg	13	12	-	-
Lead	5	mg/kg	6.1	6.2	-	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	-
Nickel	5	mg/kg	13	13	-	-
Selenium	2	mg/kg	< 2	< 2	-	-
Zinc	5	mg/kg	13	13	-	-

Client Sample ID			SED07_1	SED07_1.5	HA01_0.2	HA03_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33431	P20-Jn33432	P20-Jn33433	P20-Jn33434
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
pH-KCL	0.1	pH Units	9.3	9.3	9.5	9.5
pH-OX	0.1	pH Units	7.8	8.1	8.7	8.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.02	0.03	0.07	0.09
Sulfur - Peroxide	0.02	% S	0.03	0.06	0.24	0.28
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	< 0.02	0.17	0.19
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	< 10	110	120
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0

Client Sample ID			SED07_1	SED07_1.5	HA01_0.2	HA03_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33431	P20-Jn33432	P20-Jn33433	P20-Jn33434
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	0.15	0.16	0.19	0.21
Calcium - Peroxide	0.02	% Ca	2.7	1.7	3.6	5.3
Acid Reacted Calcium	0.02	% Ca	2.5	1.5	3.4	5.1
acidity - Acid Reacted Calcium	10	mol H+/t	1300	740	1700	2600
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	2.0	1.2	2.7	4.1
Magnesium - KCl Extractable	0.02	% Mg	0.04	0.04	0.06	0.07
Magnesium - Peroxide	0.02	% Mg	0.09	0.09	0.27	0.36
Acid Reacted Magnesium	0.02	% Mg	0.06	0.05	0.21	0.30
acidity - Acid Reacted Magnesium	10	mol H+/t	46	43	170	250
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.07	0.07	0.28	0.39
Acid Neutralising Capacity (ANCE)	0.02	% CaCO ₃	7.0	4.0	9.4	15
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	1400	800	1900	2900
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	2.2	1.3	3.0	4.7
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	< 0.02	< 0.02	0.17	0.19
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	< 2	< 2	100	120
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO ₃ /t	< 1	< 1	8.0	9.0
Extraneous Material						
<2mm Fraction	0.005	g	55	54	47	41
>2mm Fraction	0.005	g	6.6	7.6	< 0.005	0.61
Analysed Material	0.1	%	89	88	100	99
Extraneous Material	0.1	%	11	12	< 0.1	1.5
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	1.3	6.8	7.7
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	18	90	100
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.03	0.14	0.16
pH-KCL	0.1	pH Units	9.3	9.3	9.5	9.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.005	0.028	0.15	0.16
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.3	18	90	100
Sulfur - KCl Extractable	0.02	% S	0.02	0.03	0.07	0.09
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	7.1	4.6	13	19
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	1400	930	2600	3700
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	2.3	1.5	4.2	6.0
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5

Client Sample ID			SED07_1	SED07_1.5	HA01_0.2	HA03_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33431	P20-Jn33432	P20-Jn33433	P20-Jn33434
Date Sampled			Feb 06, 2020	Feb 05, 2020	Feb 05, 2020	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	-	-
Arsenic	2	mg/kg	9.7	11	-	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	-
Chromium	5	mg/kg	38	42	-	-
Copper	5	mg/kg	13	11	-	-
Lead	5	mg/kg	5.7	6.8	-	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	-
Nickel	5	mg/kg	13	16	-	-
Selenium	2	mg/kg	< 2	< 2	-	-
Zinc	5	mg/kg	20	17	-	-

Client Sample ID			HA05_0.2	HA06_0.5	HA08_0-1	SED02_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33435	P20-Jn33436	P20-Jn33437	P20-Jn33597
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Feb 06, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
pH-KCL	0.1	pH Units	9.5	9.5	9.5	8.9
pH-OX	0.1	pH Units	8.8	8.6	8.7	7.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.08	0.12	0.10	0.02
Sulfur - Peroxide	0.02	% S	0.24	0.35	0.24	0.03
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.15	0.23	0.14	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	94	150	89	< 10
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	0.20	0.23	0.21	0.11
Calcium - Peroxide	0.02	% Ca	5.4	6.5	5.0	0.11
Acid Reacted Calcium	0.02	% Ca	5.2	6.3	4.7	< 0.02
acidity - Acid Reacted Calcium	10	mol H+/t	2600	3200	2400	< 10
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	4.2	5.0	3.8	< 0.02
Magnesium - KCl Extractable	0.02	% Mg	0.06	0.08	0.07	0.05
Magnesium - Peroxide	0.02	% Mg	0.32	0.43	0.30	0.07
Acid Reacted Magnesium	0.02	% Mg	0.27	0.35	0.23	0.02
acidity - Acid Reacted Magnesium	10	mol H+/t	220	290	190	19
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.35	0.47	0.31	0.03

Client Sample ID			HA05_0.2	HA06_0.5	HA08_0-1	SED02_1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn33435	P20-Jn33436	P20-Jn33437	P20-Jn33597
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Feb 06, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
Acid Neutralising Capacity (ANCE)	0.02	% CaCO ₃	15	18	13	0.39
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	3100	3600	2600	79
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	4.9	5.8	4.2	0.13
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	0.15	0.23	0.14	< 0.02
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	94	150	89	< 2
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO ₃ /t	7.0	11	7.0	< 1
Extraneous Material						
<2mm Fraction	0.005	g	44	33	44	48
>2mm Fraction	0.005	g	1.4	0.44	0.85	< 0.005
Analysed Material	0.1	%	97	99	98	100
Extraneous Material	0.1	%	3.1	1.3	1.9	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	7.2	9.9	6.5	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	95	130	87	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.15	0.21	0.14	< 0.02
pH-KCL	0.1	pH Units	9.5	9.5	9.5	8.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.15	0.21	0.14	0.007
Chromium Reducible Sulfur -acidity units	3	mol H+/t	95	130	87	4.1
Sulfur - KCl Extractable	0.02	% S	0.08	0.12	0.10	0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	20	22	17	0.79
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	4100	4400	3500	160
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	6.5	7.0	5.5	0.25
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
Heavy Metals						
Antimony	10	mg/kg	-	-	-	< 10
Arsenic	2	mg/kg	-	-	-	12
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	45
Copper	5	mg/kg	-	-	-	14
Lead	5	mg/kg	-	-	-	6.7
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	15
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	14

Client Sample ID			SED02_1.5	SED04_2-2.2	SED06_0.5-0.7	SED09_0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn51268	P20-Jn51269	P20-Jn51270	P20-Jn51271
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
SPOCAS Suite (Minus ANC- WA)						
pH-KCL	0.1	pH Units	9.2	9.2	9.3	9.4
pH-OX	0.1	pH Units	8.1	8.2	8.4	8.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.02	0.02	0.04	0.07
Sulfur - Peroxide	0.02	% S	0.02	0.02	0.12	0.22
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	< 0.02	0.08	0.16
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	< 10	51	97
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	0.16	0.16	0.15	0.18
Calcium - Peroxide	0.02	% Ca	4.3	4.8	5.1	5.6
Acid Reacted Calcium	0.02	% Ca	4.1	4.6	5.0	5.4
acidity - Acid Reacted Calcium	10	mol H+/t	2100	2300	2500	2700
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	3.3	3.7	4.0	4.3
Magnesium - KCl Extractable	0.02	% Mg	0.04	0.04	0.05	0.06
Magnesium - Peroxide	0.02	% Mg	0.13	0.11	0.09	0.29
Acid Reacted Magnesium	0.02	% Mg	0.08	0.07	0.05	0.23
acidity - Acid Reacted Magnesium	10	mol H+/t	69	55	38	190
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.11	0.09	0.06	0.31
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	11	11	1.7	13
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	2200	2300	330	2600
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	3.6	3.6	0.53	4.2
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	< 0.02	< 0.02	0.08	0.15
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	< 2	< 2	51	97
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO3/t	< 1	< 1	3.8	7.3
Extraneous Material						
<2mm Fraction	0.005	g	84	70	65	84
>2mm Fraction	0.005	g	2.6	2.1	< 0.005	10.0
Analysed Material	0.1	%	97	97	100	89
Extraneous Material	0.1	%	3.0	2.9	< 0.1	11
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	4.0	7.9
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	54	110
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	0.09	0.17
pH-KCL	0.1	pH Units	9.2	9.2	9.3	9.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2

Client Sample ID			SED02_1.5	SED04_2-2.2	SED06_0.5-0.7	SED09_0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-Jn51268	P20-Jn51269	P20-Jn51270	P20-Jn51271
Date Sampled			Feb 06, 2020	Feb 06, 2020	Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	0.086	0.17
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	54	110
Sulfur - KCl Extractable	0.02	% S	0.02	0.02	0.04	0.07
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	11	11	3.0	16
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2200	2300	590	3200
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	3.6	3.6	0.94	5.2
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	< 10
Arsenic	2	mg/kg	11	9.9	9.2	15
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	5	mg/kg	50	50	44	37
Copper	5	mg/kg	17	22	13	10
Lead	5	mg/kg	7.2	7.2	5.9	5.4
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	19	19	13	12
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	24	24	18	23

Client Sample ID			SED11_0-0.3	SED02_0
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Jn51272	P20-Jn51273
Date Sampled			Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit		
SPOCAS Suite (Minus ANC- WA)				
pH-KCL	0.1	pH Units	9.4	9.3
pH-OX	0.1	pH Units	8.6	7.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	0.07	0.10
Sulfur - Peroxide	0.02	% S	0.23	0.45
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.16	0.35
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	100	220
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0

Client Sample ID			SED11_0-0.3	SED02_0
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Jn51272	P20-Jn51273
Date Sampled			Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit		
SPOCAS Suite (Minus ANC- WA)				
HCl Extractable Sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a
Calcium - KCl Extractable	0.02	% Ca	0.17	0.19
Calcium - Peroxide	0.02	% Ca	6.2	5.7
Acid Reacted Calcium	0.02	% Ca	6.0	5.5
acidity - Acid Reacted Calcium	10	mol H+/t	3000	2800
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	4.8	4.4
Magnesium - KCl Extractable	0.02	% Mg	0.07	0.06
Magnesium - Peroxide	0.02	% Mg	0.30	0.29
Acid Reacted Magnesium	0.02	% Mg	0.23	0.23
acidity - Acid Reacted Magnesium	10	mol H+/t	190	190
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.31	0.30
Acid Neutralising Capacity (ANCE)	0.02	% CaCO ₃	13	13
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	2600	2500
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	4.2	4.1
ANC Fineness Factor		factor	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO ₃ /t	< 1	< 1
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	0.02	% S	0.16	0.35
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	2	mol H+/t	100	220
SPOCAS WA (- ANC) - Liming rate	1	kg CaCO ₃ /t	7.7	16
Extraneous Material				
<2mm Fraction	0.005	g	56	52
>2mm Fraction	0.005	g	8.2	16
Analysed Material	0.1	%	87	77
Extraneous Material	0.1	%	13	23
Chromium Suite (Minus ANC- WA)				
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	7.8	17
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	100	220
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.17	0.36
pH-KCL	0.1	pH Units	9.4	9.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.17	0.36
Chromium Reducible Sulfur -acidity units	3	mol H+/t	100	220
Sulfur - KCl Extractable	0.02	% S	0.07	0.10
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	17	17
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	3400	3300
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	5.4	5.4
ANC Fineness Factor		factor	1.5	1.5

Client Sample ID			SED11_0-0.3	SED02_0
Sample Matrix			Soil	Soil
Eurofins Sample No.			P20-Jn51272	P20-Jn51273
Date Sampled			Feb 06, 2020	Feb 06, 2020
Test/Reference	LOR	Unit		
Chromium Suite (Minus ANC- WA)				
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1
Heavy Metals				
Antimony	10	mg/kg	< 10	< 10
Arsenic	2	mg/kg	15	14
Cadmium	0.5	mg/kg	< 0.5	< 0.5
Chromium	5	mg/kg	39	37
Copper	5	mg/kg	10	8.7
Lead	5	mg/kg	5.6	< 5
Mercury	0.1	mg/kg	< 0.1	< 0.1
Nickel	5	mg/kg	13	12
Selenium	2	mg/kg	< 2	< 2
Zinc	5	mg/kg	25	23

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
SPOCAS Suite (Minus ANC- WA)			
SPOCAS Suite (Minus ANC- WA)	Brisbane	Jul 02, 2020	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Jul 08, 2020	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Jul 08, 2020	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Heavy Metals	Brisbane	Jul 02, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Metals M8	Brisbane	Jul 02, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS			
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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NATA # 1261 Site # 20794

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IANZ # 1290

Company Name:	GHD Pty Ltd WA	Order No.:		Received:	Jun 29, 2020 12:39 PM
Address:	999 Hay Street Perth Perth WA 6004	Report #:	726720	Due:	Jul 6, 2020
Project Name:	K + S	Phone:	08 6222 8222	Priority:	5 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony	CANCELLED	Selenium	Selenium	Metals M8	Metals M8	SPOCAS Suite (Minus ANC- WA)	Chromium Suite (Minus ANC- WA)
Melbourne Laboratory - NATA Site # 1254 & 14271														
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794						X			X		X		X	X
Perth Laboratory - NATA Site # 23736							X	X		X		X		
External Laboratory														
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID									
1	SED01_0.3-0.6	Feb 06, 2020		Soil	P20-Jn33421								X	X
2	SED02_0.0-0.3	Feb 06, 2020		Soil	P20-Jn33422			X						
3	SED03_0	Feb 06, 2020		Soil	P20-Jn33423			X						
4	SED03_0.3_0.6	Feb 05, 2020		Soil	P20-Jn33424								X	X
5	SED03_1	Feb 05, 2020		Soil	P20-Jn33425		X		X		X	X	X	X
6	SED03_1.5	Feb 05, 2020		Soil	P20-Jn33426								X	X
7	SED04_0.5	Feb 05, 2020		Soil	P20-Jn33427		X		X		X			
8	SED05_1-1.2	Feb 06, 2020		Soil	P20-Jn33428		X		X		X			

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S
Project ID: 12516706

Order No.:
Report #: 726720
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jun 29, 2020 12:39 PM
Due: Jul 6, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Antimony	Antimony	CANCELLED	Selenium	Selenium	Metals M8	Metals M8	SPOCAS Suite (Minus ANC- WA)	Chromium Suite (Minus ANC- WA)
Melbourne Laboratory - NATA Site # 1254 & 14271														
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794						X			X		X		X	X
Perth Laboratory - NATA Site # 23736							X	X		X		X		
9	SED05_1.5	Feb 05, 2020		Soil	P20-Jn33429								X	X
10	SED07_0.5	Feb 06, 2020		Soil	P20-Jn33430								X	X
11	SED07_1	Feb 06, 2020		Soil	P20-Jn33431		X		X		X	X	X	X
12	SED07_1.5	Feb 05, 2020		Soil	P20-Jn33432		X		X		X	X	X	X
13	HA01_0.2	Feb 05, 2020		Soil	P20-Jn33433								X	X
14	HA03_0.2	Not Provided		Soil	P20-Jn33434								X	X
15	HA05_0.2	Not Provided		Soil	P20-Jn33435								X	X
16	HA06_0.5	Not Provided		Soil	P20-Jn33436								X	X
17	HA08_0-1	Not Provided		Soil	P20-Jn33437								X	X
18	SED02_1	Feb 06, 2020		Soil	P20-Jn33597		X		X		X	X	X	X
19	SED01_0	Feb 06, 2020		Soil	P20-Jn39489			X						
20	SED01_1	Feb 06, 2020		Soil	P20-Jn39490			X						
21	SED01_1.5	Feb 06, 2020		Soil	P20-Jn39491			X						

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
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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
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Site # 23736

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Melbourne Laboratory - NATA Site # 1254 & 14271														
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794						X			X		X		X	X
Perth Laboratory - NATA Site # 23736							X	X		X		X		
22	SED05_0.5	Feb 06, 2020		Soil	P20-Jn39492			X						
23	SED05_2.4	Feb 06, 2020		Soil	P20-Jn39493			X						
24	SED09_0.5	Feb 06, 2020		Soil	P20-Jn39494			X						
25	SED11_0.5	Feb 06, 2020		Soil	P20-Jn39495			X						
26	SED11_1	Feb 06, 2020		Soil	P20-Jn39496			X						
27	FD2_200206	Feb 06, 2020		Soil	P20-Jn39497			X						
28	SED02_1.5	Feb 06, 2020		Soil	P20-Jn51268	X			X	X		X	X	
29	SED04_2-2.2	Feb 06, 2020		Soil	P20-Jn51269	X			X	X		X	X	
30	SED06_0.5-0.7	Feb 06, 2020		Soil	P20-Jn51270	x			X	X		X	X	
31	SED09_0.3	Feb 06, 2020		Soil	P20-Jn51271	X			X	X		X	X	
32	SED11_0-0.3	Feb 06, 2020		Soil	P20-Jn51272	X			X	X		X	X	
33	SED02_0	Feb 06, 2020		Soil	P20-Jn51273	X			X	X		X	X	

Australia

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6 Monterey Road
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Sample Detail	Antimony	Antimony	CANCELLED	Selenium	Selenium	Metals M8	Metals M8	SPOCAS Suite (Minus ANC- WA)	Chromium Suite (Minus ANC- WA)
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794	X			X		X		X	X
Perth Laboratory - NATA Site # 23736		X	X		X		X		
Test Counts	12	12	11	12	12	12	12	20	20

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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
Method Blank								
Heavy Metals								
Antimony			mg/kg	< 10		10	Pass	
Arsenic			mg/kg	< 2		2	Pass	
Cadmium			mg/kg	< 0.4		0.5	Pass	
Chromium			mg/kg	< 5		5	Pass	
Copper			mg/kg	< 5		5	Pass	
Lead			mg/kg	< 5		5	Pass	
Mercury			mg/kg	< 0.1		0.1	Pass	
Nickel			mg/kg	< 5		5	Pass	
Selenium			mg/kg	< 2		2	Pass	
Zinc			mg/kg	< 5		5	Pass	
LCS - % Recovery								
SPOCAS Suite (Minus ANC- WA)								
pH-KCL			%	100		80-120	Pass	
Acid trail - Titratable Actual Acidity			%	97		80-120	Pass	
LCS - % Recovery								
Chromium Suite (Minus ANC- WA)								
pH-KCL			%	98		80-120	Pass	
Acid trail - Titratable Actual Acidity			%	95		80-120	Pass	
Chromium Reducible Sulfur			%	100		80-120	Pass	
Acid Neutralising Capacity (ANCbt)			%	98		80-120	Pass	
LCS - % Recovery								
Heavy Metals								
Antimony			%	94		80-120	Pass	
Arsenic			%	92		80-120	Pass	
Cadmium			%	99		80-120	Pass	
Chromium			%	99		80-120	Pass	
Copper			%	99		80-120	Pass	
Lead			%	99		80-120	Pass	
Mercury			%	115		70-130	Pass	
Nickel			%	100		80-120	Pass	
Selenium			%	95		80-120	Pass	
Zinc			%	102		80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Heavy Metals								
Antimony	P20-Jn33425	CP	%	96		75-125	Pass	
Arsenic	P20-Jn33425	CP	%	121		75-125	Pass	
Cadmium	P20-Jn33425	CP	%	100		75-125	Pass	
Chromium	P20-Jn33425	CP	%	98		75-125	Pass	
Copper	P20-Jn33425	CP	%	92		75-125	Pass	
Lead	P20-Jn33425	CP	%	106		75-125	Pass	
Mercury	P20-Jn33425	CP	%	118		70-130	Pass	
Nickel	P20-Jn33425	CP	%	92		75-125	Pass	
Selenium	P20-Jn33425	CP	%	97		75-125	Pass	
Zinc	P20-Jn33425	CP	%	95		75-125	Pass	
Spike - % Recovery								
Heavy Metals								
Antimony	P20-Jn51269	CP	%	89		75-125	Pass	
Arsenic	P20-Jn51269	CP	%	87		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	P20-Jn51269	CP	%	94			75-125	Pass	
Chromium	P20-Jn51269	CP	%	98			75-125	Pass	
Copper	P20-Jn51269	CP	%	99			75-125	Pass	
Lead	P20-Jn51269	CP	%	93			75-125	Pass	
Mercury	P20-Jn51269	CP	%	96			70-130	Pass	
Nickel	P20-Jn51269	CP	%	98			75-125	Pass	
Selenium	P20-Jn51269	CP	%	93			75-125	Pass	
Zinc	P20-Jn51269	CP	%	96			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
SPOCAS Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
pH-KCL	P20-Jn33421	CP	pH Units	8.3	8.3	<1	30%	Pass	
pH-OX	P20-Jn33421	CP	pH Units	7.3	7.4	1.0	30%	Pass	
Acid trail - Titratable Actual Acidity	P20-Jn33421	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Peroxide Acidity	P20-Jn33421	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	P20-Jn33421	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P20-Jn33421	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	P20-Jn33421	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	P20-Jn33421	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Sulfur - KCl Extractable	P20-Jn33421	CP	% S	0.02	0.02	1.0	30%	Pass	
Sulfur - Peroxide	P20-Jn33421	CP	% S	0.03	0.03	2.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	P20-Jn33421	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acid soluble sulfur	P20-Jn33421	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P20-Jn33421	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P20-Jn33421	CP	% S	n/a	n/a	n/a	30%	Pass	
Calcium - KCl Extractable	P20-Jn33421	CP	% Ca	0.06	0.05	5.0	30%	Pass	
Calcium - Peroxide	P20-Jn33421	CP	% Ca	0.07	0.07	1.0	30%	Pass	
Acid Reacted Calcium	P20-Jn33421	CP	% Ca	< 0.02	< 0.02	<1	30%	Pass	
acidity - Acid Reacted Calcium	P20-Jn33421	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Magnesium - KCl Extractable	P20-Jn33421	CP	% Mg	0.06	0.06	2.0	30%	Pass	
Magnesium - Peroxide	P20-Jn33421	CP	% Mg	0.09	0.09	1.0	30%	Pass	
Acid Reacted Magnesium	P20-Jn33421	CP	% Mg	0.04	0.04	6.0	30%	Pass	
acidity - Acid Reacted Magnesium	P20-Jn33421	CP	mol H+/t	29	31	6.0	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Jn33421	CP	% S	0.05	0.05	6.0	30%	Pass	
Acid Neutralising Capacity (ANCE)	P20-Jn33421	CP	% CaCO3	0.32	0.28	15	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Jn33421	CP	mol H+/t	64	55	15	30%	Pass	
ANC Fineness Factor	P20-Jn33421	CP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	P20-Jn33421	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	P20-Jn33421	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Jn33421	CP	mol H+/t	5.1	4.9	4.0	30%	Pass	
SPOCAS WA (- ANC) - Liming rate	P20-Jn33421	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-Jn33421	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Jn33421	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass
Chromium Reducible Sulfur	P20-Jn33421	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-Jn33421	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-Jn33421	CP	% CaCO3	0.69	0.60	13	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Jn33421	CP	% S	0.22	0.19	13	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-Jn33421	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-Jn33421	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-Jn33421	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
SPOCAS Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
pH-KCL	P20-Jn33431	CP	pH Units	9.3	9.3	<1	30%	Pass
pH-OX	P20-Jn33431	CP	pH Units	7.8	7.9	1.0	30%	Pass
Acid trail - Titratable Actual Acidity	P20-Jn33431	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Acid trail - Titratable Peroxide Acidity	P20-Jn33431	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Acid trail - Titratable Sulfidic Acidity	P20-Jn33431	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-Jn33431	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
sulfidic - TPA equiv. S% pyrite	P20-Jn33431	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass
sulfidic - TSA equiv. S% pyrite	P20-Jn33431	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass
Sulfur - KCl Extractable	P20-Jn33431	CP	% S	0.02	0.02	6.0	30%	Pass
Sulfur - Peroxide	P20-Jn33431	CP	% S	0.03	0.03	2.0	30%	Pass
Sulfur - Peroxide Oxidisable Sulfur	P20-Jn33431	CP	% S	< 0.02	< 0.02	<1	30%	Pass
acidity - Peroxide Oxidisable Sulfur	P20-Jn33431	CP	mol H+/t	< 10	< 10	<1	30%	Pass
Calcium - KCl Extractable	P20-Jn33431	CP	% Ca	0.15	0.15	4.0	30%	Pass
Calcium - Peroxide	P20-Jn33431	CP	% Ca	2.7	2.7	<1	30%	Pass
Acid Reacted Calcium	P20-Jn33431	CP	% Ca	2.5	2.5	<1	30%	Pass
acidity - Acid Reacted Calcium	P20-Jn33431	CP	mol H+/t	1300	1300	<1	30%	Pass
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Jn33431	CP	% S	2.0	2.0	<1	30%	Pass
Magnesium - KCl Extractable	P20-Jn33431	CP	% Mg	0.04	0.04	4.0	30%	Pass
Magnesium - Peroxide	P20-Jn33431	CP	% Mg	0.09	0.09	1.0	30%	Pass
Acid Reacted Magnesium	P20-Jn33431	CP	% Mg	0.06	0.06	5.0	30%	Pass
acidity - Acid Reacted Magnesium	P20-Jn33431	CP	mol H+/t	46	48	5.0	30%	Pass
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Jn33431	CP	% S	0.07	0.08	5.0	30%	Pass
Acid Neutralising Capacity (ANCE)	P20-Jn33431	CP	% CaCO3	7.0	6.9	2.0	30%	Pass
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Jn33431	CP	mol H+/t	1400	1400	2.0	30%	Pass
ANC Fineness Factor	P20-Jn33431	CP	factor	1.5	1.5	<1	30%	Pass
SPOCAS - Net Acidity (Sulfur Units)	P20-Jn33431	CP	% S	< 0.02	< 0.02	<1	30%	Pass
SPOCAS - Net Acidity (Acidity Units)	P20-Jn33431	CP	mol H+/t	< 10	< 10	<1	30%	Pass
SPOCAS - Liming rate	P20-Jn33431	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Jn33431	CP	% S	< 0.02	< 0.02	<1	30%	Pass
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Jn33431	CP	mol H+/t	< 2	< 2	<1	30%	Pass
SPOCAS WA (- ANC) - Liming rate	P20-Jn33431	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-Jn33431	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Jn33431	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Jn33431	CP	% S	< 0.02	< 0.02	<1	30%	Pass
Chromium Reducible Sulfur	P20-Jn33431	CP	% S	0.005	0.005	<1	30%	Pass
Chromium Reducible Sulfur - acidity units	P20-Jn33431	CP	mol H+/t	3.3	3.3	<1	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-Jn33431	CP	% CaCO3	7.1	7.1	1.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Jn33431	CP	% S	2.3	2.3	1.0	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-Jn33431	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-Jn33431	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-Jn33431	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
SPOCAS Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
pH-KCL	P20-Jn33437	CP	pH Units	9.5	9.5	<1	30%	Pass
pH-OX	P20-Jn33437	CP	pH Units	8.7	8.7	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-Jn33437	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Acid trail - Titratable Peroxide Acidity	P20-Jn33437	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Acid trail - Titratable Sulfidic Acidity	P20-Jn33437	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-Jn33437	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
sulfidic - TPA equiv. S% pyrite	P20-Jn33437	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass
sulfidic - TSA equiv. S% pyrite	P20-Jn33437	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass
Sulfur - KCl Extractable	P20-Jn33437	CP	% S	0.10	0.10	1.0	30%	Pass
Sulfur - Peroxide	P20-Jn33437	CP	% S	0.24	0.24	1.0	30%	Pass
Sulfur - Peroxide Oxidisable Sulfur	P20-Jn33437	CP	% S	0.14	0.14	<1	30%	Pass
acidity - Peroxide Oxidisable Sulfur	P20-Jn33437	CP	mol H+/t	89	89	<1	30%	Pass
Calcium - KCl Extractable	P20-Jn33437	CP	% Ca	0.21	0.21	2.0	30%	Pass
Calcium - Peroxide	P20-Jn33437	CP	% Ca	5.0	4.9	1.0	30%	Pass
Acid Reacted Calcium	P20-Jn33437	CP	% Ca	4.7	4.7	1.0	30%	Pass
acidity - Acid Reacted Calcium	P20-Jn33437	CP	mol H+/t	2400	2300	1.0	30%	Pass
sulfidic - Acid Reacted Ca equiv. S% pyrite	P20-Jn33437	CP	% S	3.8	3.8	1.0	30%	Pass
Magnesium - KCl Extractable	P20-Jn33437	CP	% Mg	0.07	0.06	2.0	30%	Pass
Magnesium - Peroxide	P20-Jn33437	CP	% Mg	0.30	0.30	1.0	30%	Pass
Acid Reacted Magnesium	P20-Jn33437	CP	% Mg	0.23	0.23	<1	30%	Pass
acidity - Acid Reacted Magnesium	P20-Jn33437	CP	mol H+/t	190	190	<1	30%	Pass
sulfidic - Acid Reacted Mg equiv. S% pyrite	P20-Jn33437	CP	% S	0.31	0.31	<1	30%	Pass
Acid Neutralising Capacity (ANCE)	P20-Jn33437	CP	% CaCO3	13	13	<1	30%	Pass
Acid Neutralising Capacity - Acidity units (a-ANCE)	P20-Jn33437	CP	mol H+/t	2600	2600	<1	30%	Pass
ANC Fineness Factor	P20-Jn33437	CP	factor	1.5	1.5	<1	30%	Pass
SPOCAS - Liming rate	P20-Jn33437	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
SPOCAS WA (- ANC) - Net Acidity (S% pyrite units)	P20-Jn33437	CP	% S	0.14	0.14	<1	30%	Pass
SPOCAS WA (- ANC) - Net Acidity (Acidity Units)	P20-Jn33437	CP	mol H+/t	89	89	<1	30%	Pass
SPOCAS WA (- ANC) - Liming rate	P20-Jn33437	CP	kg CaCO3/t	7.0	7.0	<1	30%	Pass

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-Jn33437	CP	kg CaCO ₃ /t	6.5	7.2	10	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-Jn33437	CP	mol H ⁺ /t	87	96	10	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-Jn33437	CP	% S	0.14	0.15	10	30%	Pass
Chromium Reducible Sulfur	P20-Jn33437	CP	% S	0.14	0.15	10	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-Jn33437	CP	mol H ⁺ /t	87	96	10	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-Jn33437	CP	% CaCO ₃	17	17	1.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Jn33437	CP	% S	5.5	5.6	1.0	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-Jn33437	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-Jn33437	CP	mol H ⁺ /t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-Jn33437	CP	kg CaCO ₃ /t	< 1	< 1	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony	P20-Jn51268	CP	mg/kg	< 10	< 10	<1	30%	Pass
Arsenic	P20-Jn51268	CP	mg/kg	11	11	<1	30%	Pass
Chromium	P20-Jn51268	CP	mg/kg	50	52	4.0	30%	Pass
Copper	P20-Jn51268	CP	mg/kg	17	18	6.0	30%	Pass
Lead	P20-Jn51268	CP	mg/kg	7.2	7.4	3.0	30%	Pass
Nickel	P20-Jn51268	CP	mg/kg	19	19	2.0	30%	Pass
Selenium	P20-Jn51268	CP	mg/kg	< 2	< 2	<1	30%	Pass
Zinc	P20-Jn51268	CP	mg/kg	24	23	3.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Cadmium	B20-JI15782	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Mercury	B20-JI15782	NCP	mg/kg	< 0.1	< 0.1	<1	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	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins Environment Testing is not able to determine whether analysis has been performed within recommended holding times.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO ₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m ³ in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m ³ '
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl is greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Robert Johnston	Analytical Services Manager
Elden Garrett	Senior Analyst-Metal (WA)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Steven Trout	Senior Analyst-Metal (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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#AU06_EnviroSampleWA

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Saturday, 27 June 2020 11:23 AM
To: #AU06_EnviroSampleWA; Rhys Thomas
Cc: Matthew Deaves
Subject: 12516706 Material Characterisation Schedule
Attachments: 12516706_Material characterisation analysis 25.06.2020.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Carlynn Gibson
Eurofins #730742

Rhys/Matt

Material schedule attached.

Apart from the pH rebatching we should be complete now. Il hoping to have the last of it next week.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

Proudly employee owned

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Please consider our environment before printing this email

Please note, the majority of our team members are working remotely but available at any time should you want to get in contact. GHD's commitment to delivering for our clients remains strong, and we understand that through these uncertain times our clients need our support more than ever. We look forward to continuing our work, together.

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**CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST**



GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project No. (as set up in ESdat) 12516706	Site Name (as set up in ESdat) K+S Salt	Laboratory: Eurofins I mgt
		Address: 2/91 Leach Hwy, Kewdale 6105
		Laboratory Contact: Sample Receipt

Laboratory Quote No.		Turnaround Time Standard (5 days)		Sample Matrix <small>S-Soil/ SL- Sludge/ W-Water/ A-Air</small>	Container				Analyses										Remarks							
Job Manager (Invoice) & GHD accounts Paul.Baker@ghd.com AP-FSS@ghd.com		Email Address (Results) louise.cockerton@ghd.com			Type <small>B-Bottle/Jar/V- Vial/Bag/G-Glass/P-Plastic</small>	Preservative <small>Unpreserved/ HCl/ H2SO4/HNO3/Other</small>	No	Material characterisation suite	Fibrous material: Silicate XRD																	
GHD Sample ID	Previous Lab Work	Date	Time																							
AJ03_1.0	698189	15-Jan-20		S	Bag/Jar	Un-Pre	1	X	X																	
BH01_1.0				S	Bag/Jar	Un-Pre	1	X	X																	
BH01_6.5				S	Bag/Jar	Un-Pre	1	X	X																	
BH03_3.0-3.4	698298	23-Jan-20		S	2 xGJ	Un-Pre	1	X	X																	
BW03_11.45-11.75	696731			S	2 x GJ	Un-Pre	1	X	X																	
BH07_0.75				S	Bag/Jar	Un-Pre	1	X	X																	
BH07_1.75				S	Bag/Jar	Un-Pre	1	X	X																	
BH10_4.1-5.0				S	Bag/Jar	Un-Pre	1	X	X																	
BH11_1.0-1.5		17-Mar-20		S	Bag/Jar	Un-Pre	1	X	X																	
BH12_2.25				S	Bag/Jar	Un-Pre	1	X																		
BH14_1.0-1.5				S	Bag/Jar	Un-Pre	1	X																		
BH14_5.0-5.5				S	Bag/Jar	Un-Pre	1	X																		
BH14_8.0-8.5				S	Bag/Jar	Un-Pre	1	X																		
BH02_11.45-11.75	698298			S	2 x GJ	Un-Pre	1	X																		
BH05_0.6	698298			S	2 x GJ	Un-Pre	1	X	X																	

Sampled by:	Date/Time:	Relinquished by:	Date/Time:
Requested by:	Date/Time:	Relinquished by:	Date/Time:

Caitlyn Gibson of Eurofins #730742

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ABN – 50 005 085 521

e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K + S SALT
Project ID: 12516706
COC number: Not provided
Turn around time: 10 Day
Date/Time received: Jun 27, 2020 11:23 AM
Eurofins reference: **730742**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
 999 Hay Street Perth
 Perth
 WA 6004

Attention: **Louise Cockerton**

Report **730742-S**
 Project name **K + S SALT**
 Project ID **12516706**
 Received Date **Jun 27, 2020**

Client Sample ID			BH01_1.0	BH01_6.5	BH07_0.75	BH07_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI16055	P20-JI16056	P20-JI16057	P20-JI16058
Date Sampled			Mar 24, 2020	Mar 24, 2020	Mar 11, 2020	Mar 11, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	4000	2100	6200	9300
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	8.4	8.6	8.8	9.0
Total Soluble Salts*		mg/kg	3100	1600	510	7300
Exchangeable Sodium Percentage (ESP)	0.1	%	0.9	3.2	1.6	1.2
% Moisture	1	%	17	11	21	18
XRD Analysis						
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	40	20	32	31
Net Acid Production Potential (by CRS)						
Acid Neutralising Capacity (as CaCO ₃)*	0.1	% CaCO ₃	5.9	1.6	53	49
Acid Neutralising Capacity (as H ₂ SO ₄ /t)*	0.5	kgH ₂ SO ₄ /t	58	16	520	480
Acid Production Potential (by CRS)	0.15	kgH ₂ SO ₄ /t	< 0.15	< 0.15	< 0.15	< 0.15
Chromium Reducible Sulfur ^{SO4}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Net Acid Production Potential (NAPP) by CRS*	0.1	kgH ₂ SO ₄ /t	(-)58.0074	(-)16.0845	(-)521.7809	(-)476.3163
Net Acid Generation						
Net Acid Generation: NAG (initial to pH 4.5)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
pH After Oxidation (pH NAG)*	0.1	pH Units	10	7.5	11	11

Client Sample ID			BH10_4.1_5.0	BH11_1.0_1.5	BH14_1.0_1.5	BH14_5.0_5.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI16059	P20-JI16060	P20-JI16061	P20-JI16062
Date Sampled			Mar 11, 2020	Mar 17, 2020	Mar 17, 2020	Mar 17, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	16000	12000	11000	13000
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	8.5	8.7	8.3	8.3
Total Soluble Salts*		mg/kg	13000	9100	8100	10000
Exchangeable Sodium Percentage (ESP)	0.1	%	5.6	4.8	16	28
% Moisture	1	%	25	14	11	18
XRD Analysis					-	-
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	21	36	7.4	16

Client Sample ID			BH10_4.1_5.0	BH11_1.0_1.5	BH14_1.0_1.5	BH14_5.0_5.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI16059	P20-JI16060	P20-JI16061	P20-JI16062
Date Sampled			Mar 11, 2020	Mar 17, 2020	Mar 17, 2020	Mar 17, 2020
Test/Reference	LOR	Unit				
Net Acid Production Potential (by CRS)						
Acid Neutralising Capacity (as CaCO ₃)*	0.1	% CaCO ₃	1.1	16	5.1	1.1
Acid Neutralising Capacity (as H ₂ SO ₄ /t)*	0.5	kgH ₂ SO ₄ /t	11	160	50	11
Acid Production Potential (by CRS)	0.15	kgH ₂ SO ₄ /t	< 0.15	< 0.15	< 0.15	< 0.15
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Net Acid Production Potential (NAPP) by CRS*	0.1	kgH ₂ SO ₄ /t	(-)10.9395	(-)160.1326	(-)49.5164	(-)11.0772
Net Acid Generation						
Net Acid Generation: NAG (initial to pH 4.5)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
pH After Oxidation (pH NAG)*	0.1	pH Units	8.3	8.8	9.1	7.2

Client Sample ID			BH14_8.0_8.5	AU03_0.75	BH03_3.4	BH10_4.1_5.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI16063	P20-JI19020	P20-JI19021	P20-JI19022
Date Sampled			Mar 17, 2020	Jan 15, 2020	Jan 23, 2020	Jan 15, 2020
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	12000	12000	-	17000
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	8.3	8.4	-	8.1
Total Soluble Salts*		mg/kg	9300	10000	-	15000
Exchangeable Sodium Percentage (ESP)	0.1	%	22	0.4	-	7.6
% Moisture	1	%	16	22	-	25
XRD Analysis			-			
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	24	210	-	17
Net Acid Production Potential (by CRS)						
Acid Neutralising Capacity (as CaCO ₃)*	0.1	% CaCO ₃	3.0	2.8	5.8	1.1
Acid Neutralising Capacity (as H ₂ SO ₄ /t)*	0.5	kgH ₂ SO ₄ /t	29	27	57	11
Acid Production Potential (by CRS)	0.15	kgH ₂ SO ₄ /t	< 0.15	< 0.15	0.71	< 0.15
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	0.023	< 0.005
Net Acid Production Potential (NAPP) by CRS*	0.1	kgH ₂ SO ₄ /t	(-)28.9825	(-)27.3353	(-)55.8181	(-)10.9702
Net Acid Generation						
Net Acid Generation: NAG (initial to pH 4.5)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	0.1	kgH ₂ SO ₄ /t	< 0.1	< 0.1	< 0.1	< 0.1
pH After Oxidation (pH NAG)*	0.1	pH Units	9.2	8.3	11	8.7

Client Sample ID			BH05_0.6
Sample Matrix			Soil
Eurofins Sample No.			P20-JI19023
Date Sampled			Jan 15, 2020
Test/Reference	LOR	Unit	
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	9600
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	9.0
Total Soluble Salts*		mg/kg	7000
Exchangeable Sodium Percentage (ESP)	0.1	%	1.6
% Moisture	1	%	12
XRD Analysis			

Client Sample ID			BH05_0.6
Sample Matrix			Soil
Eurofins Sample No.			P20-JI19023
Date Sampled			Jan 15, 2020
Test/Reference	LOR	Unit	
Cation Exchange Capacity			
Cation Exchange Capacity	0.05	meq/100g	29
Net Acid Production Potential (by CRS)			
Acid Neutralising Capacity (as CaCO ₃)*	0.1	% CaCO ₃	42
Acid Neutralising Capacity (as H ₂ SO ₄ /t)*	0.5	kgH ₂ SO ₄ /t	410
Acid Production Potential (by CRS)	0.15	kgH ₂ SO ₄ /t	0.18
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.006
Net Acid Production Potential (NAPP) by CRS*	0.1	kgH ₂ SO ₄ /t	(-)413.0621
Net Acid Generation			
Net Acid Generation: NAG (initial to pH 4.5)*	0.1	kgH ₂ SO ₄ /t	< 0.1
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	0.1	kgH ₂ SO ₄ /t	< 0.1
pH After Oxidation (pH NAG)*	0.1	pH Units	11

DRAFT

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
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Melbourne	Jul 14, 2020	7 Days
Cation Exchange Capacity - Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage	Melbourne	Jul 15, 2020	180 Days
pH (1:5 Aqueous extract at 25°C as rec.) - Method: LTM-GEN-7090 pH in soil by ISE	Melbourne	Jul 14, 2020	7 Days
Total Soluble Salts* - Method:	Perth	Jul 16, 2020	0 Day
Exchangeable Sodium Percentage (ESP) - Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)	Melbourne	Jul 15, 2020	28 Days
Net Acid Production Potential (by CRS) Acid Neutralising Capacity (as CaCO ₃)* - Method: Net Acid Production Potential (by CRS)	Brisbane	Jul 14, 2020	6 Week
Acid Production Potential (by CRS) - Method: Net Acid Production Potential (by CRS)	Brisbane	Jul 14, 2020	6 Week
Chromium Reducible Sulfur - Method: Net Acid Production Potential (by CRS)	Brisbane	Jul 14, 2020	0 Days
Net Acid Generation - Method: Miller S.D (1998)	Brisbane	Jul 14, 2020	6 Week
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Jul 10, 2020	14 Days

L
E
A
R
D

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S SALT
Project ID: 12516706

Order No.:
Report #: 730742
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jun 27, 2020 11:23 AM
Due: Jul 13, 2020
Priority: 10 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Exchangeable Sodium Percentage (ESP)	pH (1:5 Aqueous extract at 25°C as rec.)	Total Soluble Salts*	XRD Analysis	Moisture Set	Cation Exchange Capacity	Net Acid Production Potential (by CRS)	Net Acid Generation
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X			X	X		
Sydney Laboratory - NATA Site # 18217													
Brisbane Laboratory - NATA Site # 20794											X	X	
Perth Laboratory - NATA Site # 23736								X					
External Laboratory									X				
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	BH01_1.0	Mar 24, 2020		Soil	P20-JI16055	X	X	X	X	X	X	X	X
2	BH01_6.5	Mar 24, 2020		Soil	P20-JI16056	X	X	X	X	X	X	X	X
3	BH07_0.75	Mar 11, 2020		Soil	P20-JI16057	X	X	X	X	X	X	X	X
4	BH07_1.75	Mar 11, 2020		Soil	P20-JI16058	X	X	X	X	X	X	X	X
5	BH10_4.1_5.0	Mar 11, 2020		Soil	P20-JI16059	X	X	X	X	X	X	X	X
6	BH11_1.0_1.5	Mar 17, 2020		Soil	P20-JI16060	X	X	X	X	X	X	X	X
7	BH14_1.0_1.5	Mar 17, 2020		Soil	P20-JI16061	X	X	X		X	X	X	X
8	BH14_5.0_5.5	Mar 17, 2020		Soil	P20-JI16062	X	X	X		X	X	X	X
9	BH14_8.0_8.5	Mar 17, 2020		Soil	P20-JI16063	X	X	X		X	X	X	X
10	AU03_0.75	Jan 15, 2020		Soil	P20-JI19020	X	X	X	X	X	X	X	X

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
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
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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

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K + S SALT
Project ID: 12516706

Order No.:
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Received: Jun 27, 2020 11:23 AM
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Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Exchangeable Sodium Percentage (ESP)	pH (1:5 Aqueous extract at 25°C as rec.)	Total Soluble Salts*	XRD Analysis	Moisture Set	Cation Exchange Capacity	Net Acid Production Potential (by CRS)	Net Acid Generation
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X			X	X		
Sydney Laboratory - NATA Site # 18217													
Brisbane Laboratory - NATA Site # 20794												X	X
Perth Laboratory - NATA Site # 23736								X					
11	BH03_3.4	Jan 23, 2020		Soil	P20-JI19021				X			X	X
12	BH10_4.1_5.0	Jan 15, 2020		Soil	P20-JI19022	X	X	X	X	X	X	X	X
13	BH05_0.6	Jan 15, 2020		Soil	P20-JI19023	X	X	X	X	X	X	X	X
Test Counts						12	12	12	10	12	12	13	13

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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	
Method Blank								
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass		
LCS - % Recovery								
Net Acid Production Potential (by CRS)								
Acid Neutralising Capacity (as CaCO ₃)*	%	99			70-130	Pass		
Chromium Reducible Sulfur	%	97			80-120	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	P20-JI16055	CP	%	17	16	2.0	30%	Pass
Duplicate								
Net Acid Production Potential (by CRS)								
Acid Production Potential (by CRS)	P20-JI16055	CP	kgH ₂ SO ₄ /t	< 0.15	< 0.15	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI16055	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
Net Acid Generation								
Net Acid Generation: NAG (initial to pH 4.5)*	P20-JI16055	CP	kgH ₂ SO ₄ /t	< 0.1	< 0.1	<1	30%	Pass
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	P20-JI16055	CP	kgH ₂ SO ₄ /t	< 0.1	< 0.1	<1	30%	Pass
pH After Oxidation (pH NAG)*	P20-JI16055	CP	pH Units	10	10	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Conductivity (1:5 aqueous extract at 25°C as rec.)	P20-JI16060	CP	uS/cm	12000	11000	13	30%	Pass
pH (1:5 Aqueous extract at 25°C as rec.)	P20-JI16060	CP	pH Units	8.7	8.7	pass	30%	Pass
Duplicate								
Net Acid Production Potential (by CRS)								
Acid Production Potential (by CRS)	P20-JI19021	CP	kgH ₂ SO ₄ /t	0.71	0.71	1.0	30%	Pass
Chromium Reducible Sulfur	P20-JI19021	CP	% S	0.023	0.023	1.0	30%	Pass
Duplicate								
Net Acid Generation								
Net Acid Generation: NAG (initial to pH 4.5)*	P20-JI19021	CP	kgH ₂ SO ₄ /t	< 0.1	< 0.1	<1	30%	Pass
Net Acid Generation: NAG (pH 4.5 - pH 7.0)*	P20-JI19021	CP	kgH ₂ SO ₄ /t	< 0.1	< 0.1	<1	30%	Pass
pH After Oxidation (pH NAG)*	P20-JI19021	CP	pH Units	11	11	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	P20-JI19022	CP	%	25	25	<1	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	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes

Qualifier Codes/Comments

Code	Description
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Rhys Thomas	Senior Analyst-Inorganic (WA)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

**Glenn Jackson
General Manager**

- Indicates Not Requested

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

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

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Sample ID	pH Field Screen Original work order	Analysis request		Eurofins ID (Carbonate samples)	Field Log
		CRS plus TPA (Soil Suite 2)	Carbonate content (Soil Suite 5)		
AU02_1	698189	1	1	Ja21646	Clayey SAND
AU02_1.5	698189	1		Ja21647	CLAY
AU02_2.3	698189	1	1	Ja21651	SILT (shells)
AU02_2.75	698298	1		Ja22561	SILT (shells)
AU03_0.5	698189	1		Ja21653	Carbonate SAND
AU03_1.25	698189	1	1	Ja21655	Carbonate gravelly SAND
AU03_2.25	698189	1	1	Ja21659	Carbonate gravelly SAND/GRAVEL
AU102_0.5	698298	1	1	Ja22563	Clayey SAND
AU102_1	698298	1		Ja22570	CLAY
AU102_1.75	698298	1	1	Ja22572	Clayey SAND
AU102_2.75	698189	1		Ja22561	Sandy CLAY
AU102_3	698189	1	1	Ja21672	Sandy CLAY
AU20_1	698298	1		Ja22578	Carbonate sandy CLAY
AU20_2	698189	1		Ja21674	CLAY
AU20_3	698298	1		Ja22584	Calcarene - gravel/cobble
AU60_0.5	698298	1		Ja21674	Clayey SAND
AU60_1.25	698189	1		Ja21676	Sandy CLAY
AU60_3	698189	1		Ja21682	CLAY
AU66_0.25	698189	1		Ja21683	Sandy CLAY
AU66_2.75	698189	1	1	Ja21688	Sandy CLAY/SAND
AU70_2.5	698298	1		Ja22601	Sandy CLAY/SAND
AU75_0.25	698298	1		Ja22611	CLAY
AU75_1.25	698298	1		Ja22613	CLAY
AU75_3	698298	1		Ja22619	Sandy CLAY
BH03_1.25	696731	1	1	Ja09859	Silty SAND
BH03_1.5	696731	1		Ja09860	
BH03_2	696731	1	1	Ja09862	Silty SAND
BH03_2.5	696731	1		Ja09864	
BH03_3	696731	1	1	Ja09866	SAND
BH03_3.25	696731	1		Ja09867	SAND
BH03_4	696731	1	1	Ja09871	SAND
BH05_1.5	698189	1	1	Ja21706	Clayey GRAVEL
BH05_2	698189	1		Ja21708	CLAY
BH05_3	698189	1		Ja21712	Sandy CLAY/CLAY
BH05_5	698189	1		Ja21720	CLAY
BH07_1.0	704405	1	1	Jn12801	SAND
BH07_1.75	704405	1		Jn12804	Gravelly SAND
BH07_2.75	704405	1	1	Jn12808	Silty SAND
BH07_3.75	704405	1		Jn12812	Silty SAND
BH07_5.0	704405	1	1	Jn12818	Silty SAND
BH08_0.5	704405	1		Jn12820	Silty SAND
BH09_0.25	701828	1	1	Fe16908	SAND
BH09_1.25	701828	1		Fe16911	CLAY
BH09_2.5	701828	1	1	Fe16916	Clayey SAND
BH09_3.75	701828	1		Fe16920	Sandy CLAY
BH09_5	701828	1	1	Fe16925	Sandy CLAY
BH10_0.25	701828	1		Fe16928	Sandy CLAY
BH10_1.5	701828	1		Fe16932	CLAY
BH10_2	701828	1		Fe16934	Sandy CLAY
BH10_2.75	701828	1		Fe16937	Sandy CLAY
BH10_4.75	701828	1		Fe16945	Sandy CLAY
BH11_0.75	708420	1	1	Ma26159	Sandy CLAY? Clayey SAND
BH11_2.25	708420	1	1	Ma26144	Gravelly SAND
BH11_4.25	708420	1		Ma26175	Sandy CLAY
BH12_0.5	703226	1		Fe27603	Silty SAND
BH12_1.5	703226	1	1	Fe27605	Silty SAND
BH12_3.25	703226	1		Fe27608	Silty SAND
BH12_4.25	708420	1	1	Ma26162	SAND
BH12_5.0	708420	1		Ma26118	SAND
BH12A_1.0	708420	1		Ma26120	Silty SAND
BH14_0.5	708420	1		Ma26166	Clayey SAND
BH14_1.75	708420	1		Ma26168	Clayey SAND
BH14_3.25	708420	1		Ma26169	Silty SAND
BH14_4.25	708420	1		Ma26132	Silty SAND
BH14_5.0	708420	1		Ma26134	SAND
BH15_0.25	701828	1	1	Fe16948	SAND
BH15_1.75	701828	1		Fe16954	Sandy CLAY
BH15_3	701828	1	1	Fe16959	Sandy CLAY
BH15_4.5	701828	1		Fe16965	CLAY
HA02_0.2	701587	1		Fe15092	CLAY
HA04_0.2	701587	1	1	Fe15096	Clayey SAND
HA06_0.5	701587	1		Fe15100	CLAY
HA08_0.25-0.5	698298	1	1	Ja22621	Sandy CLAY
HA10_0-1	701587	1	1	Fe15105	
HA12_0.25		1		Jn12844	
HA12_0.5		1		Jn12845	
HA12_1.0		1		Jn12847	
HA30_0.25	708420	1		Ma26171	
HA30_0.5	708420	1		Ma26172	
HA30_0.75	708420	1		Ma26173	
QA01	696731	1		Ja09872	
QA05	701828	1		Fe16947	
QA12	708420	1		Ma26135	
QA14	708420	1		Ma26136	
Total		84	29		

Carbonate content - method

1. Sieve (<0.5mm)
2. Carbonate content - represented as % S or mol H/tonne
Conversion - % CaCO3 to mol H+/tonne = x 1665

CRS plus TPA

Standard method - removal of shells and visible calcareous/

Eurofins Quote Reference: 161026GHDW (Rev 2)

Rhys Thomas

From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Tuesday, 21 July 2020 9:32 AM
To: Rhys Thomas; Robert Johnston
Cc: #AU06_EnviroSampleWA
Subject: RE: K+S Salt Rebatch Request

Importance: High

EXTERNAL EMAIL*

Rhys

Analysis everything you have available that was requested on the spreadsheet – send me an updated Sample Summary and any extras il add on for reporting at a later date – the client and internal GHD has just spat the dummy so I’m in the proper dog house – I need those results asap.

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

Proudly employee owned

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Level 10, 999 Hay Street, Perth WA 6000 Australia | www.ghd.com

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Please consider our environment before printing this email

Please note, the majority of our team members are working remotely but available at any time should you want to get in contact. GHD's commitment to delivering for our clients remains strong, and we understand that through these uncertain times our clients need our support more than ever. We look forward to continuing our work, together.

From: Rhys Thomas <RhysThomas@eurofins.com>
Sent: Monday, 20 July 2020 6:18 PM
To: Louise Cockerton <Louise.Cockerton@ghd.com>; Robert Johnston <RobertJohnston@eurofins.com>
Cc: EnviroSampleWA@eurofins.com
Subject: FW: K+S Salt Rebatch Request

Hi Louise,

Samples located in bags (all kept at ambient temperature) for the carbonate analysis as follows;

- AU02_1
- AU02_2.3
- AU03_2.25
- AU102_0.5
- AU02_1.75
- AU102_3
- AU66_2.75
- BH05_1.5
- BH07_1.0
- BH09_0.25
- BH09_2.5
- BH09_5
- BH11_0.75
- BH11_2.25
- BH12_1.5
- BH12_4.25
- BH15_0.25
- BH15_3
- HA04_0.2
- HA08_0.25-0.5
- HA10_0-1

Everything is on the way to Brisbane, logged as receive on Friday to help meet the deadline. I'll have one last crack at few more bags for the carbonate, might be rustle up a few more and sneak them onto this report.

Kind regards,

Rhys Thomas
Laboratory Supervisor

Eurofins

Unit 2, 91 Leach Highway

KEWDALE WA 6105

Australia

Phone: +61 (0)8 9251 9602

Email: RhysThomas@Eurofins.com

Website: www.eurofins.com.au/environmental-testing

From: Rhys Thomas

Sent: Friday, 17 July 2020 4:14 PM

To: 'Louise Cockerton' <Louise.Cockerton@ghd.com>; #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>

Cc: Robert Johnston <RobertJohnston@eurofins.com>

Subject: RE: K+S Salt Rebatch Request

Argh sorry, this excel, I had found another 2 samples and not marked them off as good.

Rhys Thomas
Laboratory Supervisor

Eurofins

Unit 2, 91 Leach Highway

KEWDALE WA 6105

Australia

Phone: +61 (0)8 9251 9602

Email: RhysThomas@Eurofins.comWebsite: www.eurofins.com.au/environmental-testing**From:** Louise Cockerton <Louise.Cockerton@ghd.com>**Sent:** Friday, 17 July 2020 11:48 AM**To:** #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>**Cc:** Robert Johnston <RobertJohnston@eurofins.com>; Rhys Thomas <RhysThomas@eurofins.com>**Subject:** RE: K+S Salt Rebatch Request**Importance:** High

EXTERNAL EMAIL*

Guys – I'm so sorry!

The spreadsheet below shows we have jars available for the below samples (that helps alot – thanks).

But I also need to know how the jars are stored. Are they:

- In the fridge
- At room temperature
- Other combo I don't know about – in which can you tell me
- Need to phone friend

For CRS analysis - the soils come from calcareous site, so I might want to get them sieved before you analyse them for CRS – this is why I want the jars and know how they are stored to see if it will be anywhere near legit. As the dry sample from the pH screening will have been oven dried and pulverised already.

Same deal goes for the carbonate content – I want to see if we can sieve them first.

Sample ID	pH Field Screen Original work order	Eurofins ID		Comer
HA01_0.2	701587	Fe15090	No	Rebatch
HA02_0.2	701587	Fe15092	Jar	
HA03_0.2	701587	Fe15094	No	Rebatch
HA04_0.2	701587	Fe15096	Jar	
HA06_0.5	701587	Fe15100	No	Rebatch
HA10_0-1	701587	Fe15105	Jar	

From: EnviroSampleWA@eurofins.com <EnviroSampleWA@eurofins.com>**Sent:** Friday, 17 July 2020 11:22 AM**To:** Louise Cockerton <Louise.Cockerton@ghd.com>**Cc:** Robert Johnston <RobertJohnston@eurofins.com>; Rhys Thomas <RhysThomas@eurofins.com>**Subject:** RE: K+S Salt Rebatch Request

Hi Louise,

I just spoke to Rhys all the CRS samples he found were the appropriate dry samples for CRS analysis. Did you need to know the preservation on anything else?

Kind regards,
Caitlyn

Eurofins | Environment Testing

Unit 2, 91 Leach Highway
KEWDALE WA 6105
Australia

Phone : +61 8 9251 9692

Email : EnviroSampleWA@eurofins.com

From: Rhys Thomas <RhysThomas@eurofins.com>
Sent: Thursday, 16 July 2020 5:00 PM
To: Louise Cockerton <Louise.Cockerton@ghd.com>
Cc: Robert Johnston <RobertJohnston@eurofins.com>; #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>
Subject: RE: K+S Salt Rebatch Request

Hey Louise,

That sure was a whole lot of CRS! After deep diving I've found the majority of the jars, as listed in the spreadsheet you sent through the other day. Some of the others look like they may have been rebatched already (as commented in the ss) as they've already been removed from the DND box.

I believe you already spoke to Rob about the carbonate's, and that they ideally needed to be kept frozen. The only samples that strike me as having been kept frozen are the Hold samples from job 701587 (that were provided as bags and not subsequently rebatched in 726720. I can get the Sample ID's if that helps, there's only a dozen or so left in there from memory.

Let us know if you want to proceed with the list as is or make some additions for the samples that couldn't be located.

Regards,

Rhys Thomas
Laboratory Supervisor, WA

Eurofins

Unit 2, 91 Leach Highway
KEWDALE WA 6105
AUSTRALIA

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Email: RhysThomas@Eurofins.com

Website: environment.eurofins.com.au

LinkedIn: www.linkedin.com/in/rhysjthomas



From: Louise Cockerton <Louise.Cockerton@ghd.com>
Sent: Thursday, 16 July 2020 11:13 AM
To: Rhys Thomas <RhysThomas@eurofins.com>; Robert Johnston <RobertJohnston@eurofins.com>;
#AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>
Subject: RE: K+S Salt Rebatch Request

EXTERNAL EMAIL *

Morning

Can you please send me an update as it needs to get this lodged in the system on Friday to make the client deadline.

Thanks

From: Louise Cockerton
Sent: Tuesday, 14 July 2020 1:42 PM
To: Rhys Thomas <RhysThomas@eurofins.com>; Robert Johnston <RobertJohnston@eurofins.com>;
EnviroSampleWA@eurofins.com
Subject: K+S Salt Rebatch Request
Importance: High

Guys

Can we look at the spreadsheet and let me know the below and availability of the work orders.

Eurofins

Can you tell me how each work order is currently stored and availability
i.e. Work Order 698298 is located in the freezer (original sample), stored at room temperature (original sample), processed and

Confirm the above methods are able to be undertaken?
i.e. Carbonate content

Thanks

Louise Cockerton
Technical Lead Acid Sulfate Soil
Senior Environmental Scientist

GHD

Proudly employee owned

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Please note, the majority of our team members are working remotely but available at any time should you want to get in contact. GHD's commitment to delivering for our clients remains strong, and we understand that through these uncertain times our clients need our support more than ever. We look forward to continuing our work, together.

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e.mail : EnviroSales@eurofins.com

web : www.eurofins.com.au

Sample Receipt Advice

Company name: **GHD Pty Ltd WA**
Contact name: Louise Cockerton
Project name: K+S
Project ID: 12516706
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jul 17, 2020 5:00 PM
Eurofins reference: **732827**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
 - All samples have been received as described on the above COC.
 - COC has been completed correctly.
 - Attempt to chill was evident.
 - Appropriately preserved sample containers have been used.
 - All samples were received in good condition.
 - Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
 - Appropriate sample containers have been used.
 - Split sample sent to requested external lab.
 - Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Louise Cockerton - louise.cockerton@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd WA email address.

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004



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The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Louise Cockerton**

Report **732827-S**
Project name **K+S**
Project ID **12516706**
Received Date **Jul 17, 2020**

Client Sample ID			AU02_1	AU02_1.5	AU02_2.3	AU03_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31807	P20-JI31808	P20-JI31809	P20-JI31810
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	0.3	-	0.9	-
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	170	63	52	68
>2mm Fraction	0.005	g	< 0.005	2.9	0.050	0.65
Analysed Material	0.1	%	100	96	100	99
Extraneous Material	0.1	%	< 0.1	4.4	< 0.1	0.9
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	9.9	9.6
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	130	130
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	0.21	0.20
pH-KCL	0.1	pH Units	8.6	9.1	9.3	9.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	0.21	0.20
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	130	130
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.7	4.5	6.9	6.4
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	350	890	1400	1300
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.56	1.4	2.2	2.1
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			AU102_0.5 Soil	AU102_1 Soil	AU102_1.75 Soil	AU102_3 Soil
Sample Matrix			P20-JI31811	P20-JI31812	P20-JI31813	P20-JI31815
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	0.3	-	0.2	0.1
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	66	60	60	36
>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
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.0	9.1	8.3	8.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	0.006	0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	3.9	3.4
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	2.7	1.5	0.90	0.78
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	540	310	180	160
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.86	0.49	0.29	0.25
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			AU20_1 Soil	AU20_2 Soil	AU20_3 Soil	AU60_0.5 Soil
Sample Matrix			P20-JI31816	P20-JI31817	P20-JI31818	P20-JI31819
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	39	41	37	43
>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

Client Sample ID			AU20_1	AU20_2	AU20_3	AU60_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31816	P20-JI31817	P20-JI31818	P20-JI31819
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.7	8.7	8.9	9.2
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H ⁺ /t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.9	5.7	2.0	34
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H ⁺ /t	390	1100	390	6900
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.62	1.8	0.63	11
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			AU60_1.25	AU60_3	AU66_0.25	AU70_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31820	P20-JI31821	P20-JI31822	P20-JI31823
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	44	40	41	43
>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
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.2	8.8	9.1	9.3
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a

Client Sample ID			AU60_1.25	AU60_3	AU66_0.25	AU70_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31820	P20-JI31821	P20-JI31822	P20-JI31823
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
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	18	9.6	2.8	1.9
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	3500	1900	560	370
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	5.6	3.1	0.89	0.59
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID			AU75_0.25	AU75_1.25	AU75_3	BH03_1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31824	P20-JI31825	P20-JI31826	P20-JI31827
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	-	-	0.1
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	46	47	45	37
>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
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.6	8.2	8.8	8.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	1.3	1.1	1.7	0.72
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	250	210	330	140
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.41	0.34	0.53	0.23
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID			BH03_1.5	BH03_2	BH03_2.5	BH03_3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31828	P20-JI31829	P20-JI31830	P20-JI31831
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	0.6	-	0.7
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	430	31	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	45	46	64	52
>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
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	27	17	14	1.4
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	360	220	190	19
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.58	0.36	0.31	0.03
pH-KCL	0.1	pH Units	5.1	6.8	9.0	9.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	10	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.57	0.36	0.31	0.030
Chromium Reducible Sulfur -acidity units	3	mol H+/t	350	220	190	19
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	n/a	1.7	3.3	4.6
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	330	650	910
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	n/a	0.53	1.1	1.5
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.58	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	360	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	27	< 1	< 1	< 1

Client Sample ID			BH03_3.25	BH03_4	BH05_1.5	BH05_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31832	P20-JI31833	P20-JI31834	P20-JI31835
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	1.4	3.0	-
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	22
Extraneous Material						
<2mm Fraction	0.005	g	46	40	48	53
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	13
Analysed Material	0.1	%	100	100	100	80
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	20

Client Sample ID			BH03_3.25	BH03_4	BH05_1.5	BH05_2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31832	P20-JI31833	P20-JI31834	P20-JI31835
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	1.4	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	19	< 10	< 10	11
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.03	< 0.02	< 0.02	0.02
pH-KCL	0.1	pH Units	9.6	9.8	9.2	5.8
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	7.0
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	0.010
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.031	0.008	0.007	0.007
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	19	5.1	4.5	4.2
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H ⁺ /t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	5.9	11	24	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H ⁺ /t	1200	2200	4800	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	1.9	3.5	7.7	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	11
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH05_3	BH05_5	BH07 1.0	BH07 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31836	P20-JI31837	P20-JI31838	P20-JI31839
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	-	6.2	2.8
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	30	34	56	38
>2mm Fraction	0.005	g	< 0.005	< 0.005	1.4	8.3
Analysed Material	0.1	%	100	100	97	82
Extraneous Material	0.1	%	< 0.1	< 0.1	2.5	18
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.0	8.4	9.7	9.4
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0

Client Sample ID			BH05_3	BH05_5	BH07 1.0	BH07 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31836	P20-JI31837	P20-JI31838	P20-JI31839
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	3.4	0.90	47	22
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	690	180	9500	4400
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	1.1	0.29	15	7.0
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH07 3.75	BH07 5.0	BH08 0.5	BH09_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31840	P20-JI31841	P20-JI31842	P20-JI31843
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	1.3	-	0.2
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	42	64	35	62
>2mm Fraction	0.005	g	13	< 0.005	0.080	< 0.005
Analysed Material	0.1	%	77	100	100	100
Extraneous Material	0.1	%	23	< 0.1	0.2	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.3	9.5	9.4	8.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	2.8	12	4.8	0.70
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	560	2300	950	140
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.91	3.7	1.5	0.22
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02

Client Sample ID			BH07 3.75	BH07 5.0	BH08 0.5	BH09_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31840	P20-JI31841	P20-JI31842	P20-JI31843
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID			BH09_1.25	BH09_2.5	BH09_3.75	BH09_5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31844	P20-JI31845	P20-JI31846	P20-JI31847
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	2.3	-	1.2
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	45	54	63	34
>2mm Fraction	0.005	g	3.5	< 0.005	< 0.005	22
Analysed Material	0.1	%	93	100	100	61
Extraneous Material	0.1	%	7.3	< 0.1	< 0.1	39
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.3	9.3	9.2	9.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	13	19	2.5	9.6
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2700	3800	490	1900
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	4.3	6.2	0.78	3.1
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID			BH10_0.25	BH10_1.5	BH10_2	BH10_2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31848	P20-JI31849	P20-JI31850	P20-JI31851
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	33	41	42	53
>2mm Fraction	0.005	g	< 0.005	< 0.005	4.0	< 0.005
Analysed Material	0.1	%	100	100	91	100
Extraneous Material	0.1	%	< 0.1	< 0.1	8.6	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.4	9.0	8.9	8.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.1	0.90	0.89	0.67
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	220	180	180	130
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.35	0.29	0.28	0.21
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH10_4.75	BH11_0.75	BH11_2.25	BH11_4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31852	P20-JI31853	P20-JI31854	P20-JI31855
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	1.2	4.2	-
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	40	49	42	55
>2mm Fraction	0.005	g	< 0.005	1.7	11	2.9
Analysed Material	0.1	%	100	97	79	95
Extraneous Material	0.1	%	< 0.1	3.3	21	5.0

Client Sample ID			BH10_4.75	BH11_0.75	BH11_2.25	BH11_4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31852	P20-JI31853	P20-JI31854	P20-JI31855
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.9	9.2	9.4	9.4
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H ⁺ /t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.1	9.0	34	12
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H ⁺ /t	220	1800	6900	2300
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.35	2.9	11	3.8
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH12_0.5	BH12_1.5	BH12_3.25	BH12_4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31856	P20-JI31857	P20-JI31858	P20-JI31859
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Total Inorganic Carbon	0.1	%	-	0.2	-	0.4
Extraneous Material						
Acid trail - Titratable Peroxide Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.5	9.2	9.4	9.5
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0

Client Sample ID			BH12_0.5	BH12_1.5	BH12_3.25	BH12_4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31856	P20-JI31857	P20-JI31858	P20-JI31859
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.1	0.87	0.97	2.7
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	230	170	190	540
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.36	0.28	0.31	0.87
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH12_5.0	BH12A_1.0	BH14_0.5	BH14_1.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31860	P20-JI31861	P20-JI31862	P20-JI31863
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	46	48	59	46
>2mm Fraction	0.005	g	1.8	< 0.005	0.42	1.7
Analysed Material	0.1	%	96	100	99	97
Extraneous Material	0.1	%	3.7	< 0.1	0.7	3.5
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.5	8.1	8.6	7.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	11	0.60	0.81	0.46
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2200	120	160	93
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	3.5	0.19	0.26	0.15
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH14_3.25	BH14_4.25	BH14_5.0	BH15_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31864	P20-JI31865	P20-JI31866	P20-JI31867
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	-	-	0.2
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	45	54	49	50
>2mm Fraction	0.005	g	0.61	1.4	2.2	0.73
Analysed Material	0.1	%	99	97	96	99
Extraneous Material	0.1	%	1.3	2.6	4.3	1.4
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.2	9.3	9.3	8.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.4	1.5	4.3	2.1
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	280	290	850	410
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.45	0.46	1.4	0.66
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			BH15_1.75	BH15_3	BH15_4.5	HA02_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31868	P20-JI31869	P20-JI31870	P20-JI31871
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Total Inorganic Carbon	0.1	%	-	0.2	-	-
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	35	40	42	60
>2mm Fraction	0.005	g	0.36	1.2	1.2	4.8
Analysed Material	0.1	%	99	97	97	93
Extraneous Material	0.1	%	1.0	2.8	2.8	7.4

Client Sample ID			BH15_1.75	BH15_3	BH15_4.5	HA02_0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31868	P20-JI31869	P20-JI31870	P20-JI31871
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	< 1	< 1	7.4
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	99
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	0.16
pH-KCL	0.1	pH Units	8.9	8.1	8.6	9.4
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	< 0.005	< 0.005	0.16
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	< 3	< 3	< 3	99
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H ⁺ /t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	2.2	0.83	4.8	14
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H ⁺ /t	440	170	960	2800
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.71	0.26	1.5	4.5
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H ⁺ /t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			HA04_0.2	HA08_0.25-0.5	HA10_0-1	HA12_0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31872	P20-JI31874	P20-JI31875	P20-JI31876
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Total Inorganic Carbon	0.1	%	1.8	0.4	1.7	-
Extraneous Material						
Acid trail - Titratable Peroxide Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	940
<2mm Fraction	0.005	g	46	77	60	28
>2mm Fraction	0.005	g	3.3	4.4	13	2.2
Analysed Material	0.1	%	93	95	83	93
Extraneous Material	0.1	%	6.8	5.4	17	7.2
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	6.7	< 1	13	50
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H ⁺ /t	89	< 10	170	670
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.14	< 0.02	0.27	1.1
pH-KCL	0.1	pH Units	9.5	9.2	9.3	5.3
Acid trail - Titratable Actual Acidity	2	mol H ⁺ /t	< 2	< 2	< 2	11
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	0.020
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.14	0.007	0.27	1.1
Chromium Reducible Sulfur -acidity units	3	mol H ⁺ /t	89	4.6	170	660
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0

Client Sample ID			HA04_0.2 Soil	HA08_0.25-0.5 Soil	HA10_0-1 Soil	HA12_0.25 Soil
Sample Matrix			P20-JI31872	P20-JI31874	P20-JI31875	P20-JI31876
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	15	5.3	16	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	3100	1100	3100	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	5.0	1.7	5.0	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	1.1
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	670
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	50

Client Sample ID			HA12_0.5 Soil	HA12_1.0 Soil	HA30_0.25 Soil	HA30_0.5 Soil
Sample Matrix			P20-JI31877	P20-JI31878	P20-JI31879	P20-JI31880
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	150	< 2	4.0	210
Extraneous Material						
<2mm Fraction	0.005	g	37	51	58	68
>2mm Fraction	0.005	g	2.6	1.9	0.72	< 0.005
Analysed Material	0.1	%	93	96	99	100
Extraneous Material	0.1	%	6.5	3.6	1.2	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	10	1.7	2.3	15
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	130	23	30	200
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.21	0.04	0.05	0.33
pH-KCL	0.1	pH Units	5.6	8.6	6.5	4.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	7.0	< 2	< 2	14
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	< 0.003	< 0.003	0.020
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.20	0.036	0.049	0.30
Chromium Reducible Sulfur -acidity units	3	mol H+/t	130	23	30	190
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	n/a	0.03	n/a	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	6.3	n/a	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	n/a	< 0.02	n/a	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.21	0.03	0.05	0.33
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	130	18	30	200
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	10	1.4	2.3	15

Client Sample ID			HA30_0.75	QA01	QA05	QA12
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P20-JI31881	P20-JI31882	P20-JI31883	P20-JI31884
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Extraneous Material						
<2mm Fraction	0.005	g	46	45	64	61
>2mm Fraction	0.005	g	< 0.005	2.2	< 0.005	< 0.005
Analysed Material	0.1	%	100	95	100	100
Extraneous Material	0.1	%	< 0.1	4.7	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1	1.1	< 1	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	14	< 10	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.02	0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	9.1	9.6	9.1	9.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.016	0.023	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	9.9	14	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	10	4.2	0.90	4.6
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2100	840	180	930
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	3.3	1.3	0.29	1.5
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	< 1

Client Sample ID			QA14
Sample Matrix			Soil
Eurofins Sample No.			P20-JI31885
Date Sampled			Not Provided ¹²
Test/Reference	LOR	Unit	
SPOCAS Suite			
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2
Extraneous Material			
<2mm Fraction	0.005	g	69
>2mm Fraction	0.005	g	< 0.005
Analysed Material	0.1	%	100
Extraneous Material	0.1	%	< 0.1
Chromium Suite (Minus ANC- WA)			
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO ₃ /t	< 1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02
pH-KCL	0.1	pH Units	9.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2

Client Sample ID			QA14
Sample Matrix			Soil
Eurofins Sample No.			P20-JI31885
Date Sampled			Not Provided ¹²
Test/Reference	LOR	Unit	
Chromium Suite (Minus ANC- WA)			
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3
Sulfur - KCl Extractable	0.02	% S	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0
HCl Extractable Sulfur	0.02	% S	n/a
Net Acid soluble sulfur	0.02	% S	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	1.2
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	250
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.40
ANC Fineness Factor		factor	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1

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
Total Inorganic Carbon - Method: LTM-INO-4060 Total Organic Carbon in water and soil	Melbourne	Jul 29, 2020	28 Days
SPOCAS Suite - Method: LTM-GEN-7050	Brisbane	Jul 20, 2020	6 Week
Extraneous Material - Method: LTM-GEN-7050/7070	Brisbane	Jul 21, 2020	6 Week
Chromium Suite (Minus ANC- WA) - Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite	Brisbane	Jul 21, 2020	6 Week

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Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: K+S
Project ID: 12516706

Order No.:
Report #: 732827
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Jul 17, 2020 5:00 PM
Due: Jul 24, 2020
Priority: 5 Day
Contact Name: Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid trail - Titratable Peroxide Acidity	Total Inorganic Carbon	Moisture Set	Chromium Suite (Minus ANC - WA)
Melbourne Laboratory - NATA Site # 1254 & 14271							X		
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	AU02_1	Not Provided		Soil	P20-JI31807	X	X	X	X
2	AU02_1.5	Not Provided		Soil	P20-JI31808	X		X	X
3	AU02_2.3	Not Provided		Soil	P20-JI31809	X	X	X	X
4	AU03_0.5	Not Provided		Soil	P20-JI31810	X		X	X
5	AU102_0.5	Not Provided		Soil	P20-JI31811	X	X	X	X
6	AU102_1	Not Provided		Soil	P20-JI31812	X		X	X
7	AU102_1.75	Not Provided		Soil	P20-JI31813	X	X	X	X
8	AU102_2.75	Not Provided		Soil	P20-JI31814	X		X	X
9	AU102_3	Not Provided		Soil	P20-JI31815	X	X	X	X
10	AU20_1	Not Provided		Soil	P20-JI31816	X		X	X

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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
11	AU20_2	Not Provided		Soil	P20-JI31817	X		X	X
12	AU20_3	Not Provided		Soil	P20-JI31818	X		X	X
13	AU60_0.5	Not Provided		Soil	P20-JI31819	X		X	X
14	AU60_1.25	Not Provided		Soil	P20-JI31820	X		X	X
15	AU60_3	Not Provided		Soil	P20-JI31821	X		X	X
16	AU66_0.25	Not Provided		Soil	P20-JI31822	X		X	X
17	AU70_2.5	Not Provided		Soil	P20-JI31823	X		X	X
18	AU75_0.25	Not Provided		Soil	P20-JI31824	X		X	X
19	AU75_1.25	Not Provided		Soil	P20-JI31825	X		X	X
20	AU75_3	Not Provided		Soil	P20-JI31826	X		X	X
21	BH03_1.25	Not Provided		Soil	P20-JI31827	X	X	X	X
22	BH03_1.5	Not Provided		Soil	P20-JI31828	X		X	X
23	BH03_2	Not Provided		Soil	P20-JI31829	X	X	X	X

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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
24	BH03_2.5	Not Provided		Soil	P20-JI31830	X		X	X
25	BH03_3	Not Provided		Soil	P20-JI31831	X	X	X	X
26	BH03_3.25	Not Provided		Soil	P20-JI31832	X		X	X
27	BH03_4	Not Provided		Soil	P20-JI31833	X	X	X	X
28	BH05_1.5	Not Provided		Soil	P20-JI31834	X	X	X	X
29	BH05_2	Not Provided		Soil	P20-JI31835	X		X	X
30	BH05_3	Not Provided		Soil	P20-JI31836	X		X	X
31	BH05_5	Not Provided		Soil	P20-JI31837	X		X	X
32	BH07 1.0	Not Provided		Soil	P20-JI31838	X	X	X	X
33	BH07 2.75	Not Provided		Soil	P20-JI31839	X	X	X	X
34	BH07 3.75	Not Provided		Soil	P20-JI31840	X		X	X
35	BH07 5.0	Not Provided		Soil	P20-JI31841	X	X	X	X
36	BH08 0.5	Not Provided		Soil	P20-JI31842	X		X	X

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Project Name:	K+S	Phone:	08 6222 8222	Priority:	5 Day
Project ID:	12516706	Fax:	08 9429 6555	Contact Name:	Louise Cockerton

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Acid trail - Titratable Peroxide Acidity	Total Inorganic Carbon	Moisture Set	Chromium Suite (Minus ANC - WA)
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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
37	BH09_0.25	Not Provided		Soil	P20-JI31843	X	X	X	X
38	BH09_1.25	Not Provided		Soil	P20-JI31844	X		X	X
39	BH09_2.5	Not Provided		Soil	P20-JI31845	X	X	X	X
40	BH09_3.75	Not Provided		Soil	P20-JI31846	X		X	X
41	BH09_5	Not Provided		Soil	P20-JI31847	X	X	X	X
42	BH10_0.25	Not Provided		Soil	P20-JI31848	X		X	X
43	BH10_1.5	Not Provided		Soil	P20-JI31849	X		X	X
44	BH10_2	Not Provided		Soil	P20-JI31850	X		X	X
45	BH10_2.75	Not Provided		Soil	P20-JI31851	X		X	X
46	BH10_4.75	Not Provided		Soil	P20-JI31852	X		X	X
47	BH11_0.75	Not Provided		Soil	P20-JI31853	X	X	X	X
48	BH11_2.25	Not Provided		Soil	P20-JI31854	X	X	X	X
49	BH11_4.25	Not Provided		Soil	P20-JI31855	X		X	X

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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
50	BH12_0.5	Not Provided		Soil	P20-JI31856	X		X	X
51	BH12_1.5	Not Provided		Soil	P20-JI31857	X	X	X	X
52	BH12_3.25	Not Provided		Soil	P20-JI31858	X		X	X
53	BH12_4.25	Not Provided		Soil	P20-JI31859	X	X	X	X
54	BH12_5.0	Not Provided		Soil	P20-JI31860	X		X	X
55	BH12A_1.0	Not Provided		Soil	P20-JI31861	X		X	X
56	BH14_0.5	Not Provided		Soil	P20-JI31862	X		X	X
57	BH14_1.75	Not Provided		Soil	P20-JI31863	X		X	X
58	BH14_3.25	Not Provided		Soil	P20-JI31864	X		X	X
59	BH14_4.25	Not Provided		Soil	P20-JI31865	X		X	X
60	BH14_5.0	Not Provided		Soil	P20-JI31866	X		X	X
61	BH15_0.25	Not Provided		Soil	P20-JI31867	X	X	X	X
62	BH15_1.75	Not Provided		Soil	P20-JI31868	X		X	X

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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
63	BH15_3	Not Provided		Soil	P20-JI31869	X	X	X	X
64	BH15_4.5	Not Provided		Soil	P20-JI31870	X		X	X
65	HA02_0.2	Not Provided		Soil	P20-JI31871	X		X	X
66	HA04_0.2	Not Provided		Soil	P20-JI31872	X	X	X	X
67	HA08_0.25-0.5	Not Provided		Soil	P20-JI31874	X	X	X	X
68	HA10_0-1	Not Provided		Soil	P20-JI31875	X	X	X	X
69	HA12_0.25	Not Provided		Soil	P20-JI31876	X		X	X
70	HA12_0.5	Not Provided		Soil	P20-JI31877	X		X	X
71	HA12_1.0	Not Provided		Soil	P20-JI31878	X		X	X
72	HA30_0.25	Not Provided		Soil	P20-JI31879	X		X	X
73	HA30_0.5	Not Provided		Soil	P20-JI31880	X		X	X
74	HA30_0.75	Not Provided		Soil	P20-JI31881	X		X	X
75	QA01	Not Provided		Soil	P20-JI31882	X		X	X

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Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794						X			X
Perth Laboratory - NATA Site # 23736								X	
76	QA05	Not Provided		Soil	P20-JI31883	X		X	X
77	QA12	Not Provided		Soil	P20-JI31884	X		X	X
78	QA14	Not Provided		Soil	P20-JI31885	X		X	X
79	AU66_2.75	Not Provided		Soil	P20-JI31886		X	X	
Test Counts						78	26	79	78

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 Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 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.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- 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.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 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 in the C10-C14 cell of the Report.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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 (Minus ANC- WA)										
pH-KCL				%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity				%	94			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
SPOCAS Suite										
Acid trail - Titratable Peroxide Acidity				mol H+/t	< 2	< 2	< 1	30%	Pass	
Duplicate										
Chromium Suite (Minus ANC- WA)										
CRS suite WA (-ANC) - Liming Rate				kg CaCO3/t	9.9	10	4.0	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)				mol H+/t	130	140	4.0	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)				% S	0.21	0.22	4.0	30%	Pass	
pH-KCL				pH Units	9.3	9.3	< 1	30%	Pass	
Acid trail - Titratable Actual Acidity				mol H+/t	< 2	< 2	< 1	30%	Pass	
sulfidic - TAA equiv. S% pyrite				% pyrite S	< 0.003	< 0.003	< 1	30%	Pass	
Chromium Reducible Sulfur				% S	0.21	0.22	4.0	30%	Pass	
Chromium Reducible Sulfur -acidity units				mol H+/t	130	140	4.0	30%	Pass	
Sulfur - KCl Extractable				% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur				% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units				mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite				% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)				% CaCO3	6.9	6.9	< 1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)				% S	2.2	2.2	< 1	30%	Pass	
ANC Fineness Factor				factor	1.5	1.5	< 1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)				% S	< 0.02	< 0.02	< 1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)				mol H+/t	< 10	< 10	< 1	30%	Pass	
CRS Suite - Liming Rate				kg CaCO3/t	< 1	< 1	< 1	30%	Pass	
Duplicate										
SPOCAS Suite										
Acid trail - Titratable Peroxide Acidity				mol H+/t	< 2	< 2	< 1	30%	Pass	
Duplicate										
Chromium Suite (Minus ANC- WA)										
CRS suite WA (-ANC) - Liming Rate				kg CaCO3/t	< 1	< 1	< 1	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)				mol H+/t	< 10	< 10	< 1	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)				% S	< 0.02	< 0.02	< 1	30%	Pass	
pH-KCL				pH Units	9.0	9.0	< 1	30%	Pass	
Acid trail - Titratable Actual Acidity				mol H+/t	< 2	< 2	< 1	30%	Pass	
sulfidic - TAA equiv. S% pyrite				% pyrite S	< 0.003	< 0.003	< 1	30%	Pass	
Chromium Reducible Sulfur				% S	< 0.005	< 0.005	< 1	30%	Pass	
Chromium Reducible Sulfur -acidity units				mol H+/t	< 3	< 3	< 1	30%	Pass	

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	P20-JI31811	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur	P20-JI31811	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	P20-JI31811	CP	mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	P20-JI31811	CP	% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31811	CP	% CaCO3	2.7	2.7	1.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31811	CP	% S	0.86	0.85	1.0	30%	Pass
ANC Fineness Factor	P20-JI31811	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31811	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31811	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31811	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Total Inorganic Carbon	P20-JI31813	CP	%	0.2	0.2	2.5	30%	Pass
Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31821	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31821	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31821	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31821	CP	% S	< 0.02	< 0.02	<1	30%	Pass
pH-KCL	P20-JI31821	CP	pH Units	8.8	8.8	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31821	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31821	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31821	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31821	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Sulfur - KCl Extractable	P20-JI31821	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur	P20-JI31821	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	P20-JI31821	CP	mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	P20-JI31821	CP	% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31821	CP	% CaCO3	9.6	9.2	4.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31821	CP	% S	3.1	2.9	4.0	30%	Pass
ANC Fineness Factor	P20-JI31821	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31821	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31821	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31821	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31831	CP	mol H+/t	< 2	< 2	<1	30%	Pass

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31831	CP	kg CaCO3/t	1.4	1.4	2.0	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31831	CP	mol H+/t	19	19	2.0	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31831	CP	% S	0.03	0.03	2.0	30%	Pass
pH-KCL	P20-JI31831	CP	pH Units	9.6	9.6	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31831	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31831	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31831	CP	% S	0.030	0.030	2.0	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31831	CP	mol H+/t	19	19	2.0	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31831	CP	% CaCO3	4.6	4.6	2.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31831	CP	% S	1.5	1.5	2.0	30%	Pass
ANC Fineness Factor	P20-JI31831	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31831	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31831	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31831	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31841	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31841	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31841	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31841	CP	% S	< 0.02	< 0.02	<1	30%	Pass
pH-KCL	P20-JI31841	CP	pH Units	9.5	9.5	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31841	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31841	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31841	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31841	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31841	CP	% CaCO3	12	12	3.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31841	CP	% S	3.7	3.8	3.0	30%	Pass
ANC Fineness Factor	P20-JI31841	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31841	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31841	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31841	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Total Inorganic Carbon	P20-JI31853	CP	%	1.2	1.2	1.5	30%	Pass
Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31860	CP	mol H+/t	< 2	< 2	<1	30%	Pass

Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31860	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31860	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31860	CP	% S	< 0.02	< 0.02	<1	30%	Pass
pH-KCL	P20-JI31860	CP	pH Units	9.5	9.5	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31860	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31860	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31860	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31860	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Sulfur - KCl Extractable	P20-JI31860	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur	P20-JI31860	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	P20-JI31860	CP	mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	P20-JI31860	CP	% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31860	CP	% CaCO3	11	11	2.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31860	CP	% S	3.5	3.6	2.0	30%	Pass
ANC Fineness Factor	P20-JI31860	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31860	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31860	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31860	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31870	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31870	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31870	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31870	CP	% S	< 0.02	< 0.02	<1	30%	Pass
pH-KCL	P20-JI31870	CP	pH Units	8.6	8.6	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31870	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31870	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31870	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31870	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Sulfur - KCl Extractable	P20-JI31870	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur	P20-JI31870	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	P20-JI31870	CP	mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	P20-JI31870	CP	% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31870	CP	% CaCO3	4.8	4.7	2.0	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31870	CP	% S	1.5	1.5	2.0	30%	Pass
ANC Fineness Factor	P20-JI31870	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31870	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31870	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31870	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass

Duplicate								
SPOCAS Suite				Result 1	Result 2	RPD		
Acid trail - Titratable Peroxide Acidity	P20-JI31881	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Duplicate								
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD		
CRS suite WA (-ANC) - Liming Rate	P20-JI31881	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P20-JI31881	CP	mol H+/t	< 10	10	4.0	30%	Pass
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P20-JI31881	CP	% S	0.02	0.02	4.0	30%	Pass
pH-KCL	P20-JI31881	CP	pH Units	9.1	9.1	<1	30%	Pass
Acid trail - Titratable Actual Acidity	P20-JI31881	CP	mol H+/t	< 2	< 2	<1	30%	Pass
sulfidic - TAA equiv. S% pyrite	P20-JI31881	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass
Chromium Reducible Sulfur	P20-JI31881	CP	% S	0.016	0.016	4.0	30%	Pass
Chromium Reducible Sulfur -acidity units	P20-JI31881	CP	mol H+/t	9.9	10	4.0	30%	Pass
Sulfur - KCl Extractable	P20-JI31881	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur	P20-JI31881	CP	% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	P20-JI31881	CP	mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	P20-JI31881	CP	% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	P20-JI31881	CP	% CaCO3	10	10	<1	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-JI31881	CP	% S	3.3	3.3	<1	30%	Pass
ANC Fineness Factor	P20-JI31881	CP	factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	P20-JI31881	CP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	P20-JI31881	CP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	P20-JI31881	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass

Comments

Moistures acquired from historical data

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	N/A
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins Environment Testing is not able to determine whether analysis has been performed within recommended holding times.

Authorised By

Robert Johnston	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (VIC)


**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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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	D. Hadrill	L. Cockerton		A. Jennings		25/08/2020
B	D. Hadrill	L. Cockerton		A. Jennings		20/10/2020
0	D. Hadrill	L. Cockerton		A. Jennings		25/03/2021
1	D. Hadrill	L. Cockerton		A. Jennings		23/04/2021
2	D. Hadrill	L.Cockerton P. Baker		A. Jennings		13/05/2021
3	D. Hadrill	L.Cockerton P. Baker		A. Jennings		31/05/2021

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