PRECISE ENVIRONMENTAL
Consulting Environmental Scientists

ACID SULFATE SOIL INVESTIGATION AND MANAGEMENT PLAN

Lot 2 DP733507 and Lot 32 DP1280863

110 - 120 Carrs Drive, Yamba, New South Wales

Easterly Point Environmental

July 2023

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Report

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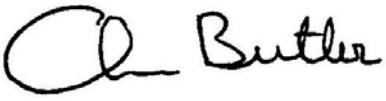

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1 INTRODUCTION

Precise Environmental (PE) was commissioned by Easterly Point Environmental to conduct and acid sulfate soil investigation (ASSI) and prepare an acid sulfate soil management plan (ASSMP) for the proposed residential subdivision of Lot 2 DP733507 and Lot 32 DP1280863, 110 - 120 Carrs Drive, Yamba, New South Wales.

The current site layout is presented in Appendix A, Figure 1.

1.1 Project overview

The extent of the development is 10 ha and will be restricted to the eastern half of the site which is currently zoned for residential land use (refer Table 1). The western half of the site is zoned as environmental conservation and environmental management and is heavily vegetated. The proposed allotment layout is provided in Appendix B.

The development area will be filled by importing ~ 2.0 – 2.5 m of sand across the development area. Whilst most utility services will be constructed / installed within the imported fill, localised excavations will be required in natural soils at depths < 5 m AHD. The vertical extent of earthworks is expected to be limited to disturbance of natural soils in the top 0.5 – 1.0 m, noting the extent of PE's ASSI was 2.0 – 3.0 m depth.

Lateral extents of the ASSI were limited to areas of the site which could be accessed by a drilling rig. Borehole locations are provided in Appendix A, Figure 1.

1.1.1 Potential disturbance of ASS

ASS occur predominantly on coastal land with elevations generally below 5 m Australian Height Datum (AHD). These soils also occur further inland in saline seepage areas, rivers, lake beds and irrigation channels. Where ASS are present, draw-down of the local water table can expose these soils to oxidising conditions creating acidity and mobilising metals at potentially harmful concentrations.

In such situations, extracted groundwater can be impacted by acidity and dissolved heavy metals at potentially harmful concentrations, and requires appropriate management.

1.2 Objectives

The objectives of the ASSMP are to:

- Summarise acid sulfate soil (ASS) conditions within the development area
- Describe the nature and extents of ASS which may be disturbed and any requirement/s for management.

1.3 Scope of work

To meet the above objectives, the following scope of work was undertaken:

- Detailed site inspection
- Underground service clearance
- Drilling of fifteen boreholes ranging in depth from 2.0 – 3.0 m depth
- Collection of soil samples at 0.25 m depth intervals in each borehole
- ASS screen testing (pH_F and pH_{FOX}) of all recovered soil samples
- Selective chromium reducible sulfur suite (SCR Method 22B) and S_{KCl} analysis based on screen testing results
- Preparation of this ASSI and ASSMP.

1.4 Relevant guidance

The scope of this ASSI and management measures described in this report have been prepared with reference to the Acid Sulfate Soil Manual (ASSMAC 1998). Other guidance information referenced in completing the scope of work included:

- Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al, 2004)
- Clarence Valley Local Environmental Plan (LEP) 2011

1.5 Planning trigger for ASS management

The NSW Government ePlanning Spatial Viewer maps the site within a Class 2 acid sulfate soil (refer property reports presented in Appendix B). As per section 7.1 of the Clarence Valley LEP development consent is required in Class 2 land where works are carried out below the natural ground surface or where works which will lower the water table.

Section 7.1 states consent must not be granted under this clause for the carrying out of works unless an acid sulfate soils management plan has been prepared for the proposed works in accordance with the Acid Sulfate Soils Manual and has been provided to the consent authority.

1.6 Limitations

The findings of this report are based on the objectives and scope of work outlined above. PE performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees, express or implied, are made. Subject to the scope of work, PE's assessment is limited strictly to identifying typical environmental conditions associated with the subject property, and does not include evaluation of any other issues.

This report does not comment on any regulatory obligations based on the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated, and does not relate to any other works undertaken for the Client. The report and conclusions are based on the information obtained at the time of the assessment. Changes to the subsurface conditions may occur subsequent to the investigation described herein, through natural processes or through the intentional or accidental addition of contaminants, and these conditions may change with space and time.

The results of this assessment are based upon site inspection and fieldwork conducted by PE personnel and information provided by the Client. All conclusions regarding the property area are the professional opinions of the PE personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, PE assumes no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of PE, or developments resulting from situations outside the scope of this project.

2 SITE CONDITIONS AND ENVIRONMENTAL SETTING

2.1 Site and environmental setting

Site identification, land use and environmental setting details are provided in Table 1. Key built features within the site are shown in Appendix A, Figure 1.

Table 1. Site and surrounding land details.

Aspect	Detail	
Street address	120 Carrs Drive, Yamba, New South Wales.	
Real property description	Lot 2 DP733507	Lot 32 DP1280863
Total area	16.2 ha	~1.5 ha
Local Government	Clarence Valley Council (CVC)	
Zoning (CVC)	Eastern half: R1 – General residential Western half: C2 – Environmental conservation C3 – Environmental management	R1 – General residential
	The objectives of the general residential zone are to: 1. Provide for the housing needs of the community 2. Provide for a variety of housing types and densities; and 3. Enable other land uses that provide facilities of services to meet the day to day needs of residents The objectives of the environmental conservation zone are to: 1. Protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values 2. Prevent development that could destroy, damage or otherwise have an adverse effect on those values 3. Protect coastal wetlands and littoral rainforests 4. Protect land affected by coastal processes and environmentally sensitive coastal land 5. Prevent development that would adversely affect, or be adversely affect by coastal processes The objectives of the environmental management zone are to: 1. Protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values 2. Provide for a limited range of development that does not have an adverse effect on those values 3. Prevent inappropriate development in geologically hazardous areas so as to minimise erosion and other adverse impacts on escarpment areas 4. Ensure that development does not unreasonably increase the demand for public services or public facilities 5. Ensure development is not adversely impacted by environmental hazards 6. Protect prominent hillsides, ridgelines, other major natural features, riparian areas and water catchment areas	
Existing land use and site structures	An existing (unoccupied) residential dwelling is located in the southeast corner of Lot 2 DP733507. A concrete slab located in the northeast corner of Lot 2	

Aspect	Detail
	DP733507 formerly contained a shed – anecdotal information supplied by the client indicates the building was demolished after a fire.
Surrounding land uses	North: Earthworks occurring for adjacent residential subdivision South: Low-density rural / residential land East: Low-density rural / residential land West: Oyster Channel – tidal waterbody between Wooloweyah Lagoon and Clarence River
Watercourses	An ephemeral watercourse is mapped in the southeast corner of the site and traverses west parallel to the southern site boundary terminating beyond the west site boundary in Oyster Channel. The ephemeral watercourse will be repurposed as a riparian zone as part of the redevelopment.

3 GEOTECHNICAL INFORMATION

The following sections presents key information derived / summarised from the geotechnical report which will need to be considered as part of the overall management strategy of disturbed ASS within the proposed development. The geotechnical report (GI 2021) was prepared by Geotech Investigations (GI) Pty Ltd on 7 July 2021.

Notwithstanding general limitations of the geotechnical report, it is noted boreholes constructed as part of the investigation were limited to three boreholes adjacent to the residential dwelling in the southeast corner of the site and one adjacent to the western boundary of Lot 32 DP1280863.

A summary of the soil conditions encountered by GI are presented in Table 2. No unconsolidated marine clay sediments were identified.

Table 2. Summary of soil conditions (GI 2021).

Material descriptions	BH1 (m)	BH2 (m)	BH3 (m)	BH4 (m)
Alluvial topsoil	0 – 0.2	0 – 0.3	0 – 0.2	NE
Alluvial Firm / stiff clay	0.2 – 0.3	0.3 – 0.5	0.2 – 0.3	NE
Loose or worse (SPT 'N' <10) sand	2.3 – 2.8	1.0 – 2.8	1.0 – 5.5	0.0 – 5.4
Medium dense (SPT 10 < 'N' < 30) sand	0.3 – 2.3 NE	0.5 – 1.0 NE	0.3 – 1.0 5.5 – 11.1	5.4 – 7.0 NE
Dense (SPT 30 < 'N' < 50) sand	NE	NE	11.1 – 12.4	NE
Very dense (SPT 'N' > 50) sand	NE	NE	NE	7.0 – 10.9
Terminated depth	2.8	2.8	12.4	10.9

Table notes:

NE denotes not encountered

3.1 Earthworks

Earthworks proposed for the proposed development include:

- Site preparation, clearing and grubbing
- Importation of up to 2.0 – 2.5 m of bulk filling across the site to achieve an estimated design level of up to RL 3.6 m
- Construction of a riparian corridor which is expected to comprise excavation and batter shaping
- Construction of a series of internal roads, entrances, and civil infrastructure.

PE has been advised by the client most civil infrastructure will be constructed within the bulk fill soils, with the exception of deeper utility services such as sewer rising mains, service trenches etc. PE has not been supplied with the proposed civil / utility services plan.

3.2 Stripping of topsoil

Topsoil stripping across the site will be in the order of 100 – 200 mm and will vary according to areas containing surface vegetation, root regrowth, site drainage and weather conditions encountered prior to stripping. Based on the development area of 10 ha there could be up to 20,000 m^3 of soil which cannot be reused as structural fill (not including uncontrolled fill encountered within the observed earthen access driveway). The topsoil may be reused onsite for landscaping following neutralisation treatment.

Alluvial soft to firm clays encountered from 100 – 500 mm in thickness below the topsoil in conjunction with the shallow water table won't be suitable to pass a 'test roll' and will cause trafficability issues during construction. Geotech Investigations have suggested importing a bridging layer to minimise the extent of disturbance to the natural ground. Building remnants and uncontrolled fill will also need to be stripped.

3.3 Bulk filling

Following clearing, site preparation and stripping, 500 mm of clean sand material shall be placed and compacted across the alluvial clay subgrade and a test roll completed prior to additional filling. Fill material should contain similar properties to the sites natural soil, and it was therefore recommended that clean cohesionless sand be used as the bulk filling material and should be placed in layers not exceeding 250 mm.

3.4 Groundwater

Groundwater was encountered at shallow depths across the site typically around 0.6 m (this was relatively consistent with PE's findings). Groundwater could rise to surface levels in times of flooding. The geotechnical report states the following relating to groundwater:

- Where excavations such as service trenches are proposed to extend near or below the water table, suitable methods of excavation and localised dewatering need to be considered
- Temporary retention such as shore boxes will be required where excavations of the groundwater is required
- Fill placement in areas within 0.5 – 1.0 m of the groundwater at the time of placement may pump groundwater into the placed fill causing heaving and compaction difficulties.

3.5 Batter slopes

The riparian zone is expected to be positioned at the natural surface level requiring no new fill and long-term batter slopes. The batter will need to be protected from erosion and scour protection.

3.6 Settlement

Settlement of the underlying alluvial sands at the site are relatively immediate and based on the depth of fill to be placed, settlement of the underlying alluvial sands is considered to be negligible (less than 20 – 30 mm). Settlements will occur as the surcharge layers are placed and will not impact the development infrastructure, or future structures.

4 ACID SULFATE SOIL INVESTIGATION METHODOLOGY

Standard operating procedures upon which the soil collection methods were based are provided in Appendix C.

4.1 Soil sampling and analysis

Fifteen boreholes (BH1 – BH15) were drilled on 12 July 2022 to depths of 2.0 – 3.0 m below ground level (BGL) using a track mounted drill rig with solid stem augers. Locations were selected to provide as much site coverage as possible noting parts of the site were inaccessible due to waterlogged soils / dense vegetation.

Soil samples were collected at 0.25 m intervals ensuring inclusion of distinct changes in soil type. Each sample was sealed in a snap-lock bag with excess air evacuated and stored and transported below 4ºC to minimise samples oxidation and degradation. All samples were dispatched to a NATA accredited laboratory under chain of custody documentation for field screening. Select samples were analysed for Chromium Reducible Sulfur suite analysis (S_{CR} - Method 22B) in accordance with Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al, 2004).

4.2 Action criteria

The Acid Sulfate Soil Manual (ASSMAC, 1998) describes field pH_F / pH_{FOX} test results which indicate potential acid sulfate soils (PASS). Appendix 1 of the Acid Sulfate Soil Manual states that field pH provides a useful quick indication of the likely presence and severity of actual acid sulfate soils. The field pH is a qualitative method only that cannot be used as a substitute for laboratory analysis in the identification of acid sulfate soils for assessment purposes.

The guidelines offer the following information regarding the interpretation of field pH results:

- pH readings of pH ≤ 5 indicates that actual acid sulfate soil are present with the sulfides having been oxidised in the past, resulting in acid soil conditions
- pH values > 4 and < 5.5 are acid and may be the result of some previous or limited oxidation of sulfides, but is not confirmatory of actual acid sulfate soils. Substantial exchangeable / soluble aluminium and hydrogen ions usually exist at these pH values. Other factors such as excessive fertiliser use, organic acids or strong leaching can cause pH >4 - <5.5 units. Field pH alone cannot indicate potential acid sulfate soils as they may be neutral to slightly alkaline when unoxidized
- In order to the for potential acid sulfate soils that contain unoxidized sulfides, peroxide is used to rapidly oxidise the iron sulfides (usually pyrite), resulting in the production of acid with a corresponding drop in pH.

The appropriate criteria, or action thresholds, are the texture-based action criteria from Table 4.4 of the Acid Sulfate Soil Manual (*ASSMAC*. 1998). The action criteria have been developed to determine when management of disturbed acid sulfate soil is required. Soil texture influences the risk associated with a disturbance, due to differences in the rate of oxidation, permeability and potential buffering capacity of the soil. The action criteria are shown in Table 3.

The ASS to be disturbed is >1,000 tonnes and the applicable action criteria is 18 mol. H^+/ t.

Table 3. Texture-based acid sulfate soil action criteria.

Type of Material	*Approx. clay content (%)*	*Sum of existing and potential acidity*			
		1-1000 tonnes disturbed		*>1000 tonnes disturbed*	
Texture range (NCST, 2009)		**% S-equiv. (oven-dried basis)**	**mol H^+/t (oven-dried basis)**	**% S-equiv. (oven-dried basis)**	**mol H^+/t (oven-dried basis)**
Fine Medium to heavy clays and silty clays	> 40	0.1	62	0.03	18
Medium Sandy loams to light clays	5 - 40	0.06	36		
Coarse Sands - loamy sands, peats	< 5	0.03	18		

5 FIELD OBSERVATIONS AND LABORATORY RESULTS

The following section presents the results of the ASSI and should be read in conjunction with the borehole locations provided in Appendix A, data tables presented in Appendix D, complete soil profile descriptions in Appendix E and laboratory certificates of analysis presented in Appendix F.

5.1 Soil profiles

Fill soils were encountered in BH6, BH8 and BH11 which were drilled in the observed earthen access driveway (refer Appendix A, Figure 1). Fill soil comprised a mix of sand and clay of variable plasticity with silt inclusions to depths of 0.5 – 0.8 m.

With the exception of BH5 which comprised clayey sand and sand, natural soils comprised clay of variable plasticity (light to heavy) with silt and sand inclusions up to 0.95 m depth overlying sand (with some clay and silt inclusions).

Soil profiles were generally consistent with the geotechnical report (GI 2021) although deeper clay profiles were observed in some locations.

Groundwater seepage was observed on the day of works from 0.25 – 1.5 m.

5.2 Screening results

The screening results indicated the presence of PASS on the basis that:

- Most pH_{FOX} results were ≥1 unit less than pH_F results and pH_{FOX} results ≥ 2 units less than pH_F results was common.
- pH_{FOX} results < 3 were common although there did not appear to be any trends between sample depth and results.

5.3 Laboratory results

5.3.1 Fill soil

Net acidity excluding acid neutralising capacity (ANC) in analysed fill soils (applicable to BH6 0.5 – 0.75 m, BH8 0.0 – 0.25 m, BH8 0.25 – 0.5 m and BH11 0.5 – 0.75 m) ranged from 49 – 61 mol. H^+/tonne and exceeded the 18 mol. H+/tonne action criteria). Net acidity in these samples predominantly comprised titratable actual acidity (TAA) ranging from 32 – 45 mol. H^+ / tonne. Chromium reducible sulfur (potential acidity) was reported at <10 – 16 mol. H^+ / tonne.

5.3.2 Natural clay soil above the water bearing zone

Net acidity excluding ANC was detected in all analysed natural clay soil samples above the water bearing zone except for BH9 0.5 – 0.75 m. Results ranged from 26 – 138 mol H^+ / tonne and all results exceeded the action criteria.

Net acidity in these samples predominantly comprised TAA ranging from 9 – 124 mol H^+ / tonne and potential acidity ranged from <10 – 24 mol H^+ / tonne.

5.3.3 Natural sand soil below the water bearing zone

Net acidity excluding ANC was detected in all analysed natural sand soils below the water bearing zone. Results ranged from 13 – 142 mol H^+ / tonne and more than 60 % of samples exceeded the action criteria.

Net acidity in these samples predominantly comprised potential acidity ranging from <10 - 139 mol H^+ / tonne. TAA ranged from <2 – 15 mol H^+ / tonne.

6 ACID SULFATE SOIL MANAGEMENT MEASURES

6.1 Responsibility

The Principal Contractor shall be responsible for ensuring the appropriate management of acid sulfate soil (ASS) as detailed in the document.

6.2 Stripped surfaces

Aglime shall be placed at a rate ≥ 5 kg/m^2 across all surfaces following the stripping and grubbing of topsoil / clay above the water table. Additional aglime shall also be placed around the perimeter of stripped areas daily throughout the earthworks program. This shall be applied in all drainage lines, whether temporary or permanent.

6.3 Temporary ASS stockpiling and treatment areas

Stockpiling of untreated ASS should be minimised by preparing a detailed earthworks strategy that documents the timing of soil volumes to be moved, treatment locations and capacity of specified areas to accept materials.

Excavated ASS which has not been treated and verified must be contained within bunded areas constructed in accordance with relevant design standards and the cross sections presented in Appendix G. These areas will be positioned to mitigate potential runoff and/or stormwater ingress.

A guard layer of aglime shall be placed beneath and over the surface of untreated soils and surrounded by a lime enriched perimeter. The basal layer of aglime shall be at a minimum rate of 5 kg per m^2 per vertical metre of fill, with 5 kg per m^2 spread over the stockpile surface.

The recommended maximum time for which soils can be temporarily stockpiled without treatment are presented in Table 4. The total volume of material that is placed in short-term stockpiles should not exceed 20% of a day's total extraction, as immediate treatment should be implemented.

Table 4. Indicative maximum periods for short term stockpiling of untreated ASS.

Type of Material		***Sum of existing and potential acidity***
Texture range (NCST, 2009)	***Approx. clay content (%)***	
Fine Medium to heavy clays and silty clays	> 40	3 nights, e.g. a weekend (66 hours)
Medium Sandy loams to light clays	5 - 40	2 nights (42 hours)
Coarse Sands to loamy sands and peats	< 5	Overnight (18 hours)

6.4 Leachate collection and discharge

Leachate collection drains surrounding the treatment pads will be constructed within bunded areas. Leachate will be directed to a sump or holding ponds for monitoring, and treatment (if required), prior to discharge.

Alternatively, dispersal over land of leachate shall be the preferred method of disposal and shall be conducted in a manner to ensure the leachate does not enter the stormwater network, or adjacent waterways. Where this is not possible leachate must be managed in accordance with an approved Dewatering Management Plan.

Where off-site discharge via dispersal over land is required, or has the potential to occur, water quality monitoring shall be conducted prior to discharge in accordance Section 6.4.1.

6.4.1 Leachate monitoring

Where dewatering is occurring during works involving ASS, leachate generated shall be monitored in accordance with an approved DMP.

In all other cases (i.e. where leachate is generated in collection drains and stored in sumps / holding ponds) surface water quality monitoring shall be undertaken at the locations and frequencies specified in Table 5.

A suitably qualified person shall review the monitoring results. Non-compliance with the water quality objectives shall trigger corrective and preventive action to be determined by a suitably qualified expert (SQE).

Table 5. Water quality monitoring program.

Parameter	Water quality objectives	Location	Frequency
pH (units)	6.5 – 8.5 [A]	Discharge	Prior to release
Total suspended solids (mg/L)	≤50 [B]		
Dissolved aluminium and iron	-		

Table notes

A. Derived from Acid Sulfate Soils Management Guidelines (ASSMAC 1998)

B. Derived from Soils and construction (NSW Blue Book) Vol. 1 – 4th Edition, March 2004 (NSW Landcom 2004)

Corrective actions shall be implemented in consultation with a SQE to ensure potential impacts of the release on the receiving environment are mitigated.

Monitoring results shall be reviewed by a SQE prior to release and the necessary actions (e.g. water treatment) determined by the SQE. If visual and/or water quality monitoring indicates the production and migration of acidic leachate, additional treatment measures will be implemented as necessary. These measures may include:

- The application of additional neutralising agent (typically agricultural lime) to temporary and permanent stockpiles
- The application of additional neutralising agent (typically agricultural lime) to leachate collection drains and overland flow pathways
- Neutralisation treatment (typically hydrated lime) of surface water contained within the leachate collection tanks or basins.

6.5 Neutralisation treatment

6.5.1 Bulk excavated and trench excavated soils

All bulk excavated soils including topsoil will be treated using conventional neutralisation methods whereby agricultural lime is incorporated homogenously into the material either during the excavation process or on a purpose-built treatment pad/s (Refer Appendix G).

Testing will be undertaken on the treated soil not used as backfill on the day of excavation to verify that the quantity of lime added is sufficient to neutralise the soils net acidity to the standards specified in the Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al, 2004).

Verification results shall be interpreted by a SQE to assess conformance with the verification performance criteria (Table 2). Material deemed by the SQE to be non-conforming shall be re-treated at the liming rate nominated by the SQE and the verification process repeated.

Treated material may be reused within the development where fit for purpose or disposed of at a licensed landfill (Refer Section 6.7).

6.5.2 Excavations

The geotechnical investigation has not specified the depth of footings for the development as additional investigations are required following placement of compacted fill. Notwithstanding this, no ASS will be disturbed for all civil infrastructure constructed within the compacted fill.

Soils excavated as part of deeper service trenches which penetrate natural soils shall be treated by applying aglime at the nominated liming rate specified in Section 3.4.3 (according to the soil type encountered.

6.5.3 Liming rates

Based on a bulk density (BD) of 1.7 t / m^3, agricultural lime (97% pure fine $CaCO_3$) must be applied to the excavated material as per Table 6. Given the relatively high variability in net acidity between the three main soil types encountered at the site, liming rates have been calculated based on the 95%ile of net acidity results.

Where material requiring a higher liming rate cannot be separated from material with a lower liming rate then the highest liming applicable to those material types shall be used for neutralisation treatment.

Table 6. ASS treatment liming rates.

Soil type	Encountered depth	Liming rate minimum (kg / m^3)
Uncontrolled fill soils (earthen access driveway – refer Figure 1)	Up to 0.8 m below existing surface level	8.4
Natural clay	Up to 0.95 m below existing surface level	19.2
Natural sand	Generally ≥ 0.5 m below existing surface level	19.2

The calculation used to determine the liming rates was:

1) Sum of existing acidity + potential acidity (moles H+/t for oven-dried soil)
2) divided conversion factor for mol H+/t to kg $CaCO^3$/t (i.e. 19.98)
3) multiplied by lime purity factor for 97 % pure aglime (i.e. 100/97, or 1.03)
4) multiplied by default bulk density of wet soil (i.e. 1.7 t / m^3)
5) multiplied by default safety factor of (i.e. 1.5).

Note: Where soil bulk density is likely to vary from the default (1.7 t / m^3), or lime product used has a purity below 97%) lime treatment rates must be modified accordingly.

6.6 Verification of neutralisation treatment

All treated soil shall be verified at a minimum rate of 1 sample / 1,000 m^3 (as required for soils containing acidity concentrations < 142 mol H+/t), or greater where necessary in each batch of soil. Each sample

shall be a composite sample made up of at least 6 sub-samples collected using a random or stratified-random approach.

Chromium suite acid base accounting will be used to verify treated material in accordance with Table A3.6 of the Laboratory Methods Guidelines (Ahern et al. 2004).

The following performance criteria must all be met for soil that has been treated:

- The neutralising capacity of the treated soil must exceed the existing plus potential acidity of the soil by at least a safety factor of 1.5
- Post-neutralisation, the soil pH (pH_{KCl}) is to be > 6.5, and preferably < 8.5
- Excess neutralising agent should stay within the treated soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity.

Interpretation of verification results may consider the following:

Medium and fine textured material (sandy loams, light clays, heavy clays and silty clays):

1) No single sample shall exceed a net acidity of 62 mol H^+/t.
2) If any single sample is between 0 - 62 mol H+/t, then the average of any four spatially adjacent samples (including the exceeding sample) shall have an average net acidity of zero or less.

Coarse textured material (sands to loamy sands and peats):

1) No single sample shall exceed a net acidity of 18 mol H^+/t.
2) If any single sample is between 0 - 18 mol H+/t, then the average of any four spatially adjacent samples (including the exceeding sample) shall have an average net acidity of zero or less.

Poorly buffered sands (see Soil Management Guidelines Table 4.1 and associated commentary):

1) No single sample shall exceed a net acidity of 6 mol H+/t.
2) If any single sample is between 0 - 6 mol H+/t, then the average of any four spatially adjacent samples (including the exceeding sample) shall have an average net acidity of zero or less.

6.7 Disposal of surplus acid sulfate soil

Following treatment, material that cannot be re-used within the development site (namely uncontrolled fill and clay topsoil) shall be removed to a landfill licensed to accept ASS in accordance with the NSW Waste Classification Guidelines Part 4: Acid Sulfate Soils (Refer Appendix H).

Dry material shall be kept moist and covered during transport. Wet material shall be of at least 'spadable' consistency or carted in lined containers to minimise potential spillage. Council must be provided with the full details of the facility prior to any material being removed off-site, and other records such as tonnage receipts upon request following disposal.

6.8 Potential displacement and extrusion of ASS due to settlement of materials

The upper unconsolidated natural clay layer and loose underlying sand has the potential to displace and extrude during the bulk filling of the site, and a rise in the groundwater level in the surrounding area. The degree of soil and groundwater movement which will depend on the settlement strategy adopted.

A slow rate (i.e. many years) of compression of unconsolidated material may minimise the environmental risks associated with the oxidation of disturbed ASS. However, this may not be feasible for the site.

The Soil Management Guidelines (2014) state:

> *Dewatering soils using wick drains is a common management strategy available when sediments need to be compressed and dewatered. Vacuum settlement (also known as vacuum consolidation) methods can potentially be employed to hasten the compression process. Vacuum settlement involves sealing the surface of the soil with an impermeable membrane and then using a preinstalled drainage network to pump air and water out of the soil, rather than waiting for it to compress under load....*
>
> *Note that where these techniques are employed, extracted water must be treated to meet pH, metals (particularly iron and aluminium) and visual amenity targets prior to discharge, and care must be taken to properly isolate the soil to be dewatered from the surrounding environment.*
>
> *Note: These techniques do not necessarily provide a clearance layer of non-ASS or fully treated ASS material for future land uses.*

Wick drains enable the direct vertical rise and capture of groundwater (typically by a preload perimeter drain) reducing the likelihood of lateral displacement of groundwater and extrusion of ASS.

Where wick drains are not required (e.g. no to limited unconsolidated soils present), then a limestone filled cut-off drain of sufficient depth to neutralise horizontal sub-surface groundwater flow may need to be installed around the fill zone boundaries. Decisions on, and design of, the most appropriate management strategy will be the responsibility of the project geotechnical engineer, in consultation with the SQE.

Groundwater monitoring wells must be installed around the perimeter of the fill area and baseline groundwater conditions assess at these locations. Existing baseline groundwater information shall be incorporated for the wider site where available. There can be no decline in groundwater pH as a result of the filling activities. A groundwater neutralising agent may be required where there is an unacceptable change in pH to mitigate risks to groundwater dependant ecosystems including surfaces waters.

6.9 Dewatering and oxidation of ASS

Excavation methodologies that minimise the extent and duration of dewatering as far as practicable shall be adopted as a primary control measure. All dewatering shall be undertaken in accordance with an approved dewatering management plan.

7 MONITORING

7.1 Visual monitoring of ASS impacts

Regular visual monitoring shall be undertaken to detect:

- Unexplained scalding or degradation of vegetation
- Iron staining
- Green-blue or extremely clear water indicating high concentrations of aluminium.

Any observations of the above shall be reported to the SQE who shall inspect the site and advise appropriate corrective action/s, as required.

8 REPORTING

All incidents that have the potential to cause environmental harm shall be immediately reported to Clarence Valley Council. The Site Manager is responsible for liaising with the Principal's Representative to determine the most appropriate communication pathways for reporting such incidents in accordance with the Protection of the Environment Operations (PoEO) Act 1997 and its associated schedules.

The Principal Contractor shall maintain records of the following:

- ASS verification testing
- ASS disposal (volumes, contractor, disposal facility, waste transport certificates)
- Soil and water treatment
- Water quality monitoring
- Incidents
- Corrective and preventive actions.

The records shall be available for inspection on site during the construction phase and maintained for a minimum of 5 years.

9 REFERENCES

Ahern, C.R., McElnea, A.E., Sulivan, L.A. 2004. *Acid Sulfate Soils Laboratory Methods Guidelines*. Queensland Department of Natural Resources, Mines and Energy

Stone, Y., Ahern C R., Blunden B., (1998), Acid Sulfate Soil Manual 1998, Acid Sulfate Soil Management Advisory Committee (ASSMAC), Wollongbar, NSW, Australia

Clarence Valley Local Environmental Plan 2011, July 2022, New South Wales Government

GI. 2021. Preliminary Geotechnical Investigation for Proposed Manufactured Housing Estate at Carrs Drive, Yamba, NSW, Described as Lot 2 on DP733507, Geotech Investigatons Pty Ltd, 7 July 2022.

APPENDIX A – FIGURE

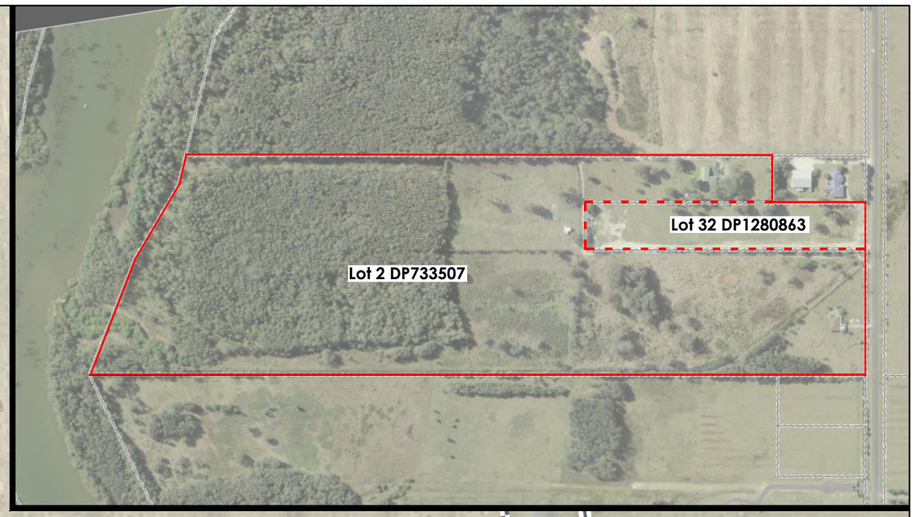
LEGEND

Site boundary

Borehole location

Image sourced and modified from Six Maps (2022)

All locations indicative only



Dilapidated shed and concrete slabs

BH10

BH9

BH7

BH5

BH4

Earthen access driveway (subject to filling)

BH11

BH8

BH6

Dilapidated shed

BH15

BH12

Development extent

BH13

BH2

BH14

Unoccupied dwelling

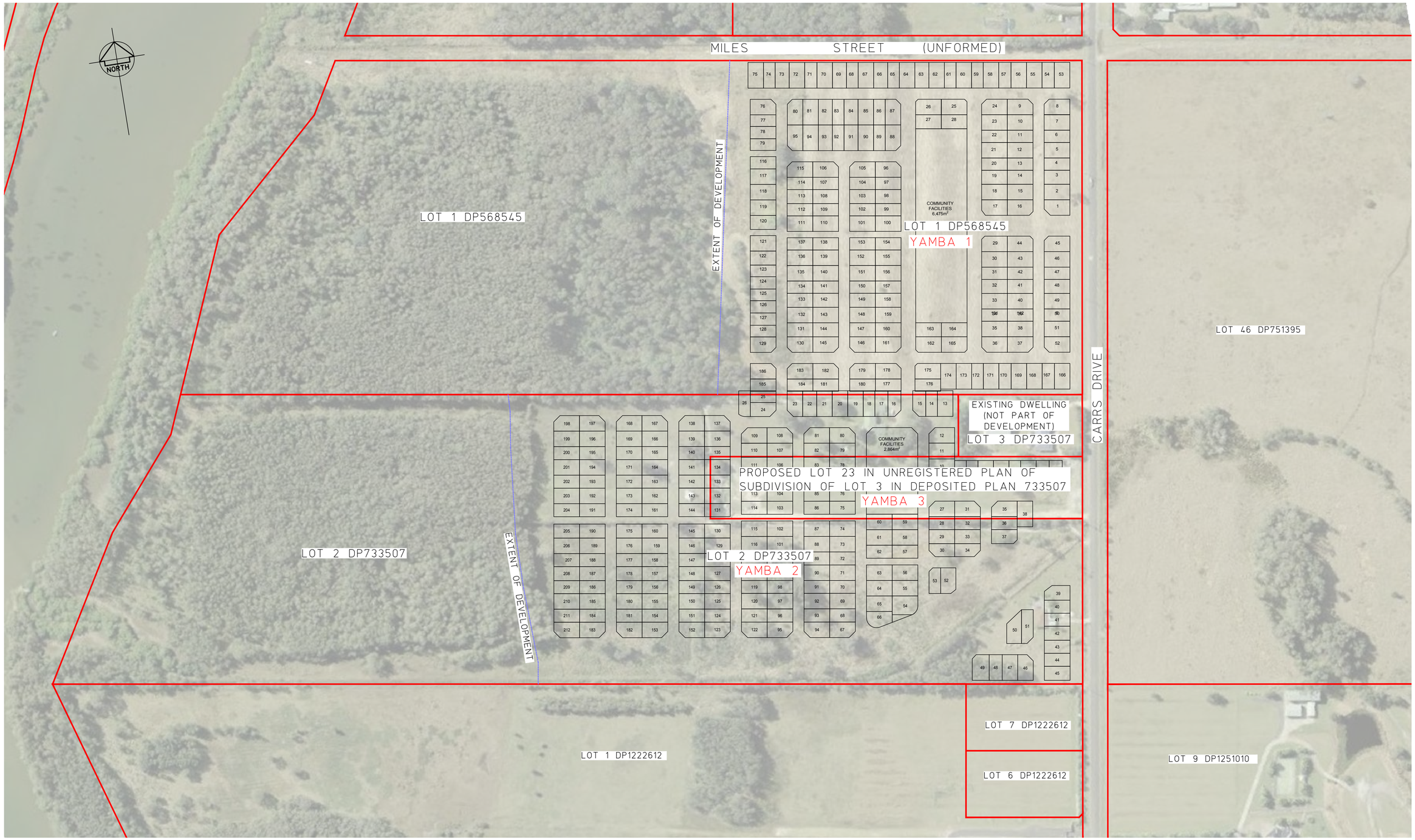
BH3

BH1

0 m 25 m 50 m 100 m

Client: EASTERLY POINT ENVIRONMENTAL	Site location: 110 - 120 CARRS DRIVE, YAMBA, NEW SOUTH WALES		Real property description: LOT 2 DP733507 AND LOT 32 DP1280863		Drawing number: FIGURE 1 Drawing version: A	PRECISE ENVIRONMENTAL Consulting Environmental Scientists Unit 7 / 14 Fremantle Street, Burleigh Heads, Qld, 4220 PO Box 4424, Robina Town Centre, Qld 4230 Ph: (07) 5593 7848 Fax: (07) 5593 7020 mail@preciseenvironmental.com.au
Project: ACID SULFATE SOIL INVESTIGATION	Project number: PE3394.22	Scale: AS SHOWN	Drawn by: SG Date drawn: 16.08.22	Reviewed by: CB Approved: CB	Drawing title: SITE AND SAMPLING LOCATIONS	

APPENDIX B – PROPOSED SUBDIVISION LAYOUT AND PROPERTY REPORTS



30 15 0 30 60 90

Horizontal Scale 1:1500 (A1)
1:3000 (A3)

YAMBA 1:
LOT LAYOUT AS PER MASTERPLAN REV 16
TOTAL LOT YIELD 185

YAMBA 2 & 3:
LOT LAYOUT AS PER CONCEPT PLAN OPTION 3 REV 2
TOTAL LOTS YIELD 212

PLANS TO BE PRINTED IN COLOUR

PRELIMINARY FOR SITE PLANNING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO ACCURACY SHOULD BE PLACED ON AERIAL IMAGE. AERIAL IMAGE IS FOR VISUAL PURPOSES ONLY

ISSUE	DESCRIPTION	DATE
3	MASTERPLAN LAYOUT OVERLAY ON AERIAL IMAGE YAMBA 1 & 2	02.12.2021
2	MASTERPLAN LAYOUT RE-ISSUED FOR CLIENT REVIEW	18.08.2021
1	MASTERPLAN LAYOUT RE-ISSUED FOR CLIENT REVIEW	23.07.2021
0	MASTERPLAN LAYOUT ISSUED FOR CLIENT REVIEW	28.06.2021

DESIGNED: T.RYDEN
DRAWN: A.SCHMID
SURVEYING:
DATE: DECEMBER 2021
SCALE: AS SHOWN
SHEET SIZE: A1

NOT FOR CONSTRUCTION

MANAGE-DESIGN-ENGINEER PTY LTD
PROJECT MANAGEMENT-CIVIL ENGINEERING-DESIGN-SURVEYING
SUITE 1, 64 BALLINA STREET, LENNOX HEAD NSW 2478
PO Box 44 LENNOX HEAD NSW 2478
www.md-engineer.com.au
ABN: 88 607 109 357

CLIENT: CLIFTON YAMBA LAND PTY LTD

TITLE: PROPOSED MANUFACTURED HOUSING ESTATE

PROJECT: CARRS DRIVE
YAMBA NSW
LOT 2 DP733507

CIVIL DRAWING

DRAWING TITLE: SITE MASTERPLAN
YAMBA 1 & 2 OVER AERIAL IMAGE

DWG No: 01
SHEET: 1 OF 1
REV: 3

Property Report

120 CARRS DRIVE YAMBA 2464

Property Details

Address:	120 CARRS DRIVE YAMBA 2464
Lot/Section /Plan No:	2/-/DP733507
Council:	CLARENCE VALLEY COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Clarence Valley Local Environmental Plan 2011 (pub. 23-12-2011)
Land Zoning	C2 - Environmental Conservation: (pub. 5-11-2021) C3 - Environmental Management: (pub. 5-11-2021) R1 - General Residential: (pub. 23-12-2011)
Height Of Building	9 m
Floor Space Ratio	NA
Minimum Lot Size	6 ha
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Acid Sulfate Soils	Class 2
Local Provisions	Earthworks exclusion area
Urban Release Area	Urban Release Area

Greenfield Housing Code Area	Complying Development Code: https://www.planningportal.nsw.gov.au/greenfield-housing-code Building type: 1-2 storey homes, residential alterations and additions Development consent authority: Council or accredited certifier Note: Applications which meet all relevant requirements in the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be approved within 20 days. Exclusions may apply. https://legislation.nsw.gov.au/#/view/EPI/2008/572/full

Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Allowable Clearing Area (pub. 2-12-2021)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Subject Land (pub. 2-12-2021)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Subject Land (pub. 6-5-2018)
- State Environmental Planning Policy (Housing) 2021: Land Application (pub. 26-11-2021)
- State Environmental Planning Policy (Industry and Employment) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Planning Systems) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Primary Production) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Subject Land (pub. 2-12-2021)
- State Environmental Planning Policy (Resources and Energy) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Transport and Infrastructure) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

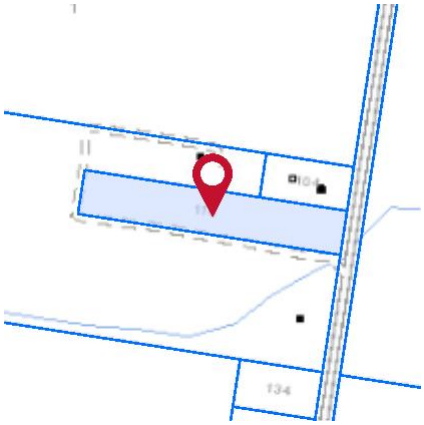
Other matters affecting the property

Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

Land near Electrical Infrastructure	This property may be located near electrical infrastructure and could be subject to requirements listed under ISEPP Clause 45. Please contact Essential Energy for more information.
Local Aboriginal Land Council	BIRRIGAN GARGLE
Regional Plan Boundary	North Coast

Property Report

110 CARRS DRIVE YAMBA 2464



Property Details

Address:	110 CARRS DRIVE YAMBA 2464
Lot/Section /Plan No:	32/-/DP1280863
Council:	CLARENCE VALLEY COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Clarence Valley Local Environmental Plan 2011 (pub. 23-12-2011)
Land Zoning	R1 - General Residential: (pub. 23-12-2011)
Height Of Building	9 m
Floor Space Ratio	NA
Minimum Lot Size	NA
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Acid Sulfate Soils	Class 2
Urban Release Area	Urban Release Area
Greenfield Housing Code Area	Complying Development Code: https://www.planningportal.nsw.gov.au/greenfield-housing-code Building type: 1-2 storey homes, residential alterations and additions Development consent authority: Council or accredited certifier Note: Applications which meet all relevant requirements in the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be approved within 20 days. Exclusions may apply. https://legislation.nsw.gov.au/#/view/EPI/2008/572/full

Detailed planning information

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- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Subject Land (pub. 2-12-2021)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Subject Land (pub. 6-5-2018)
- State Environmental Planning Policy (Housing) 2021: Land Application (pub. 26-11-2021)
- State Environmental Planning Policy (Industry and Employment) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Planning Systems) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Primary Production) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Land Application (pub. 2 -12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Subject Land (pub. 2-12 -2021)
- State Environmental Planning Policy (Resources and Energy) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Transport and Infrastructure) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

Property Report

110 CARRS DRIVE YAMBA 2464

Other matters affecting the property

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Land near Electrical Infrastructure	This property may be located near electrical infrastructure and could be subject to requirements listed under ISEPP Clause 45. Please contact Essential Energy for more information.
Local Aboriginal Land Council	BIRRIGAN GARGLE
Regional Plan Boundary	North Coast

APPENDIX C – STANDARD OPERATING PROCEDURES

SOP.PROC.001 - SOIL SAMPLING

1 PURPOSE AND SCOPE

This is a standard procedure for the collection of soil samples for environmental assessment. This procedure must be followed to ensure that soil samples are collected in an appropriate and consistent manner, that the soil sampling is appropriate for the media and analytes, and to allow the documentation of standard operating procedures used for soil sample collection and handling.

This procedure has been written for environmental soil sampling of *in situ* and *ex situ* soils and fills for general physical and chemical tests and non-volatile, semi-volatile, and volatile analyses.

2 DEFINITIONS

CoC - chain of custody form

OH&S - occupational health and safety

PID - photo-ionisation detector

VOCs - volatile organic compounds

3 REFERENCES

Guidance considered in preparing this standard operating procedure included:

- Australian Standard AS 4482.1. 2005. Guide to sampling and investigation of potentially contaminated soil, Part 1 Non-Volatile and semi-volatile compounds
- Australian Standard AS 4482.2. 1999. Guide to sampling and investigation of potentially contaminated soil, Part 2: Volatile substances
- Contaminated Sites: Sampling Design Guidelines. NSW Environmental Protection Authority (EPA 2005)
- National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater, National Environment Protection Council Service Corporation (NEPC 2013)

4 GENERAL

Sampling locations and depths should be clearly stated in a sampling analysis quality plan (SAQP) prior to commencement of fieldwork.

A health and safety plan (HSP) should be produced or Safe Work Method Statement induction completed prior to the commencement of any field work.

Soil samples should be representative of the target depth, media and environmental condition from which they are collected. Soil samples should not be influenced by the method of extraction or sampling from the soil.

Soil samples should not be retained if they have come into direct contact with machinery or sampling equipment that has not been decontaminated.

In general samples should be collected at the surface and at depth at regular intervals consistent with the lithology or contaminant transport encountered during the assessment. This may include soil profiles or horizons or areas of contamination or media.

The assessor must record all information on how the samples were taken in the geological log including refusal or exceedance of equipment reach. The geological log should clearly document the reason sampling was discontinued and a description of material if it continues to greater depths.

Surface samples should be 0 – 0.10 m or 0 – 0.15 m and samples from depth should not exceed a depth range of 0.5 m to avoid compositing effects. Some land uses may require shallower surface samples, e.g. banana lands 0.075 m, and this should be established as part of the SAQP.

As a general rule, never composite samples unless stated in the SAQP.

5 PROCEDURE

5.1 Sample collection

All personnel who will come into contact with the soil must always use clean disposable gloves for each sample. Prevention of contamination exposure to personnel and cross-contamination of samples is paramount in soil sampling.

All sampling equipment is to be decontaminated before use and between samples

5.2 Sample collection

Once collected, samples are to be transferred immediately to the appropriate sample container, ensuring that the container is filled to the top so that no head-space remains.

5.3 Hand tools

Hand tools, including spatulas, trowels, shovels, spades, etc, can be used to collect samples from the land surface, walls and floors of test pits or excavations, stockpiles, etc.

The surface to be sampled is first to be cleared of any organic material, e.g. grass and roots, and the sample collected from fresh, exposed soil. Fresh soil should be exposed prior to sampling to remove any smear affects from the sampling equipment. Soil peds or clods should be removed from the auger or trowel and split so that samples can be taken from the middle of the peds or clods. The sampler should not sample from exposed surfaces which may not be representative of contamination, especially where release of volatiles may have occurred from the exposed soil.

Test pits or excavations are not to be entered unless appropriate assessment of stability has been conducted and documented. Test pits over 1 m depth are not to be entered.

5.4 Test pits

The sampler should direct the excavator operator as to where the sample is to be collected and ensure the location is accurate. The sampler must be aware of the 'swing zone' of the machine and follow *SOP_PROC_008-Vehicle and heavy machinery operations.*

Sampling from excavator buckets is permissible, providing the procedures in *Section 5.1 – 5.3* are adhered to by the sampler, where appropriate, and the following sampling quality controls are observed by the sampler:

- The sample must be collected from within soil clods or material which has not contacted the excavator bucket
- The bucket must be screened with a PID prior to sampling where volatiles are a contaminant of concern.

5.5 Soil cores

For push tubes, split spoons, etc, samples should be transferred directly to the sampling container and procedures in *Section 5.1 – 5.3* adhered to by the sampler, where appropriate.

5.6 Augers

Samples should be collected from the auger with a trowel by cutting away the outside and collecting soil from the centre of the auger bit. Samples should then be transferred directly to the sampling container. Procedures in *Section 5.1 – 5.3* must be adhered to by the sampler, where appropriate.

5.7 Field screening for VOCs

If volatiles are a contaminant of concern and field screening using a photo-ionisation detector (PID) is required, a sample should also be transferred to a snap-lock plastic bag. Refer to SOP_PROC_011- Measurement of volatiles – PIDs for field screening procedure.

5.8 Composite sampling

Composite sampling is used to reduce analytical costs and involves the bulking and thorough mixing of soil samples (collected as above) to form one composite sample for laboratory analysis. Generally, compositing is not encouraged and should only be undertaken if specifically stated in the SAQP. Samples should be sent to the laboratory for compositing with appropriate instructions recorded on the CoC. Composite sampling must not be undertaken where volatile substances are present, including BTEXN compounds and F1 TRHs / TRHs C_6 – C_9, or soils that have a high clay content.

Composite samples must be collected from the same soil/fill horizon and no more than four sub-samples should be included in a composite sample. The sub-samples should be equal in size, from immediately adjacent sampling points, evenly spaced, and composited laterally.

6 SAMPLE CONTAINERS

Sample containers from a NATA laboratory, usually 125 mL to 250 mL clear glass jars, are to be used by the sampler. This will ensure the jars are decontaminated, clean and dry, and of the appropriate size and material. Ensure the appropriate preservative is present if required, and all jars have a gastight, non-absorptive seal, which allow no headspace. The laboratory should be contacted if numerous and/or specialty analytes are required, to confirm the required sample container type and size.

6.1 Sample labelling

Samples should be labelled clearly on the outside wall of the container with the project number, sampler's initials, sample location, depth of sample and the date. The sample location and depth should also be provided on the container lid. All labelling should be with water proof pens/markers.

The sample location number should be followed by either the sample depth or a letter, e.g. BH1 0.0 - 0.15 or TP3 A.

6.2 Sample handling, storage and dispatch

The soil jars, once filled with sample with no head space, are to be wiped clean and wrapped in bubble wrap/padding, and immediately placed in a cooler such as an Esky. Coolers should be kept out of direct sunlight, hot vehicles, etc, as far as practical, and appropriate cooling media added (ice or ice bricks) to ensure samples are kept below 4˚C. For longer term storage, samples should be kept below 4˚C in a fridge/freezer.

A chain of custody (CoC) form is to be filled out and the CoC is to be sent with the sample/s to the laboratories. The CoC/s is to be placed in a snap-lock plastic bag or plastic folder to prevent damage. All samples sent to the laboratories are to be included on the CoC/s, and if no analyses required, marked as 'Hold'.

If additional air space exists in the cooler, this should be filled with scrunched up newspaper, bubble wrap or similar to minimise movement of the samples. Coolers are to be secured with heavy tape and security seals, and clearly show the laboratory and sender contact information.

All samples, including QC samples, are to be transported to the primary and secondary laboratories. If dispatch is by courier, coolers are not to be dispatched on Fridays (or days before public holidays) unless delivery the next day has been organised.

If samples cannot be dispatched on the day of sampling with refreshed ice-blocks or ice for transport, then the samples are to be refrigerated until dispatch. The laboratory should be contacted if any delays to dispatch occur to confirm holding times available prior to extraction/analysis.

6.3 Sample location logging

A geological log is to be completed for each sample location by a qualified environmental scientist. Logs are to be completed for all sample locations, including surface samples and *ex situ* samples.

The log is to include:

- Job details, date, location, methods, climatic conditions
- Soil classification (material type and texture), colour, consistency or density, odour, staining, presence of artefacts, moisture content, sample number, and depth
- Depth of water inflow and/or groundwater level, if encountered, and comments regarding water if required; depth of excavation/drilling, excavation/drilling refusal and any field measurements taken or other relevant field observations.

7 QA DOCUMENTATION

A CoC is to be completed for all samples sent to the laboratories and/or to be analysed by the laboratories. Samples not to be analysed should be described as "Hold".

The CoC is to detail laboratory reference numbers (including quotes),site identification, the samplers initials, nature of the sample, collection time and date, analyses to be performed, sample preservation method, any relevant comments, e.g. level contamination expected, level of quality control required and dispatch information and signature.

7.1 QC samples

QC sampling should be documented in the SAQP, which should include trip spikes and trip blanks as prepared by the laboratory and should be organised through the laboratory prior to conducting the field work. Trip spikes and trip blanks should be held for as little time as possible prior to the field work, and should be kept below 4°C in a fridge/freezer. After sample collection, trip spikes and trip blanks are to be handled as a primary sample, and should also be included on the CoC.

APPENDIX D – DATA TABLES

Table A.1: Soil results

12 July 2022		Screen testing				Chromium Reducible Sulfur suite (mol H+/t)				
Borehole	Sample depth	pH_F	pH_{FOX}	Change	Reaction	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)
		Laboratory limit of reporting								
		0.1	0.1	0.1	1	0.1	2	10	10	10
BH1	0	5.9	2.9	3.0	2	5.1	31	12	43	**43**
BH1	0.25	6.1	3.1	3.0	2	-	-	-	-	-
BH1	0.5	6	4.9	1.1	1	5.8	4	<10	13	13
BH1	0.75	6.3	5.4	0.9	1	-	-	-	-	-
BH1	1	6.1	4.8	1.3	1	5.7	4	<10	13	13
BH1	1.25	5.9	4.5	1.4	1	-	-	-	-	-
BH1	1.5	6.1	1.8	4.3	4	5.4	6	123	129	**129**
BH1	1.75	6	1.8	4.2	4	-	-	-	-	-
BH1	2	6.3	1.8	4.5	4	-	-	-	-	-
BH1	2.25	6.3	2.3	4.0	4	-	-	-	-	-
BH1	2.5	7.4	2	5.4	4	5.6	4	121	125	**125**
BH1	2.75	7.7	3.7	4.0	2	-	-	-	-	-
BH2	0	6.6	3.3	3.3	3	4.9	66	<10	74	**74**
BH2	0.25	6.6	3.8	2.8	2	-	-	-	-	-
BH2	0.5	6.6	5.1	1.5	1	-	-	-	-	-
BH2	0.75	6.3	4.9	1.4	1	-	-	-	-	-
BH2	1	6.4	4.3	2.1	2	-	-	-	-	-
BH2	1.25	6.3	2.1	4.2	4	-	-	-	-	-
BH2	1.5	6.1	1.8	4.3	4	-	-	-	-	-
BH2	1.75	6.3	2.1	4.2	4	-	-	-	-	-
BH3	0	6.1	2.8	3.3	3	4.5	128	10	138	**138**
BH3	0.25	6.2	3.6	2.6	2	-	-	-	-	-
BH3	0.5	6.4	4.6	1.8	2	-	-	-	-	-
BH3	0.75	6.4	5	1.4	1	-	-	-	-	-
BH3	1	6.3	4.2	2.1	2	-	-	-	-	-
BH3	1.25	6.3	1.8	4.5	4	-	-	-	-	-
BH3	1.5	6.4	1.8	4.6	4	-	-	-	-	-
BH3	1.75	7.1	1.8	5.3	4	-	-	-	-	-
BH4	0	6.6	2.7	3.9	3	5.4	17	24	41	**41**
BH4	0.25	6.8	3.2	3.6	3	-	-	-	-	-
BH4	0.5	7.2	4.1	3.1	2	5.8	9	17	26	**26**
BH4	1	7.2	1.4	5.8	4	5.9	2	139	142	**142**
BH4	1.25	7.2	1.6	5.6	4	-	-	-	-	-
BH4	1.5	7	2	5.0	4	5.7	3	116	120	**120**
BH4	1.75	6.9	1.6	5.3	4	-	-	-	-	-
BH4	2	6.8	1.9	4.9	4	-	-	-	-	-
BH4	2.25	7.4	1.9	5.5	4	6	<2	94	94	**94**
BH5	0	6.5	4.6	1.9	3	-	-	-	-	-
BH5	0.5	6.7	5.3	1.4	1	-	-	-	-	-
BH5	0.75	6.4	5.3	1.1	1	-	-	-	-	-
BH5	1	5.6	3.3	2.3	2	-	-	-	-	-
BH5	1.25	5.1	1.8	3.3	4	-	-	-	-	-
BH5	1.5	5	2	3.0	4	-	-	-	-	-
BH5	1.75	5.4	1.8	3.6	4	-	-	-	-	-
Action criteria - disturbances > 1,000 m^3										**18**

Notes:

nd denotes laboratory limits of detection

- denotes not applicable or no criterion

Action criteria applicable to disturbances of untreated soil > 1,000 m^3 - Refer Section 4.1 of the Soil Management Guidelines (Dear et. al. 2014).

Performance criteria applicable to soil treated using neutralisation - Refer Section 8.2.1 of the Soil Management Guidelines (Dear et. al. 2014) for allowable variations in net acidity greater than laboratory limit of reporting.

BOLD denotes non-compliance with action / performance criteria.

Table A.2: Soil results

12 July 2022		Screen testing				Chromium Reducible Sulfur suite (mol H+/t)				
Borehole	Sample depth	pH_F	pH_{FOX}	Change	Reaction	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)
		Laboratory limit of reporting								
		0.1	0.1	0.1	1	0.1	2	10	10	10
BH6	0	5.6	2.9	2.7	3	5.3	12	14	26	**26**
BH6	0.25	5.7	2.6	3.1	3	-	-	-	-	-
BH6	0.5	5.6	2.5	3.1	3	4.7	45	16	61	**61**
BH6	0.75	5.8	3.1	2.7	3	-	-	-	-	-
BH6	1	6.1	4.1	2.0	2	5.2	15	12	27	**27**
BH6	1.25	5.7	3	2.7	2	-	-	-	-	-
BH6	1.5	6	1.9	4.1	4	5.3	10	88	97	**97**
BH6	1.75	6.2	1.8	4.4	4	-	-	-	-	-
BH6	2	6.3	2	4.3	4	-	-	-	-	-
BH6	2.25	6.3	2	4.3	4	-	-	-	-	-
BH6	2.5	6.2	2.1	4.1	4	5.4	8	100	108	**108**
BH6	2.75	5.6	1.8	3.8	4	-	-	-	-	-
BH7	0	5.4	3.5	1.9	3	4.6	106	11	117	**117**
BH7	0.25	5.8	3.8	2.0	2	-	-	-	-	-
BH7	0.5	5.4	4.7	0.7	2	-	-	-	-	-
BH7	0.75	6	4.6	1.4	2	-	-	-	-	-
BH7	1	5.5	2.1	3.4	4	-	-	-	-	-
BH7	1.25	5.6	1.7	3.9	4	-	-	-	-	-
BH7	1.5	5.9	1.8	4.1	4	-	-	-	-	-
BH7	1.75	6	1.6	4.4	4	-	-	-	-	-
BH8	0	5.7	2.4	3.3	3	4.8	40	<10	49	**49**
BH8	0.25	5.7	2.9	2.8	3	4.7	44	11	55	**55**
BH8	0.5	5.8	4.2	1.6	1	5.8	<2	12	12	12
BH8	0.75	5.6	3.6	2.0	1	-	-	-	-	-
BH8	1	5.9	2	3.9	1	-	-	-	-	-
BH8	1.25	6	2.1	3.9	4	-	-	-	-	-
BH8	1.5	5.8	2.3	3.5	4	-	-	-	-	-
BH8	1.75	5.8	2	3.8	4	-	-	-	-	-
BH9	0	5.8	2.4	3.4	3	4.6	79	18	98	**98**
BH9	0.25	5.9	2.8	3.1	3	-	-	-	-	-
BH9	0.5	6.2	3.8	2.4	1	5.8	<2	<10	<10	<10
BH9	0.75	6.3	4.2	2.1	1	-	-	-	-	-
BH9	1	6.4	2	4.4	1	5.6	3	23	26	**26**
BH9	1.25	5.6	1.9	3.7	1	-	-	-	-	-
BH9	1.5	5.1	1.8	3.3	1	5.2	7	77	84	**84**
BH9	1.75	5.2	1.7	3.5	1	-	-	-	-	-
BH10	0	5.4	2.6	2.8	3	4.8	42	14	56	**56**
BH10	0.25	5.7	3.5	2.2	2	-	-	-	-	-
BH10	0.5	5.4	3	2.4	2	-	-	-	-	-
BH10	0.75	5.7	2.5	3.2	2	-	-	-	-	-
BH10	1	5.8	2.2	3.6	4	-	-	-	-	-
BH10	1.25	5.7	2.1	3.6	4	-	-	-	-	-
BH10	1.5	5.5	2	3.5	4	-	-	-	-	-
BH10	1.75	5.6	2.3	3.3	4	-	-	-	-	-
Action criteria - disturbances > 1,000 m^3										**18**

Notes:

nd denotes laboratory limits of detection

- denotes not applicable or no criterion

Action criteria applicable to disturbances of untreated soil > 1,000 m^3 - Refer Section 4.1 of the Soil Management Guidelines (Dear et. al. 2014).

Performance criteria applicable to soil treated using neutralisation - Refer Section 8.2.1 of the Soil Management Guidelines (Dear et. al. 2014) for allowable variations in net acidity greater than laboratory limit of reporting.

BOLD denotes non-compliance with action / performance criteria.

Table A.3: Soil results

12 July 2022		Screen testing				Chromium Reducible Sulfur suite (mol H+/t)				
Borehole	Sample depth	pH_F	pH_{FOX}	Change	Reaction	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)
		Laboratory limit of reporting								
		0.1	0.1	0.1	1	0.1	2	10	10	10
BH11	0	5.8	2.7	3.1	3	6.1	4	12	16	16
BH11	0.25	5.7	2.8	2.9	3	-	-	-	-	-
BH11	0.5	5	3	2.0	3	5.1	32	<10	39	**39**
BH11	0.75	5.1	2.5	2.6	3	4.8	49	<10	57	**57**
BH11	1	5.5	2.6	2.9	3	5.5	8	<10	16	16
BH11	1.25	5.5	2.2	3.3	1	-	-	-	-	-
BH11	1.5	5.3	2.2	3.1	4	5.4	5	132	138	**138**
BH11	1.75	5.2	2.1	3.1	4	-	-	-	-	-
BH11	2	5.5	2	3.5	4	-	-	-	-	-
BH11	2.25	5.4	2	3.4	4	-	-	-	-	-
BH11	2.5	5.5	2	3.5	4	5.5	4	118	122	**122**
BH11	2.75	5.5	2.2	3.3	4	-	-	-	-	-
BH12	0	5.3	2.9	2.4	2	4.6	66	<10	74	**74**
BH12	0.25	5.6	3	2.6	2	-	-	-	-	-
BH12	0.5	5.6	4.2	1.4	1	-	-	-	-	-
BH12	0.75	5.5	3.6	1.9	1	-	-	-	-	-
BH12	1	5.9	2	3.9	4	-	-	-	-	-
BH12	1.25	5.4	2	3.4	4	-	-	-	-	-
BH12	1.5	5.4	2.1	3.3	4	-	-	-	-	-
BH12	1.75	5.2	2.1	3.1	4	-	-	-	-	-
BH13	0	5.3	2.1	3.2	3	4.6	87	<10	96	**96**
BH13	0.25	4.8	2.7	2.1	3	-	-	-	-	-
BH13	0.5	6	3	3.0	2	-	-	-	-	-
BH13	0.75	5.9	3.8	2.1	1	-	-	-	-	-
BH13	1	6	2.1	3.9	4	-	-	-	-	-
BH13	1.25	6	2.1	3.9	4	-	-	-	-	-
BH13	1.5	5.9	2	3.9	4	-	-	-	-	-
BH13	1.75	6	2.1	3.9	4	-	-	-	-	-
BH14	0	5.5	2.8	2.7	3	4.5	124	15	138	**138**
BH14	0.25	5.6	3.3	2.3	1	-	-	-	-	-
BH14	0.5	5.5	3.6	1.9	1	5.6	4	<10	13	13
BH14	0.75	5.9	3.4	2.5	1	-	-	-	-	-
BH14	1	5.9	2	3.9	4	5.3	7	67	74	**74**
BH14	1.25	6.2	2	4.2	4	-	-	-	-	-
BH14	1.5	6	2.1	3.9	4	5	11	58	69	**69**
BH14	1.75	6.1	2	4.1	4	-	-	-	-	-
BH15	0	5.7	3	2.7	3	4.6	108	13	121	**121**
BH15	0.25	5.6	3.3	2.3	3	-	-	-	-	-
BH15	0.5	6.3	3.6	2.7	1	5.8	4	<10	14	14
BH15	0.75	6.4	4.3	2.1	1	-	-	-	-	-
BH15	1	6.6	1.9	4.7	1	5.6	4	67	71	**71**
BH15	1.25	6.8	2.1	4.7	4	-	-	-	-	-
BH15	1.5	6.9	2	4.9	1	-	-	-	-	-
BH15	1.75	7	1.9	5.1	1	-	-	-	-	-
Action criteria - disturbances > 1,000 m^3										**18**

Notes:

nd denotes laboratory limits of detection

- denotes not applicable or no criterion

Action criteria applicable to disturbances of untreated soil > 1,000 m^3 - Refer Section 4.1 of the Soil Management Guidelines (Dear et. al. 2014).

Performance criteria applicable to soil treated using neutralisation - Refer Section 8.2.1 of the Soil Management Guidelines (Dear et. al. 2014) for allowable variations in net acidity greater than laboratory limit of reporting.

BOLD denotes non-compliance with action / performance criteria.

Table B.1: Fill soils chromium suite results and calculated liming rates

12 July 2022				Chromium Reducible Sulfur suite (mol H+/t)					Calculated liming rate (kg $CaCO_3$ / m^3)
Borehole	Sample depth	Predominant soil type	Wet	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)	
				Limit of reporting					
				0.1	2	10	10	10	
BH6	0.5	Clay - F	No	4.7	45	16	61	61	8.5
BH8	0	Clay - F	No	4.8	40	5	49	49	6.8
BH8	0.25	Clay - F	No	4.7	44	11	55	55	7.7
BH11	0.5	Clay - F	No	5.1	32	5	39	39	5.4
Statistics									
Minimum				4.7	32	5	39	39	5.4
Mean				4.8	40.3	9.3	51.0	51.0	7.1
Median				4.75	42	8	52	52	7.2
Maximum				5.1	45	16	61	61	8.5
95%ile				5.1	44.9	15.3	60.1	60.1	8.4
Standard deviation				0.2	5.9	5.3	9.4	9.4	

Table notes:
Half LOR applied for results less than laboratory detection limits (grey shaded cells)

Table B.2: Natural clay chromium suite results and calculated liming rates

12 July 2022				Chromium Reducible Sulfur suite (mol H+/t)					Calculated liming rate (kg $CaCO_3$ / m^3)
Borehole	Sample depth	Predominant soil type	Wet	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)	
				Limit of reporting					
				0.1	2	10	10	10	
BH1	0	Clay - N	No	5.1	31	12	43	43	6.0
BH4	0	Clay - N	No	5.4	17	24	41	41	5.7
BH7	0	Clay - N	No	4.6	106	11	117	117	16.3
BH12	0	Clay - N	No	4.6	66	5	74	74	10.3
BH13	0	Clay - N	No	4.6	87	5	96	96	13.4
BH14	0	Clay - N	No	4.5	124	15	138	138	19.2
BH15	0	Clay - N	No	4.6	108	13	121	121	16.8
BH2	0	Clay - N	No	4.9	66	5	74	74	10.3
BH3	0	Clay - N	No	4.5	128	10	138	138	19.2
BH9	0	Clay - N	No	4.6	79	18	98	98	13.6
BH10	0	Clay - N	No	4.8	42	14	56	56	7.8
BH4	0.5	Clay - N	No	5.8	9	17	26	26	3.6
BH9	0.5	Clay - N	No	5.8	1	5	5	5	0.7
BH11	0.75	Clay - N	No	4.8	49	5	57	57	7.9
Statistics									
Minimum				4.5	1	5	5	5	0.7
Mean				4.9	67.8	11.3	80.1	80.1	11.1
Median				4.6	66	11	74	74	10.3
Maximum				5.8	128	24	138	138	19.2
95%ile				5.8	125.6	20.4	138.0	138.0	19.2
Standard deviation				0.5	42.7	6.2	42.4	42.4	

Table notes:

Half LOR applied for results less than laboratory detection limits (grey shaded cells)

Table B.3: Natural sand chromium suite results and calculated liming rates

12 July 2022				Chromium Reducible Sulfur suite (mol H+/t)					Calculated liming rate (kg $CaCO_3$ / m^3)
Borehole	Sample depth	Predominant soil type	Wet	pH-KCl	Titratable actual acidity	S_{Cr}	Net acidity	Net acidity not including ANC (mol H^+/t)	
				Limit of reporting					
				0.1	2	10	10	10	
BH8	0.5	Sand - N	Yes	5.8	1	12	12	12	1.7
BH1	0.5	Sand - N	Yes	5.8	4	5	13	13	1.8
BH14	0.5	Sand - N	Yes	5.6	4	5	13	13	1.8
BH15	0.5	Sand - N	Yes	5.8	4	5	14	14	1.9
BH4	1	Sand - N	Yes	5.9	2	139	142	142	19.8
BH9	1	Sand - N	Yes	5.6	3	23	26	26	3.6
BH11	1	Sand - N	No	5.5	8	5	16	16	2.2
BH14	1	Sand - N	Yes	5.3	7	67	74	74	10.3
BH1	1	Sand - N	Yes	5.7	4	5	13	13	1.8
BH6	1	Sand - N	Yes	5.2	15	12	27	27	3.8
BH15	1	Sand - N	Yes	5.6	4	67	71	71	9.9
BH1	1.5	Sand - N	Yes	5.4	6	123	129	129	17.9
BH4	1.5	Sand - N	Yes	5.7	3	116	120	120	16.7
BH6	1.5	Sand - N	Yes	5.3	10	88	97	97	13.5
BH9	1.5	Sand - N	Yes	5.2	7	77	84	84	11.7
BH11	1.5	Sand - N	Yes	5.4	5	132	138	138	19.2
BH14	1.5	Sand - N	Yes	5	11	58	69	69	9.6
BH4	2.25	Sand - N	Yes	6	1	94	94	94	13.1
BH1	2.5	Sand - N	Yes	5.6	4	121	125	125	17.4
BH6	2.5	Sand - N	Yes	5.4	8	100	108	108	15.0
BH11	2.5	Sand - N	Yes	5.5	4	118	122	122	17.0
Statistics									
Minimum				5	1	5	13	13	1.8
Mean				5.5	5.7	68.0	74.8	74.8	10.4
Median				5.55	4	72	79	79	11.0
Maximum				6	15	139	142	142	19.8
95%ile				5.9	11.2	132.4	138.2	138.0	19.2
Standard deviation				0.3	3.4	49.8	47.9	47.9	

Table notes:

Half LOR applied for results less than laboratory detection limits (grey shaded cells)

APPENDIX E – SOIL PROFILE DESCRIPTIONS

Table A. Soil profile description and sample analysis logs

Client:	Easterly Point Environmental			**Site Address:**	120 Carrs Drive, Yamba, New South Wales		**Commenced**	12 July 2022	**Key Results**		
							Completed:	12 July 2022			
Project:	Acid Sulfate Soil Investigation and Management Plan			**RPD:**	Lot 2 DP733507 and Lot 32 DP1280863		**Logged by:**	Chris Butler			
Project Number:	PE3394.22			**Equipment Type:**	Track mounted rig - solid stem augers		**Checked by:**	Sean Gardiner			

BOREHOLE	FILL/NATURAL	DEPTH (m)	MATERIAL CLASSIFICATION	MATERIAL CONSTITUENTS	COLOUR	OTHER MATERIALS	SEEPAGE	ODOUR	FIELD SCREEN SAMPLE DEPTH	CHROMIUM SUITE SAMPLE DEPTH	Titratable actual acidity results (mol H^+/t)	S_{cr} (potential acidity)	Net acidity not including ANC (mol H^+/t)
BH1	Natural	0.0	Sandy Light Clay	Fine to medium grained sand, moist	Brown	Organics	Nil	Nil	0.0 - 0.25	0.0 - 0.25	31	12	43
		0.25	Sandy Light to Medium Clay	Fine to medium grainded sand, moist	Brown	Trace organics	Nil	Nil	0.25 - 0.5	-	-	-	-
		0.5	Sand	Fine to medium grained, wet	Yellow brown	Trace silt	Yes	Nil	0.5 - 0.75	0.5 - 0.75	4	<10	13
									0.75 - 1.0	-	-	-	-
									1.0 - 1.25	1.0 - 1.25	4	<10	13
		1.25	Sand	Fine to medium grained, wet	Grey	Trace silt	Nil	Nil	1.25 - 1.5	-	-	-	-
									1.5 - 1.75	1.5 - 1.75	6	123	129
									1.75 - 2.0	-	-	-	-
									2.0 - 2.25	-	-	-	-
									2.25 - 2.5	-	-	-	-
									2.5 - 2.75	2.5 - 2.75	4	121	125
									2.75 - 3.0	-	-	-	-
		3.0	Borehole terminated										
BH2	Natural	0.0	Silty Medium Clay	Moist	Dark grey	Trace fine grained sand	Nil	Nil	0.0 - 0.25	0.0 - 0.25	66	<10	74
		0.25	Sandy Light to Medium Clay	Fine to medium grained sand, moist	Grey yellow orange	-	Nil	Nil	0.25 - 0.4	-	-	-	-
		0.40	Clayey Sand	Fine to medium grained sand, moist	Grey yellow orange	-	Nil	Nil	-	-	-	-	-
		0.50	Sand	Fine to medium grained, wet	Grey	-	Yes	Nil	0.5 - 0.75	-	-	-	-
		1.25	Sand	Fine to medium grained, wet	Grey	Trace silt	Nil	Nil	1.25 - 1.5	-	-	-	-
		2.0	Borehole terminated										
BH3	Natural	0.0	Silty Medium Clay	Moist	Dark grey	Trace fine grained sand	Nil	Nil	0.0 - 0.25	0.0 - 0.25	128	10	138
		0.25	Sandy Medium Clay	Fine to medium grained sand, abundant organics, moist	Grey orange brown mottled	-	Nil	Nil	0.25 - 0.5	-	-	-	-
		0.50	Sand	Fine grained, wet	Yellow brown	-	Yes	Nil	0.5 - 0.75	-	-	-	-
									0.75 - 1.0	-	-	-	-
									1.0 - 1.2	-	-	-	-
		1.20	Sand	Fine grained, wet	Grey	-	Nil	Nil	1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH4	Natural	0.0	Sandy Medium Clay	Fine to coarse grained sand, moist to very moist	Brown	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	17	24	41
									0.25 - 0.5	-	-	-	-
		0.5	Sandy Heavy Clay	Fine to medium grained sand, moist	Brown with orange mottles	-	Nil	Nil	0.5 - 0.75	0.5 - 0.75	9	17	26
									0.75 - 0.9	-	-	-	-
		0.9	Silty Sand	Fine to coarse grained sand, wet	Grey	-	Yes	Nil	1.0 - 1.25	1.0 - 1.25	2	139	142
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	1.5 - 1.75	3	116	120
									1.75 - 2.0	-	-	-	-
									2.0 - 2.25	-	-	-	-
									2.25 - 2.5	2.25 - 2.5	<2	94	94
		3.0	Borehole terminated										
BH5	Natural	0.0	Clayey Sand	Fine to coarse grained sand, very moist	Dark grey	-	Nil	Nil	0.0 - 0.25	-	-	-	-
		0.4	Sand	Fine to medium grained, very moist	Brown grey with orange mottles	-	Nil	Nil	0.5 - 0.75	-	-	-	-
									0.75 - 0.9	-	-	-	-
		0.9	Sand	Fine to medium grained, wet	Brown grey with orange	-	Yes	Nil	1.0 - 1.1	-	-	-	-
		1.1	Sand	Fine to medium grained, wet	Grey	-	Nil	Nil	1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
									2.0 - 2.25	-	-	-	-
		3.0	Borehole terminated										
BH6	Fill	0.0	Clayey Sand	Fine to medium grained sand, moist	Orange grey brown	-	Nil	Nil	0.0 - 0.2	0.0 - 0.2	12	14	26
		0.2	Sandy Light Clay	Fine to medium grained sand, moist	Grey black	-	Nil	Nil	0.25 - 0.5	-	-	-	-
									0.5 - 0.75	0.5 - 0.75	45	16	61
									0.75 - 0.8	-	-	-	-
	Natural	0.8	Clayey Sand	Fine to coarse grained sand, wet	Brown grey	-	Yes	Nil	-	-	-	-	-
		1.0	Sand	Fine to coarse grained, wet	Brown grey with orange mottles	-	Nil	Nil	1.0 - 1.25	1.0 - 1.25	15	12	27
									1.25 - 1.5	-	-	-	-
		1.5	Sand	Fine to coarse grained, wet	Grey	-	Nil	Nil	1.5 - 1.75	1.5 - 1.75	10	88	97
									1.75 - 2.0	-	-	-	-
									2.0 - 2.25	-	-	-	-
									2.25 - 2.5	-	-	-	-
									2.5 - 2.75	2.5 - 2.75	8	100	107
									2.75 - 3.0	-	-	-	-
		3.0	Borehole terminated										
BH7	Natural	0.0	Sandy silty medium clay	Fine to medium grained sand, moist	Dark brown	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	106	11	117
		0.25	Clayey Sand	Fine to coarse grained sand, very moist	Yellow brown	-	Nil	Nil	0.25 - 0.4	-	-	-	-
		0.4	Sand	Fine to coarse grained, wet	Grey yellow brown	-	Yes	Nil	0.5 - 0.75	-	-	-	-
									0.75 - 1.0	-	-	-	-
									1.0 - 1.25	-	-	-	-
		1.25	Sand	Fine to coarse grained, wet	Grey	-	Nil	Nil	1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH8	Fill	0.0	Sandy Light Clay	Fine to medium grained sand, moist	Dark grey with brown mottles	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	40	<10	49
		0.25	Silty Sandy Heavy Clay	Fine to medium grained sand, moist	Grey with orange mottles	-	Nil	Nil	0.25 - 0.5	0.25 - 0.5	44	11	55
	Natural	0.5	Sand	Fine to medium grained, wet	Grey	-	Yes	Nil	0.5 - 0.75	0.5 - 0.75	<2	12	12
									0.75 - 1.0	-	-	-	-
									1.0 - 1.25	-	-	-	-
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										

Table A. Soil profile description and sample analysis logs

Client:	Easterly Point Environmental			**Site Address:**		110 - 120 Carrs Drive, Yamba, New South Wales		**Commenced**	12 July 2022	**Key Results**		
								Completed:	12 July 2022			
Project:	Acid Sulfate Soil Investigation and Management Plan			**RPD:**		Lot 2 DP733507 and Lot 32 DP1280863		**Logged by:**	Chris Butler			
Project Number:	PE3394.22				**Equipment Type:**	Track mounted rig solid stem augers		**Checked by:**	Sean Gardiner			

BOREHOLE	FILL/NATURAL	DEPTH (m)	MATERIAL CLASSIFICATION	MATERIAL CONSTITUENTS	COLOUR	OTHER MATERIALS	SEEPAGE	ODOUR	FIELD SCREEN SAMPLE DEPTH	CHROMIUM SUITE SAMPLE DEPTH	Titratable actual acidity results (mol H^+/t)	S_{cr} (potential acidity)	Net acidity not including ANC (mol H^+/t)
BH9	Natural	0.0	Sandy Light Clay	Fine to medium grained, sand, moist	Dark grey	Trace tree roots and	Nil	Nil	0.0 - 0.25	0.0 - 0.25	79	18	98
		0.25	Sandy Medium Clay	Fine to medium grained sand, moist to very moist	Grey with orange mottles	-	Nil	Nil	0.25 - 0.5	-	-	-	-
									0.5 - 0.7	0.5 - 0.7	<2	<10	<10
		0.7	Sand	Fine to medium grained, wet	Brown	-	Yes	Nil	0.75 - 1.0	-	-	-	-
		1.0	Sand	Fine to medium grained, wet	Grey	Trace of silt	Nil	Nil	1.0 - 1.25	1.0 - 1.25	3	23	26
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	1.5 - 1.75	7	77	84
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH10	Natural	0.0	Sandy Light to Medium Clay	Fine to medium grained sand, moist	Dark grey	Trace tree roots	Nil	Nil	0.0 - 0.25	0.0 - 0.25	42	14	56
		0.25	Clayey Sand	Fine to medium grained sand, wet	Grey brown	-	Yes	Nil	0.25 - 0.4	-	-	-	-
		0.4	Sand	Fine to medium grained, wet	Yellow brown	-	Nil	Nil	0.5 - 0.75	-	-	-	-
									0.75 - 1.0	-	-	-	-
		0.9	Sand	Fine to medium grained, wet	Grey	-	Nil	Nil	1.0 - 1.25	-	-	-	-
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH11	Fill	0.0	Sand	Fine to medium grained, moist	Grey	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	4	12	16
		0.25	Sandy Light Clay	Fine to medium grained sand, moist	Grey with dark grey mottles	-	Nil	Nil	0.25 - 0.5	-	-	-	-
									0.5 - 0.75	0.5 - 0.75	32	<10	39
	Natural	0.75	Sandy Light Clay	Fine to medium grained sand, moist	Dark grey	Trace organics	Nil	Nil	0.75 - 0.95	0.75 - 0.95	49	<10	57
		0.95	Sand	Fine to medium grained, moist	Grey	-	Nil	Nil	1.0 - 1.2	1.0 - 1.2	8	<10	16
		1.2	Sand	Fine to medium grained, moist	Light grey	-	Nil	Nil	1.25 - 1.5	-	-	-	-
		1.5	Sand	Fine to medium grained, wet	Light grey	-	Yes	Nil	1.5 - 1.75	1.5 - 1.75	5	132	138
									1.75 - 2.0	-	-	-	-
									2.0 - 2.25	-	-	-	-
									2.25 - 2.5	-	-	-	-
									2.5 - 2.75	2.5 - 2.75	4	118	122
									2.75 - 3.0	-	-	-	-
		3.0	Borehole terminated										
BH12	Natural	0.0	Silty Medium Clay	-	Brown	Moderate organics	Nil	Nil	0.0 - 0.25	0.0 - 0.25	66	<10	74
		0.25	Sand	Fine to coarse grained, wet	Brown	-	Yes	Nil	0.25 - 0.5	-	-	-	-
									0.5 - 0.75	-	-	-	-
									0.75 - 1.0	-	-	-	-
		1.0	Sand	Fine to coarse grained, wet	Grey	-	Nil	Nil	1.0 - 1.25	-	-	-	-
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH13	Natural	0.0	Sandy Light Clay	Fine to medium grained sand, very moist	Dark brown	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	87	<10	96
		0.25	Sandy Light Clay	Fine to medium grained sand, very moist	Grey with orange mottles	-	Nil	Nil	0.25 - 0.5	-	-	-	-
		0.5	Sand	Fine to coarse grained, wet	Brown grey	-	Yes	Nil	0.5 - 0.75	-	-	-	-
									0.75 - 1.0	-	-	-	-
									1.0 - 1.25	-	-	-	-
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH14	Natural	0.0	Sandy Light Clay	Fine to medium grained sand, very moist	Dark brown	-	Nil	Nil	0.0 - 0.2	0.0 - 0.2	124	15	138
		0.2	Sandy Light Clay	Fine to medium grained sand, very moist	Grey with orange mottles	-	Nil	Nil	0.25 - 0.5	-	-	-	-
		0.5	Sand	Fine to coarse grained, wet	Grey orange	-	Yes	Nil	0.5 - 0.75	0.5 - 0.75	4	<10	13
									0.75 - 1.0	-	-	-	-
		1.0	Sand	Fine to coarse grained, wet	Grey	-	Nil	Nil	1.0 - 1.25	1.0 - 1.25	7	67	74
									1.25 - 1.5	-	-	-	-
									1.5 - 1.75	1.5 - 1.75	11	69	69
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										
BH15	Natural	0.0	Sandy Light Clay	Fine to medium grained sand, very moist	Dark brown	-	Nil	Nil	0.0 - 0.25	0.0 - 0.25	108	13	121
		0.25	Sandy Light Clay	Fine to medium grained sand, very moist	Grey with orange mottles	-	Nil	Nil	0.25 - 0.5	-	-	-	-
		0.5	Sand	Fine to coarse grained, wet	Grey brown	-	Yes	Nil	0.5 - 0.75	0.5 - 0.75	4	<10	14
									0.75 - 1.0	-	-	-	-
									1.0 - 1.25	1.0 - 1.25	4	67	71
									1.25 - 1.5	-	-	-	-
		1.5	Sand	Fine to coarse grained, wet	Grey	-	Nil	Nil	1.5 - 1.75	-	-	-	-
									1.75 - 2.0	-	-	-	-
		2.0	Borehole terminated										

APPENDIX F – LABORATORY CERTIFICATES OF ANALYSIS

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB2220520**

Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@preciseenvironmental.com.au	E-mail	: nidhi.bhimani@alsglobal.com
Telephone	: ----	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: PE3394.22	Page	: 1 of 4
Order number	: PE3394.22	Quote number	: EB2017PREENV0003 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CHRIS BUTLER, SEAN GARDINER		

Dates

Date Samples Received	: 14-Jul-2022 11:35	Issue Date	: 14-Jul-2022
Client Requested Due Date	: 21-Jul-2022	Scheduled Reporting Date	: **21-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 3.8, 5.0, 3.4, 4.4°C - Ice present
Receipt Detail	: HARD ESKY	No. of samples received / analysed	: 68 / 68

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised that the container for "BH10 1.75"(ALS ID#24) was received, labelled as "10". As all other "BH10" samples have been accounted for, this container will be reported as this sample. If you wish to discuss this further, please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- **SPLIT WORK ORDER: It should be noted that ALS has split this work order over the following work orders EB2220520 and EB2220427 due to the size of the sample numbers. For any further information regarding this processing of samples please contact ALS client services division on ALSEnviro.Brisbane@alsglobal.com**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EB2220520-001	12-Jul-2022 00:00	BH8 0.0		✓
EB2220520-002	12-Jul-2022 00:00	BH8 0.25		✓
EB2220520-003	12-Jul-2022 00:00	BH8 0.50		✓
EB2220520-004	12-Jul-2022 00:00	BH8 0.75		✓
EB2220520-005	12-Jul-2022 00:00	BH8 1.00		✓
EB2220520-006	12-Jul-2022 00:00	BH8 1.25		✓
EB2220520-007	12-Jul-2022 00:00	BH8 1.50		✓
EB2220520-008	12-Jul-2022 00:00	BH8 1.75		✓
EB2220520-009	12-Jul-2022 00:00	BH9 0.0		✓
EB2220520-010	12-Jul-2022 00:00	BH9 0.25		✓
EB2220520-011	12-Jul-2022 00:00	BH9 0.50		✓
EB2220520-012	12-Jul-2022 00:00	BH9 0.75		✓
EB2220520-013	12-Jul-2022 00:00	BH9 1.00		✓
EB2220520-014	12-Jul-2022 00:00	BH9 1.25		✓
EB2220520-015	12-Jul-2022 00:00	BH9 1.50		✓
EB2220520-016	12-Jul-2022 00:00	BH9 1.75		✓
EB2220520-017	12-Jul-2022 00:00	BH10 0.0		✓
EB2220520-018	12-Jul-2022 00:00	BH10 0.25		✓
EB2220520-019	12-Jul-2022 00:00	BH10 0.50		✓
EB2220520-020	12-Jul-2022 00:00	BH10 0.75		✓
EB2220520-021	12-Jul-2022 00:00	BH10 1.00		✓
EB2220520-022	12-Jul-2022 00:00	BH10 1.25		✓
EB2220520-023	12-Jul-2022 00:00	BH10 1.50		✓
EB2220520-024	12-Jul-2022 00:00	BH10 1.75		✓
EB2220520-025	12-Jul-2022 00:00	BH11 0.0	✓	✓
EB2220520-026	12-Jul-2022 00:00	BH11 0.25		✓
EB2220520-027	12-Jul-2022 00:00	BH11 0.50	✓	✓
EB2220520-028	12-Jul-2022 00:00	BH11 0.75		✓
EB2220520-029	12-Jul-2022 00:00	BH11 1.00	✓	✓
EB2220520-030	12-Jul-2022 00:00	BH11 1.25		✓
EB2220520-031	12-Jul-2022 00:00	BH11 1.50	✓	✓
EB2220520-032	12-Jul-2022 00:00	BH11 1.75		✓
EB2220520-033	12-Jul-2022 00:00	BH11 2.00		✓
EB2220520-034	12-Jul-2022 00:00	BH11 2.25		✓
EB2220520-035	12-Jul-2022 00:00	BH11 2.50	✓	✓

			SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EB2220520-036	12-Jul-2022 00:00	BH11 2.75		✓
EB2220520-037	12-Jul-2022 00:00	BH12 0.0		✓
EB2220520-038	12-Jul-2022 00:00	BH12 0.25		✓
EB2220520-039	12-Jul-2022 00:00	BH12 0.50		✓
EB2220520-040	12-Jul-2022 00:00	BH12 0.75		✓
EB2220520-041	12-Jul-2022 00:00	BH12 1.00		✓
EB2220520-042	12-Jul-2022 00:00	BH12 1.25		✓
EB2220520-043	12-Jul-2022 00:00	BH12 1.50		✓
EB2220520-044	12-Jul-2022 00:00	BH12 1.75		✓
EB2220520-045	12-Jul-2022 00:00	BH13 0.0		✓
EB2220520-046	12-Jul-2022 00:00	BH13 0.25		✓
EB2220520-047	12-Jul-2022 00:00	BH13 0.50		✓
EB2220520-048	12-Jul-2022 00:00	BH13 0.75		✓
EB2220520-049	12-Jul-2022 00:00	BH13 1.00		✓
EB2220520-050	12-Jul-2022 00:00	BH13 1.25		✓
EB2220520-051	12-Jul-2022 00:00	BH13 1.50		✓
EB2220520-052	12-Jul-2022 00:00	BH13 1.75		✓
EB2220520-053	12-Jul-2022 00:00	BH14 0.0		✓
EB2220520-054	12-Jul-2022 00:00	BH14 0.25		✓
EB2220520-055	12-Jul-2022 00:00	BH14 0.50		✓
EB2220520-056	12-Jul-2022 00:00	BH14 0.75		✓
EB2220520-057	12-Jul-2022 00:00	BH14 1.00		✓
EB2220520-058	12-Jul-2022 00:00	BH14 1.25		✓
EB2220520-059	12-Jul-2022 00:00	BH14 1.50		✓
EB2220520-060	12-Jul-2022 00:00	BH14 1.75		✓
EB2220520-061	12-Jul-2022 00:00	BH15 0.0	✓	✓
EB2220520-062	12-Jul-2022 00:00	BH15 0.25		✓
EB2220520-063	12-Jul-2022 00:00	BH15 0.50	✓	✓
EB2220520-064	12-Jul-2022 00:00	BH15 0.75		✓
EB2220520-065	12-Jul-2022 00:00	BH15 1.00	✓	✓
EB2220520-066	12-Jul-2022 00:00	BH15 1.25		✓
EB2220520-067	12-Jul-2022 00:00	BH15 1.50		✓
EB2220520-068	12-Jul-2022 00:00	BH15 1.75		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

RESULTS & INVOICE

- *AU Certificate of Analysis - NATA (COA)	Email	mail@preciseenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@preciseenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@preciseenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@preciseenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	mail@preciseenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	mail@preciseenvironmental.com.au
- EDI Format - XTab (XTAB)	Email	mail@preciseenvironmental.com.au

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph 07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod W Ph: 08 9209 7655 E
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E adelaide@alsenviro.com
☐ Launceston: 27 Ph: 03 6331 2158 E

Environmental Division
Brisbane
Work Order Reference
EB2220520

Telephone : +61-7-3243 7222

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABO Custody Seal Present upon receipt?
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		☐ Non Standard or urgent TAT (List due date):	Random Sam
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle)	Other comme
ORDER NUMBER:	PE3394.22		COC: 1 2 3 4 5 6 7	
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	OF: 1 2 3 4 5 6 7	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	CHRIS BUTLER	
Email Reports to: mail@preciseenvironmental.com.au			DATE/TIME: 13.07.22 9AM	DATE/TIME:
Mail Invoice to: PO Box 4424, Robina Town Centre 4230				

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Water(W)			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH8	0.0	12.07.22	S	BAG/<4°C	1	X								
2	BH8	0.25	12.07.22	S	BAG/<4°C	1	X								
3	BH8	0.50	12.07.22	S	BAG/<4°C	1	X								
4	BH8	0.75	12.07.22	S	BAG/<4°C	1	X								
5	BH8	1.00	12.07.22	S	BAG/<4°C	1	X								
6	BH8	1.25	12.07.22	S	BAG/<4°C	1	X								
7	BH8	1.50	12.07.22	S	BAG/<4°C	1	X								
8	BH8	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

SPLIT PLAN
Test Assoc. Batch No.
EB2220427

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

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☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2458 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
9	BH9	0.0	12.07.22	S	BAG/<4°C	1	X								
10	BH9	0.25	12.07.22	S	BAG/<4°C	1	X								
11	BH9	0.50	12.07.22	S	BAG/<4°C	1	X								
12	BH9	0.75	12.07.22	S	BAG/<4°C	1	X								
13	BH9	1.00	12.07.22	S	BAG/<4°C	1	X								
14	BH9	1.25	12.07.22	S	BAG/<4°C	1	X								
15	BH9	1.50	12.07.22	S	BAG/<4°C	1	X								
16	BH9	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ Sydney 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Brisbane 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9434 E: samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER:	PE3394.22		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt	°C
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	OF: 1 2 3 4 5 6 7	Other comment:	

SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	CHRIS BUTLER			
Email Reports to: mail@preciseenvironmental.com.au			DATE/TIME: C. Butler	DATE/TIME:	DATE/TIME:	DATE/TIME:
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			13.07.22 9AM			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
17	BH10	0.0	12.07.22	S	BAG/<4°C	1	X								
18	BH10	0.25	12.07.22	S	BAG/<4°C	1	X								
19	BH10	0.50	12.07.22	S	BAG/<4°C	1	X								
20	BH10	0.75	12.07.22	S	BAG/<4°C	1	X								
21	BH10	1.00	12.07.22	S	BAG/<4°C	1	X								
22	BH10	1.25	12.07.22	S	BAG/<4°C	1	X								
23	BH10	1.50	12.07.22	S	BAG/<4°C	1	X								
24	BH10	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

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☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph 02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
25	BH11	0.0	12.07.22	S	BAG/<4°C	1	X	X							
26	BH11	0.25	12.07.22	S	BAG/<4°C	1	X								
27	BH11	0.50	12.07.22	S	BAG/<4°C	1	X	X							
28	BH11	0.75	12.07.22	S	BAG/<4°C	1	X								
29	BH11	1.00	12.07.22	S	BAG/<4°C	1	X	X							
30	BH11	1.25	12.07.22	S	BAG/<4°C	1	X								
31	BH11	1.50	12.07.22	S	BAG/<4°C	1	X	X							
32	BH11	1.75	12.07.22	S	BAG/<4°C	1	X								
33	BH11	2.00	12.07.22	S	BAG/<4°C	1	X								
34	BH11	2.25	12.07.22	S	BAG/<4°C	1	X								
35	BH11	2.50	12.07.22	S	BAG/<4°C	1	X	X							
36	BH11	2.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

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☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
37	BH12	0.0	12.07.22	S	BAG/<4°C	1	X								
38	BH12	0.25	12.07.22	S	BAG/<4°C	1	X								
39	BH12	0.50	12.07.22	S	BAG/<4°C	1	X								
40	BH12	0.75	12.07.22	S	BAG/<4°C	1	X								
41	BH12	1.00	12.07.22	S	BAG/<4°C	1	X								
42	BH12	1.25	12.07.22	S	BAG/<4°C	1	X								
43	BH12	1.50	12.07.22	S	BAG/<4°C	1	X								
44	BH12	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

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☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
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☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY: (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
45	BH13	0.0	12.07.22	S	BAG/<4°C	1	X								
46	BH13	0.25	12.07.22	S	BAG/<4°C	1	X								
47	BH13	0.50	12.07.22	S	BAG/<4°C	1	X								
48	BH13	0.75	12.07.22	S	BAG/<4°C	1	X								
49	BH13	1.00	12.07.22	S	BAG/<4°C	1	X								
50	BH13	1.25	12.07.22	S	BAG/<4°C	1	X								
51	BH13	1.50	12.07.22	S	BAG/<4°C	1	X								
52	BH13	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

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V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**	**FOR LABORATORY USE ONLY: (Circle)**	
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220			Custody Seal Intact?	Yes / No / N/A
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER:	PE3394.22			Random Sample Temperature on Receipt:	°C
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**		Other comment:	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**			
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**			
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Mail Invoice to: PO Box 4424, Robina Town Centre 4230					

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
53	BH14	0.0	12.07.22	S	BAG/<4°C	1	X								
54	BH14	0.25	12.07.22	S	BAG/<4°C	1	X								
55	BH14	0.50	12.07.22	S	BAG/<4°C	1	X								
56	BH14	0.75	12.07.22	S	BAG/<4°C	1	X								
57	BH14	1.00	12.07.22	S	BAG/<4°C	1	X								
58	BH14	1.25	12.07.22	S	BAG/<4°C	1	X								
59	BH14	1.50	12.07.22	S	BAG/<4°C	1	X								
60	BH14	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL:	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
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☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	FOR LABORATORY USE ONLY (Circle) Custody Seal Intact? Yes No N/A
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7
ORDER NUMBER:	PE3394.22		OF: 1 2 3 4 5 6 7 Random Sample Temperature on Receipt: °C
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	Other comments:
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: C Butler 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Water(W)			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
61	BH15	0.0	12.07.22	S	BAG/<4°C	1	X	X							
62	BH15	0.25	12.07.22	S	BAG/<4°C	1	X								
63	BH15	0.50	12.07.22	S	BAG/<4°C	1	X	X							
64	BH15	0.75	12.07.22	S	BAG/<4°C	1	X								
65	BH15	1.00	12.07.22	S	BAG/<4°C	1	X	X							
66	BH15	1.25	12.07.22	S	BAG/<4°C	1	X								
67	BH15	1.50	12.07.22	S	BAG/<4°C	1	X								
68	BH15	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2220520**	Page	: 1 of 16
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022 11:35
Order number	: PE3394.22	Date Analysis Commenced	: 19-Jul-2022
C-O-C number	: ----	Issue Date	: 21-Jul-2022 15:20
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 68		
No. of samples analysed	: 68		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **SPLIT WORK ORDER: It should be noted that ALS has split this work order over the following work orders EB2220520 and EB2220427 due to the size of the sample numbers. For any further information regarding this processing of samples please contact ALS client services division on ALSEnviro.Brisbane@alsglobal.com**
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH8 0.0	BH8 0.25	BH8 0.50	BH8 0.75	BH8 1.00
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-001	EB2220520-002	EB2220520-003	EB2220520-004	EB2220520-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.7	5.7	5.8	5.6	5.9
ø pH (Fox)	----	0.1	pH Unit	2.4	2.9	4.2	3.6	2.0
ø Reaction Rate	----	1	-	3	3	1	1	1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH8 1.25	BH8 1.50	BH8 1.75	BH9 0.0	BH9 0.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-006	EB2220520-007	EB2220520-008	EB2220520-009	EB2220520-010
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**6.0**	**5.8**	**5.8**	**5.8**	**5.9**
ø pH (Fox)	----	0.1	pH Unit	**2.1**	**2.3**	**2.0**	**2.4**	**2.8**
ø Reaction Rate	----	1	-	**4**	**4**	**4**	**3**	**3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH9 0.50	BH9 0.75	BH9 1.00	BH9 1.25	BH9 1.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-011	EB2220520-012	EB2220520-013	EB2220520-014	EB2220520-015
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**6.2**	**6.3**	**6.4**	**5.6**	**5.1**
ø pH (Fox)	----	0.1	pH Unit	**3.8**	**4.2**	**2.0**	**1.9**	**1.8**
ø Reaction Rate	----	1	-	**1**	**1**	**1**	**1**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH9 1.75	BH10 0.0	BH10 0.25	BH10 0.50	BH10 0.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-016	EB2220520-017	EB2220520-018	EB2220520-019	EB2220520-020
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.2	5.4	5.7	5.4	5.7
ø pH (Fox)	----	0.1	pH Unit	1.7	2.6	3.5	3.0	2.5
ø Reaction Rate	----	1	-	1	3	2	2	2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH10 1.00	BH10 1.25	BH10 1.50	BH10 1.75	BH11 0.0
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-021	EB2220520-022	EB2220520-023	EB2220520-024	EB2220520-025
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	6.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	4
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	----	----	----	0.020
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	----	----	----	12
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	16
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	----	16
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	----	1
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.8	5.7	5.5	5.6	5.8
ø pH (Fox)	----	0.1	pH Unit	2.2	2.1	2.0	2.3	2.7
ø Reaction Rate	----	1	-	4	4	4	4	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11 0.25	BH11 0.50	BH11 0.75	BH11 1.00	BH11 1.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-026	EB2220520-027	EB2220520-028	EB2220520-029	EB2220520-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.1	----	5.5	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	32	----	8	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.05	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.011	----	0.014	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	<10	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.06	----	0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	39	----	16	----
Liming Rate	----	1	kg CaCO3/t	----	3	----	1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.06	----	0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	39	----	16	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	3	----	1	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.7	5.0	5.1	5.5	5.5
ø pH (Fox)	----	0.1	pH Unit	2.8	3.0	2.5	2.6	2.2
ø Reaction Rate	----	1	-	3	3	3	3	1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11 1.50	BH11 1.75	BH11 2.00	BH11 2.25	BH11 2.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-031	EB2220520-032	EB2220520-033	EB2220520-034	EB2220520-035
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.4	----	----	----	5.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	5	----	----	----	4
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.212	----	----	----	0.189
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	132	----	----	----	118
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.22	----	----	----	0.19
Net Acidity (acidity units)	----	10	mole H+ / t	138	----	----	----	122
Liming Rate	----	1	kg CaCO3/t	10	----	----	----	9
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.22	----	----	----	0.19
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	138	----	----	----	122
Liming Rate excluding ANC	----	1	kg CaCO3/t	10	----	----	----	9
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.3	5.2	5.5	5.4	5.5
ø pH (Fox)	----	0.1	pH Unit	2.2	2.1	2.0	2.0	2.0
ø Reaction Rate	----	1	-	4	4	4	4	4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH11 2.75	BH12 0.0	BH12 0.25	BH12 0.50	BH12 0.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-036	EB2220520-037	EB2220520-038	EB2220520-039	EB2220520-040
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**5.5**	**5.3**	**5.6**	**5.6**	**5.5**
ø **pH (Fox)**	----	0.1	pH Unit	**2.2**	**2.9**	**3.0**	**4.2**	**3.6**
ø **Reaction Rate**	----	1	-	**4**	**2**	**2**	**1**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH12 1.00	BH12 1.25	BH12 1.50	BH12 1.75	BH13 0.0
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-041	EB2220520-042	EB2220520-043	EB2220520-044	EB2220520-045
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**5.9**	**5.4**	**5.4**	**5.2**	**5.3**
ø **pH (Fox)**	----	0.1	pH Unit	**2.0**	**2.0**	**2.1**	**2.1**	**2.1**
ø **Reaction Rate**	----	1	-	**4**	**4**	**4**	**4**	**3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH13 0.25	BH13 0.50	BH13 0.75	BH13 1.00	BH13 1.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-046	EB2220520-047	EB2220520-048	EB2220520-049	EB2220520-050
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**4.8**	**6.0**	**5.9**	**6.0**	**6.0**
ø **pH (Fox)**	----	0.1	pH Unit	**2.7**	**3.0**	**3.8**	**2.1**	**2.1**
ø **Reaction Rate**	----	1	-	**3**	**2**	**1**	**4**	**4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH13 1.50	BH13 1.75	BH14 0.0	BH14 0.25	BH14 0.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-051	EB2220520-052	EB2220520-053	EB2220520-054	EB2220520-055
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**5.9**	**6.0**	**5.5**	**5.6**	**5.5**
ø pH (Fox)	----	0.1	pH Unit	**2.0**	**2.1**	**2.8**	**3.3**	**3.6**
ø Reaction Rate	----	1	-	**4**	**4**	**3**	**1**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH14 0.75	BH14 1.00	BH14 1.25	BH14 1.50	BH14 1.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-056	EB2220520-057	EB2220520-058	EB2220520-059	EB2220520-060
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**5.9**	**5.9**	**6.2**	**6.0**	**6.1**
ø **pH (Fox)**	----	0.1	pH Unit	**3.4**	**2.0**	**2.0**	**2.1**	**2.0**
ø **Reaction Rate**	----	1	-	**1**	**4**	**4**	**4**	**4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15 0.0	BH15 0.25	BH15 0.50	BH15 0.75	BH15 1.00
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220520-061	EB2220520-062	EB2220520-063	EB2220520-064	EB2220520-065
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	4.6	----	5.8	----	5.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	108	----	4	----	4
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.17	----	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.020	----	0.016	----	0.107
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	13	----	<10	----	67
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.19	----	0.02	----	0.11
Net Acidity (acidity units)	----	10	mole H+ / t	121	----	14	----	71
Liming Rate	----	1	kg CaCO3/t	9	----	1	----	5
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.19	----	0.02	----	0.11
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	121	----	14	----	71
Liming Rate excluding ANC	----	1	kg CaCO3/t	9	----	1	----	5
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.7	5.6	6.3	6.4	6.6
ø pH (Fox)	----	0.1	pH Unit	3.0	3.3	3.6	4.3	1.9
ø Reaction Rate	----	1	-	3	3	1	1	1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH15 1.25	BH15 1.50	BH15 1.75	----	----
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EB2220520-066	EB2220520-067	EB2220520-068	--------	--------
				Result	Result	Result	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**6.8**	**6.9**	**7.0**	**----**	**----**
ø pH (Fox)	----	0.1	pH Unit	**2.1**	**2.0**	**1.9**	**----**	**----**
ø Reaction Rate	----	1	-	**4**	**1**	**1**	**----**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB2220520**	Page	: 1 of 4
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022
Order number	: PE3394.22	Date Analysis Commenced	: 19-Jul-2022
C-O-C number	: ----	Issue Date	: 21-Jul-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 68		
No. of samples analysed	: 68		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 4467835)									
EB2220449-016	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.4	8.5	0.0	0% - 20%
EB2220520-063	BH15 0.50	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	5	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.8	5.7	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4467835)									
EB2220449-016	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.042	0.045	7.2	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	26	28	7.2	No Limit
EB2220520-063	BH15 0.50	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.016	0.015	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 4465711)									
EB2220520-001	BH8 0.0	EA037: pH (F)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.4	2.4	0.0	0% - 20%
EB2220520-011	BH9 0.50	EA037: pH (F)	----	0.1	pH Unit	6.2	6.3	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.8	3.8	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4465712)									
EB2220520-021	BH10 1.00	EA037: pH (F)	----	0.1	pH Unit	5.8	5.7	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.2	2.2	0.0	0% - 20%
EB2220520-031	BH11 1.50	EA037: pH (F)	----	0.1	pH Unit	5.3	5.2	1.9	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.2	2.2	0.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA037: Ass Field Screening Analysis (QC Lot: 4465713)									
EB2220520-041	BH12 1.00	EA037: pH (F)	----	0.1	pH Unit	5.9	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.0	2.0	0.0	0% - 50%
EB2220520-051	BH13 1.50	EA037: pH (F)	----	0.1	pH Unit	5.9	5.9	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.0	2.0	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4465714)									
EB2220520-061	BH15 0.0	EA037: pH (F)	----	0.1	pH Unit	5.7	5.8	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.0	2.9	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 4467835)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	102	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	19 mole H+ / t	89.9	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4467835)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.246 % S	91.4	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2220520**	Page	: 1 of 5
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022
Site	: ----	Issue Date	: 21-Jul-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER	No. of samples received	: 68
Order number	: PE3394.22	No. of samples analysed	: 68

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH11 - 0.0, BH11 - 0.50, BH11 - 1.00, BH11 - 1.50, BH11 - 2.50, BH15 - 0.0, BH15 - 0.50, BH15 - 1.00	**12-Jul-2022**	**20-Jul-2022**	12-Jul-2023	✓	**20-Jul-2022**	18-Oct-2022	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH11 - 0.0, BH11 - 0.50, BH11 - 1.00, BH11 - 1.50, BH11 - 2.50, BH15 - 0.0, BH15 - 0.50, BH15 - 1.00	**12-Jul-2022**	**20-Jul-2022**	12-Jul-2023	✓	**20-Jul-2022**	18-Oct-2022	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH11 - 0.0, BH11 - 0.50, BH11 - 1.00, BH11 - 1.50, BH11 - 2.50, BH15 - 0.0, BH15 - 0.50, BH15 - 1.00	**12-Jul-2022**	**20-Jul-2022**	12-Jul-2023	✓	**20-Jul-2022**	18-Oct-2022	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH11 - 0.0, BH11 - 0.50, BH11 - 1.00, BH11 - 1.50, BH11 - 2.50, BH15 - 0.0, BH15 - 0.50, BH15 - 1.00	**12-Jul-2022**	**20-Jul-2022**	12-Jul-2023	✓	**20-Jul-2022**	18-Oct-2022	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH11 - 0.0, BH11 - 0.50, BH11 - 1.00, BH11 - 1.50, BH11 - 2.50, BH15 - 0.0, BH15 - 0.50, BH15 - 1.00	**12-Jul-2022**	**20-Jul-2022**	12-Jul-2023	✓	**20-Jul-2022**	18-Oct-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH8 - 0.0, BH8 - 0.25,	**12-Jul-2022**	**19-Jul-2022**	08-Jan-2023	✓	**19-Jul-2022**	08-Jan-2023	✓
BH8 - 0.50, BH8 - 0.75,							
BH8 - 1.00, BH8 - 1.25,							
BH8 - 1.50, BH8 - 1.75,							
BH9 - 0.0, BH9 - 0.25,							
BH9 - 0.50, BH9 - 0.75,							
BH9 - 1.00, BH9 - 1.25,							
BH9 - 1.50, BH9 - 1.75,							
BH10 - 0.0, BH10 - 0.25,							
BH10 - 0.50, BH10 - 0.75,							
BH11 - 0.0, BH10 - 1.00, BH10 - 1.25,							
BH10 - 1.50, BH10 - 1.75,							
BH11 - 0.25,							
BH11 - 0.50, BH11 - 0.75,							
BH11 - 1.00, BH11 - 1.25,							
BH11 - 1.50, BH11 - 1.75,							
BH11 - 2.00, BH11 - 2.25,							
BH11 - 2.50, BH11 - 2.75,							
BH12 - 0.0, BH12 - 0.25,							
BH12 - 0.50, BH12 - 0.75,							
BH12 - 1.00, BH12 - 1.25,							
BH12 - 1.50, BH12 - 1.75,							
BH13 - 0.0, BH13 - 0.25,							
BH13 - 0.50, BH13 - 0.75,							
BH13 - 1.00, BH13 - 1.25,							
BH13 - 1.50, BH13 - 1.75,							
BH14 - 0.0, BH14 - 0.25,							
BH14 - 0.50, BH14 - 0.75,							
BH14 - 1.00, BH14 - 1.25,							
BH14 - 1.50, BH14 - 1.75,							
BH15 - 0.0, BH15 - 0.25,							
BH15 - 0.50, BH15 - 0.75,							
BH15 - 1.00, BH15 - 1.25,							
BH15 - 1.50, BH15 - 1.75							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	7	68	**10.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB2220427**

Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@preciseenvironmental.com.au	E-mail	: nidhi.bhimani@alsglobal.com
Telephone	: ----	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: PE3394.22	Page	: 1 of 3
Order number	: PE3394.22	Quote number	: EB2017PREENV0003 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CHRIS BUTLER, SEAN GARDINER		

Dates

Date Samples Received	: 14-Jul-2022 11:35	Issue Date	: 14-Jul-2022
Client Requested Due Date	: 20-Jul-2022	Scheduled Reporting Date	: **20-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 4	Temperature	: 3.8, 5.0, 3.4, 4.4°C - Ice present
Receipt Detail	: HARD ESKY	No. of samples received / analysed	: 64 / 64

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised that sample "BH4 0.75, BH5 2.00 and BH5 2.25" was not received at the laboratory (denoted SNR on the scanned COC).**
- **SPLIT WORK ORDER: It should be noted that ALS has split this work order over the following work orders EB2220520 and EB2220427 due to the size of the sample numbers. For any further information regarding this processing of samples please contact ALS client services division on ALSEnviro.Brisbane@alsglobal.com**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EB2220427-001	12-Jul-2022 00:00	BH1 0.0	✓	✓
EB2220427-002	12-Jul-2022 00:00	BH1 0.25		✓
EB2220427-003	12-Jul-2022 00:00	BH1 0.50	✓	✓
EB2220427-004	12-Jul-2022 00:00	BH1 0.75		✓
EB2220427-005	12-Jul-2022 00:00	BH1 1.00	✓	✓
EB2220427-006	12-Jul-2022 00:00	BH1 1.25		✓
EB2220427-007	12-Jul-2022 00:00	BH1 1.50	✓	✓
EB2220427-008	12-Jul-2022 00:00	BH1 1.75		✓
EB2220427-009	12-Jul-2022 00:00	BH1 2.00		✓
EB2220427-010	12-Jul-2022 00:00	BH1 2.25		✓
EB2220427-011	12-Jul-2022 00:00	BH1 2.50	✓	✓
EB2220427-012	12-Jul-2022 00:00	BH1 2.75		✓
EB2220427-013	12-Jul-2022 00:00	BH2 0.0		✓
EB2220427-014	12-Jul-2022 00:00	BH2 0.25		✓
EB2220427-015	12-Jul-2022 00:00	BH2 0.50		✓
EB2220427-016	12-Jul-2022 00:00	BH2 0.75		✓
EB2220427-017	12-Jul-2022 00:00	BH2 1.00		✓
EB2220427-018	12-Jul-2022 00:00	BH2 1.25		✓
EB2220427-019	12-Jul-2022 00:00	BH2 1.50		✓
EB2220427-020	12-Jul-2022 00:00	BH2 1.75		✓
EB2220427-021	12-Jul-2022 00:00	BH3 0.0		✓
EB2220427-022	12-Jul-2022 00:00	BH3 0.25		✓
EB2220427-023	12-Jul-2022 00:00	BH3 0.50		✓
EB2220427-024	12-Jul-2022 00:00	BH3 0.75		✓
EB2220427-025	12-Jul-2022 00:00	BH3 1.00		✓
EB2220427-026	12-Jul-2022 00:00	BH3 1.25		✓
EB2220427-027	12-Jul-2022 00:00	BH3 1.50		✓
EB2220427-028	12-Jul-2022 00:00	BH3 1.75		✓
EB2220427-029	12-Jul-2022 00:00	BH4 0.0	✓	✓
EB2220427-030	12-Jul-2022 00:00	BH4 0.25		✓
EB2220427-031	12-Jul-2022 00:00	BH4 0.50	✓	✓
EB2220427-033	12-Jul-2022 00:00	BH4 1.00	✓	✓
EB2220427-034	12-Jul-2022 00:00	BH4 1.25		✓
EB2220427-035	12-Jul-2022 00:00	BH4 1.50	✓	✓
EB2220427-036	12-Jul-2022 00:00	BH4 1.75		✓

			SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA037 ASS Field Screening Analysis
EB2220427-037	12-Jul-2022 00:00	BH4 2.00		✓
EB2220427-038	12-Jul-2022 00:00	BH4 2.25	✓	✓
EB2220427-039	12-Jul-2022 00:00	BH5 0.0		✓
EB2220427-040	12-Jul-2022 00:00	BH5 0.50		✓
EB2220427-041	12-Jul-2022 00:00	BH5 0.75		✓
EB2220427-042	12-Jul-2022 00:00	BH5 1.00		✓
EB2220427-043	12-Jul-2022 00:00	BH5 1.25		✓
EB2220427-044	12-Jul-2022 00:00	BH5 1.50		✓
EB2220427-045	12-Jul-2022 00:00	BH5 1.75		✓
EB2220427-048	12-Jul-2022 00:00	BH6 0.0	✓	✓
EB2220427-049	12-Jul-2022 00:00	BH6 0.25		✓
EB2220427-050	12-Jul-2022 00:00	BH6 0.50	✓	✓
EB2220427-051	12-Jul-2022 00:00	BH6 0.75		✓
EB2220427-052	12-Jul-2022 00:00	BH6 1.00	✓	✓
EB2220427-053	12-Jul-2022 00:00	BH6 1.25		✓
EB2220427-054	12-Jul-2022 00:00	BH6 1.50	✓	✓
EB2220427-055	12-Jul-2022 00:00	BH6 1.75		✓
EB2220427-056	12-Jul-2022 00:00	BH6 2.00		✓
EB2220427-057	12-Jul-2022 00:00	BH6 2.25		✓
EB2220427-058	12-Jul-2022 00:00	BH6 2.50	✓	✓
EB2220427-059	12-Jul-2022 00:00	BH6 2.75		✓
EB2220427-060	12-Jul-2022 00:00	BH7 0.0		✓
EB2220427-061	12-Jul-2022 00:00	BH7 0.25		✓
EB2220427-062	12-Jul-2022 00:00	BH7 0.50		✓
EB2220427-063	12-Jul-2022 00:00	BH7 0.75		✓
EB2220427-064	12-Jul-2022 00:00	BH7 1.00		✓
EB2220427-065	12-Jul-2022 00:00	BH7 1.25		✓
EB2220427-066	12-Jul-2022 00:00	BH7 1.50		✓
EB2220427-067	12-Jul-2022 00:00	BH7 1.75		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

RESULTS & INVOICE

- *AU Certificate of Analysis - NATA (COA)	Email	mail@preciseenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@preciseenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@preciseenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@preciseenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	mail@preciseenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	mail@preciseenvironmental.com.au
- EDI Format - XTab (XTAB)	Email	mail@preciseenvironmental.com.au

SAMPLE RECEIPT INFORMATION & BOTTLE TYPE

160

WORKORDER No:

To be completed by Sample Receipt 13/07/22

Sorting Times (Only record for BP, Mobil & URS)	Temperature Details (record if NOT on COC)	Packaging			Courier Details (Mandatory for Quarantine)	Samples checked, labelled and put in trays by:
Time Sorting Commenced:	Sample Temp °C	Security Seal Intact? *Circle below*	Packaging Type	No.	Con Note: Jet @ 12:40, 13/7/22	Initial:
Time Placed in Fridge:	Chilling Method - Circle	YES (Security seal intact)	Hard Esky m	4		
Sorting to Fridge Target Time <1 Hour	(Ice) / Ice Bricks / No Chilling	NO (Security seal broken)	Foam Esky		*Cells shaded grey don't need to be completed on this form if they are entered directly into LIMS/ANGEL by Sample Receipt staff.*	
		NA (No security seal used)	Other			

Sample Receipt Advice Comments - To be completed by Sorting Staff

VOC analysis may be compromised as sample containers contained **headspace** *(list):*

Details of any samples damaged during transit:

Other Information (eg. Were bottles received that weren't completely filled) (eg. If sample temperature is above 6°C add further detail here - *Internal use only - Not for SRN*):

3.8 / 5.0 / 3.4 / 4.4

Precise Enviro ; PE3394.22

Environmental Division
Brisbane
Work Order Reference
EB2220427

Telephone : +61-7-3243 7222

Metals Bottles: F = Field filtered. T = Total. N/S = Not Specified.
Cyanide Bottles: Tr = Treated, meaning the client has ticked the pre-treated box on the bottle. Un = Untreated, meaning the box is not ticked.
Ferrous Iron, Hexavalent Chromium & Geosmin and MIB: F = Field filtered. N/S = Not Specified.
Soil Bags: S = Small. M = Medium (~500mL asbestos or PSD bag). L = Large (~6kg FMT bag)

Lab No.	-S		-G						-O		-P				-RF				-RGF				-B		-M					-TOC		-VOC						
	Soil Jar 125mL 250mL	Bag Plastic White Green	Nat Green			Nat White 500mL	UT Nutrients		Green Vial (Geos & MIB)	Glass Orange		Glass Purp (O&G) 250mL	Plastic Purp 250mL	Plastic Grey (PFOS / PFOA) 60ml	Bacto Black / Thio Grey 250mL	-RT 60mL Nitric Red				-RGT 60mL Lab Acidified				NaOH Hexa Chrome Blue 60mL	NaOH CN Blue 60mL	0.5L Glass Brown CIRCLE Lab Preserved Or Pre-preserved	Fluoro Yellow (Sulfide) 250mL		Fluoro Orange 125mL (Sulfite)	HCl Fe^{2+} Maroon 60mL		-DOC Vial H_2SO_4 Purple 40mL		Vial H_2SO_4 Purple 40mL (VOC)	H.S Y/N	EDA Vial 40mL	Endo-Toxin Tube	DUST CuSO4 UnPres 2.5L 4L	Other
	Frozen Wet Dry		1L	500mL	250mL	1L	Light Green (T)	Turquoise (F)		100 mL	500 mL	1L	60mL	250ml	500mL	STD F	STD T	ORC F	ORC T	STD F	STD T	ORC F	ORC T	F	T		UHS F	T		F	T	TOC	DOC						
	This line allows for an initial indication of bottle types received without specifying the exact number for each sample. When using this function tick the boxes matching the containers received for this work order.																																				
1																																					
2																																					
3																																					
4																																					
5																																					
6																																					
7																																					
8																																					
9																																					
10																																					

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod Way, Mala Ph: 08 9209 7655 E: sample
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Launceston: 27 Wellingt Ph: 03 6331 2158 E: launce

Environmental Division
Brisbane
Work Order Reference
EB2220427

Telephone : +61-7-3243 7222

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

FOR LABORATO
Custody seal intact
Free ice/frozen ice
record
Random Sample Te
Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:
CHRIS BUTLER		
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH1	0.0	12.07.22	S	BAG/<4°C	1	X	X							
2	BH1	0.25	12.07.22	S	BAG/<4°C	1	X								
3	BH1	0.50	12.07.22	S	BAG/<4°C	1	X	X							
4	BH1	0.75	12.07.22	S	BAG/<4°C	1	X								
5	BH1	1.00	12.07.22	S	BAG/<4°C	1	X	X							
6	BH1	1.25	12.07.22	S	BAG/<4°C	1	X								
7	BH1	1.50	12.07.22	S	BAG/<4°C	1	X	X							
8	BH1	1.75	12.07.22	S	BAG/<4°C	1	X								
9	BH1	2.00	12.07.22	S	BAG/<4°C	1	X								
10	BH1	2.25	12.07.22	S	BAG/<4°C	1	X								
11	BH1	2.50	12.07.22	S	BAG/<4°C	1	X	X							
12	BH1	2.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	12									

SPLIT BATCH
Test
Assoc. Batch No.
EB2220520

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → *ALS Laboratory: please tick →*

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):	**FOR LABORATORY USE ONLY (Circle):**	
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220			Custody Seal Intact:	Yes / No / N/A
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4	Free ice / frozen ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER:	PE3394.22		COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	OF: 1 2 3 4 5 6 7	Other comment:	

SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	**RELINQUISHED BY:**	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	**CHRIS BUTLER**			
Email Reports to: mail@preciseenvironmental.com.au			DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:
Mail Invoice to: PO Box 4424, Robina Town Centre 4230						

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH2	0.0	12.07.22	S	BAG/<4°C	1	X								
14	BH2	0.25	12.07.22	S	BAG/<4°C	1	X								
15	BH2	0.50	12.07.22	S	BAG/<4°C	1	X								
16	BH2	0.75	12.07.22	S	BAG/<4°C	1	X								
17	BH2	1.00	12.07.22	S	BAG/<4°C	1	X								
18	BH2	1.25	12.07.22	S	BAG/<4°C	1	X								
19	BH2	1.50	12.07.22	S	BAG/<4°C	1	X								
20	BH2	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → *ALS Laboratory: please tick →*

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304 Ph 02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Brisbane:** 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody sealed? Yes / No / N/A
Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
21	BH3	0.0	12.07.22	S	BAG/<4°C	1	X								
22	BH3	0.25	12.07.22	S	BAG/<4°C	1	X								
23	BH3	0.50	12.07.22	S	BAG/<4°C	1	X								
24	BH3	0.75	12.07.22	S	BAG/<4°C	1	X								
25	BH3	1.00	12.07.22	S	BAG/<4°C	1	X								
26	BH3	1.25	12.07.22	S	BAG/<4°C	1	X								
27	BH3	1.50	12.07.22	S	BAG/<4°C	1	X								
28	BH3	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → *ALS Laboratory: please tick →*

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☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	**PRECISE ENVIRONMENTAL**	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	**7/14 FREMANTLE ST, BURLEIGH HEADS 4220**		
PROJECT:	**PE3394.22**	**ALS QUOTE NO.:** BN031/16 v4	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:	**PE3394.22**		
PROJECT MANAGER:	**CHRIS BUTLER**	**CONTACT: 0431 565 210**	
SAMPLER:	**CHRIS BUTLER / SEAN GARDINER**	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt		°C	
Other comment:			

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	**SAMPLE DETAILS** Water(W)			MATRIX: Solid(S)	**CONTAINER INFORMATION**		**ANALYSIS REQUIRED including SUITES** (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								**Additional Information**
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
29	BH4	0.0	12.07.22	S	BAG/<4°C	1	X	X							
30	BH4	0.25	12.07.22	S	BAG/<4°C	1	X								
31	BH4	0.50	12.07.22	S	BAG/<4°C	1	X	X							
32	BH4	0.75	12.07.22	S	BAG/<4°C	1	X								
33	BH4	1.00	12.07.22	S	BAG/<4°C	1	X	X							
34	BH4	1.25	12.07.22	S	BAG/<4°C	1	X								
35	BH4	1.50	12.07.22	S	BAG/<4°C	1	X	X							
36	BH4	1.75	12.07.22	S	BAG/<4°C	1	X								
37	BH4	2.00	12.07.22	S	BAG/<4°C	1	X								
38	BH4	2.25	12.07.22	S	BAG/<4°C	1	X	X							
					TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY: (Circle)	
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER:	PE3394.22		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	OF: 1 2 3 4 5 6 7	Other comments:	

SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	CHRIS BUTLER			
Email Reports to: mail@preciseenvironmental.com.au			DATE/TIME: C Butler	DATE/TIME:	DATE/TIME:	DATE/TIME:
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			13.07.22 9AM			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
39	BH5	0.0	12.07.22	S	BAG/<4°C	1	X								
40	BH5	0.50	12.07.22	S	BAG/<4°C	1	X								
41	BH5	0.75	12.07.22	S	BAG/<4°C	1	X								
42	BH5	1.00	12.07.22	S	BAG/<4°C	1	X								
43	BH5	1.25	12.07.22	S	BAG/<4°C	1	X								
44	BH5	1.50	12.07.22	S	BAG/<4°C	1	X								
45	BH5	1.75	12.07.22	S	BAG/<4°C	1	X								
46	BH5	2.00	12.07.22	S	BAG/<4°C	1	X								
47	BH5	2.25	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	9									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
48	BH6	0.0	12.07.22	S	BAG/<4°C	1	X	X							
49	BH6	0.25	12.07.22	S	BAG/<4°C	1	X								
50	BH6	0.50	12.07.22	S	BAG/<4°C	1	X	X							
51	BH6	0.75	12.07.22	S	BAG/<4°C	1	X								
52	BH6	1.00	12.07.22	S	BAG/<4°C	1	X	X							
53	BH6	1.25	12.07.22	S	BAG/<4°C	1	X								
54	BH6	1.50	12.07.22	S	BAG/<4°C	1	X	X							
55	BH6	1.75	12.07.22	S	BAG/<4°C	1	X								
56	BH6	2.00	12.07.22	S	BAG/<4°C	1	X								
57	BH6	2.25	12.07.22	S	BAG/<4°C	1	X								
58	BH6	2.50	12.07.22	S	BAG/<4°C	1	X	X							
59	BH6	2.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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ALS Laboratory: please tick → *ALS Laboratory: please tick →*

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☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Perth:** 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston:** 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Water(W)			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
60	BH7	0.0	12.07.22	S	BAG/<4°C	1	X								
61	BH7	0.25	12.07.22	S	BAG/<4°C	1	X								
62	BH7	0.50	12.07.22	S	BAG/<4°C	1	X								
63	BH7	0.75	12.07.22	S	BAG/<4°C	1	X								
64	BH7	1.00	12.07.22	S	BAG/<4°C	1	X								
65	BH7	1.25	12.07.22	S	BAG/<4°C	1	X								
66	BH7	1.50	12.07.22	S	BAG/<4°C	1	X								
67	BH7	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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☐ Perth: 10 Hod Way, Mala Ph: 08 9209 7655 E: sample
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellingt Ph: 03 6331 2158 E: launce

Environmental Divis
Brisbane
Work Order Referenc
EB22204

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATO
Custody Seal Intact?
Free ice / frozen ice
receipt?
Random Sample Te
Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:
CHRIS BUTLER		
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:

Telephone : + 61-7-3243 7222

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Water(W)			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH1	0.0	12.07.22	S	BAG/<4°C	1	X	X							
2	BH1	0.25	12.07.22	S	BAG/<4°C	1	X								
3	BH1	0.50	12.07.22	S	BAG/<4°C	1	X	X							
4	BH1	0.75	12.07.22	S	BAG/<4°C	1	X								
5	BH1	1.00	12.07.22	S	BAG/<4°C	1	X	X							
6	BH1	1.25	12.07.22	S	BAG/<4°C	1	X								
7	BH1	1.50	12.07.22	S	BAG/<4°C	1	X	X							
8	BH1	1.75	12.07.22	S	BAG/<4°C	1	X								
9	BH1	2.00	12.07.22	S	BAG/<4°C	1	X								
10	BH1	2.25	12.07.22	S	BAG/<4°C	1	X								
11	BH1	2.50	12.07.22	S	BAG/<4°C	1	X	X							
12	BH1	2.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	12									

SPLIT BATCH
Test
Assoc. Batch No.
EB2220520

SCANNED

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph 03 8549 9600 E samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E adelaide@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):** ☐ Non Standard or urgent TAT **(List due date):**
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to:	mail@preciseenvironmental.com.au		
Mail Invoice to:	PO Box 4424, Robina Town Centre 4230		

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No

Free ice / frozen ice packs present upon receipt? Yes No

Random Sample Temperature on Receipt: °C

Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS Water(W)			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH2	0.0	12.07.22	S	BAG/<4°C	1	X								
14	BH2	0.25	12.07.22	S	BAG/<4°C	1	X								
15	BH2	0.50	12.07.22	S	BAG/<4°C	1	X								
16	BH2	0.75	12.07.22	S	BAG/<4°C	1	X								
17	BH2	1.00	12.07.22	S	BAG/<4°C	1	X								
18	BH2	1.25	12.07.22	S	BAG/<4°C	1	X								
19	BH2	1.50	12.07.22	S	BAG/<4°C	1	X								
20	BH2	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
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CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		☐ Non Standard or urgent TAT (List due date):
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes / No / N/A
Freezer / frozen ice bricks present upon receipt? Yes / No
Random Sample Temperature on Receipt: °C
Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
21	BH3	0.0	12.07.22	S	BAG/<4°C	1	X								
22	BH3	0.25	12.07.22	S	BAG/<4°C	1	X								
23	BH3	0.50	12.07.22	S	BAG/<4°C	1	X								
24	BH3	0.75	12.07.22	S	BAG/<4°C	1	X								
25	BH3	1.00	12.07.22	S	BAG/<4°C	1	X								
26	BH3	1.25	12.07.22	S	BAG/<4°C	1	X								
27	BH3	1.50	12.07.22	S	BAG/<4°C	1	X								
28	BH3	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → *ALS Laboratory: please tick →*

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT:** 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE:** 0409 827 396	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No

Free ice / frozen ice bricks present upon receipt? Yes No

Random Sample Temperature on Receipt: °C

Other comments:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
29	BH4	0.0	12.07.22	S	BAG/<4°C	1	X	X							
30	BH4	0.25	12.07.22	S	BAG/<4°C	1	X								
31	BH4	0.50	12.07.22	S	BAG/<4°C	1	X	X							
SNR	BH4	0.75	12.07.22	S	BAG/<4°C	1	X								
33	BH4	1.00	12.07.22	S	BAG/<4°C	1	X	X							
34	BH4	1.25	12.07.22	S	BAG/<4°C	1	X								
35	BH4	1.50	12.07.22	S	BAG/<4°C	1	X	X							
36	BH4	1.75	12.07.22	S	BAG/<4°C	1	X								
37	BH4	2.00	12.07.22	S	BAG/<4°C	1	X								
38	BH4	2.25	12.07.22	S	BAG/<4°C	1	X	X							
					TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: *please tick* → ALS Laboratory: *please tick* →

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☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Perth: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville environmental@alsenviro.com
☐ Adelaide: 2-4 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		☐ Non Standard or urgent TAT (List due date):
PROJECT:	PE3394.22	ALS QUOTE NO.:	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No
Free ice / frozen ice brick present upon receipt? Yes No
Random Sample Temperature on Receipt °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
39	BH5	0.0	12.07.22	S	BAG/<4°C	1	X								
40	BH5	0.50	12.07.22	S	BAG/<4°C	1	X								
41	BH5	0.75	12.07.22	S	BAG/<4°C	1	X								
42	BH5	1.00	12.07.22	S	BAG/<4°C	1	X								
43	BH5	1.25	12.07.22	S	BAG/<4°C	1	X								
44	BH5	1.50	12.07.22	S	BAG/<4°C	1	X								
45	BH5	1.75	12.07.22	S	BAG/<4°C	1	X								
SNR	BH5	2.00	12.07.22	S	BAG/<4°C	1	X								
SNR	BH5	2.25	12.07.22	S	BAG/<4°C	1	X								
					TOTAL:	9									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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☐ Townsville: 14-15 Desma Ct, Bohle QLD 4818 Ph.07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

FOR LABORATORY USE ONLY (Circle):
Custody Seal Intact? Yes No
Freeze / frozen ice bricks present upon receipt? Yes No
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W) MATRIX: Solid(S))				CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
46	BH6	0.0	12.07.22	S	BAG/<4°C	1	X	X							
49	BH6	0.25	12.07.22	S	BAG/<4°C	1	X								
50	BH6	0.50	12.07.22	S	BAG/<4°C	1	X	X							
51	BH6	0.75	12.07.22	S	BAG/<4°C	1	X								
52	BH6	1.00	12.07.22	S	BAG/<4°C	1	X	X							
53	BH6	1.25	12.07.22	S	BAG/<4°C	1	X								
54	BH6	1.50	12.07.22	S	BAG/<4°C	1	X	X							
55	BH6	1.75	12.07.22	S	BAG/<4°C	1	X								
56	BH6	2.00	12.07.22	S	BAG/<4°C	1	X								
57	BH6	2.25	12.07.22	S	BAG/<4°C	1	X								
58	BH6	2.50	12.07.22	S	BAG/<4°C	1	X	X							
59	BH6	2.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
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☐ Adelaide: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	**ALS QUOTE NO.:**	BN031/16 v4
ORDER NUMBER:	PE3394.22		
PROJECT MANAGER:	CHRIS BUTLER	**CONTACT: 0431 565 210**	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	**SAMPLER MOBILE: 0409 827 396**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No
Free Ice / Frozen Ice bricks present upon receipt? Yes No
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 13.07.22 9AM	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS			MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pH F and pH FOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
60	BH7	0.0	12.07.22	S	BAG/<4°C	1	X								
61	BH7	0.25	12.07.22	S	BAG/<4°C	1	X								
62	BH7	0.50	12.07.22	S	BAG/<4°C	1	X								
63	BH7	0.75	12.07.22	S	BAG/<4°C	1	X								
64	BH7	1.00	12.07.22	S	BAG/<4°C	1	X								
65	BH7	1.25	12.07.22	S	BAG/<4°C	1	X								
66	BH7	1.50	12.07.22	S	BAG/<4°C	1	X								
67	BH7	1.75	12.07.22	S	BAG/<4°C	1	X								
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2220427**	Page	: 1 of 15
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022 11:35
Order number	: PE3394.22	Date Analysis Commenced	: 18-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022 11:24
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 64		
No. of samples analysed	: 64		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **SPLIT WORK ORDER: It should be noted that ALS has split this work order over the following work orders EB2220520 and EB2220427 due to the size of the sample numbers. For any further information regarding this processing of samples please contact ALS client services division on ALSEnviro.Brisbane@alsglobal.com**
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 0.0	BH1 0.25	BH1 0.50	BH1 0.75	BH1 1.00
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-001	EB2220427-002	EB2220427-003	EB2220427-004	EB2220427-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.1**	**----**	**5.8**	**----**	**5.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**31**	**----**	**4**	**----**	**4**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.05**	**----**	<0.02	**----**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.019**	**----**	**0.014**	**----**	**0.014**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**12**	**----**	<10	**----**	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**----**	**1.5**	**----**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.07**	**----**	**0.02**	**----**	**0.02**
Net Acidity (acidity units)	----	10	mole H+ / t	**43**	**----**	**13**	**----**	**13**
Liming Rate	----	1	kg CaCO3/t	**3**	**----**	<1	**----**	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.07**	**----**	**0.02**	**----**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**43**	**----**	**13**	**----**	**13**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**3**	**----**	<1	**----**	<1
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**5.9**	**6.1**	**6.0**	**6.3**	**6.1**
ø pH (Fox)	----	0.1	pH Unit	**2.9**	**3.1**	**4.9**	**5.4**	**4.8**
ø Reaction Rate	----	1	-	**2**	**2**	**1**	**1**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 1.25	BH1 1.50	BH1 1.75	BH1 2.00	BH1 2.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-006	EB2220427-007	EB2220427-008	EB2220427-009	EB2220427-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	5.4	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	6	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.197	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	123	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.21	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	129	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	10	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.21	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	129	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	10	----	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.9	6.1	6.0	6.3	6.3
ø pH (Fox)	----	0.1	pH Unit	4.5	1.8	1.8	1.8	2.3
ø Reaction Rate	----	1	-	1	4	4	4	4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1 2.50	BH1 2.75	BH2 0.0	BH2 0.25	BH2 0.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-011	EB2220427-012	EB2220427-013	EB2220427-014	EB2220427-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.6**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.194**	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**121**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.20**	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**125**	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	**9**	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.20**	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**125**	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**9**	----	----	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**7.4**	**7.7**	**6.6**	**6.6**	**6.6**
ø pH (Fox)	----	0.1	pH Unit	**2.0**	**3.7**	**3.3**	**3.8**	**5.1**
ø Reaction Rate	----	1	-	**4**	**2**	**3**	**2**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH2 0.75	BH2 1.00	BH2 1.25	BH2 1.50	BH2 1.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-016	EB2220427-017	EB2220427-018	EB2220427-019	EB2220427-020
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**6.3**	**6.4**	**6.3**	**6.1**	**6.3**
ø **pH (Fox)**	----	0.1	pH Unit	**4.9**	**4.3**	**2.1**	**1.8**	**2.1**
ø **Reaction Rate**	----	1	-	**1**	**2**	**4**	**4**	**4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH3 0.0	BH3 0.25	BH3 0.50	BH3 0.75	BH3 1.00
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-021	EB2220427-022	EB2220427-023	EB2220427-024	EB2220427-025
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**6.1**	**6.2**	**6.4**	**6.4**	**6.3**
ø **pH (Fox)**	----	0.1	pH Unit	**2.8**	**3.6**	**4.6**	**5.0**	**4.2**
ø **Reaction Rate**	----	1	-	**3**	**2**	**2**	**1**	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH3 1.25	BH3 1.50	BH3 1.75	BH4 0.0	BH4 0.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-026	EB2220427-027	EB2220427-028	EB2220427-029	EB2220427-030
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	5.4	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	17	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	0.03	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	----	----	0.039	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	----	----	24	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	0.07	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	41	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	3	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	0.07	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	41	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	3	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	6.3	6.4	7.1	6.6	6.8
ø pH (Fox)	----	0.1	pH Unit	1.8	1.8	1.8	2.7	3.2
ø Reaction Rate	----	1	-	4	4	4	3	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH4 0.50	BH4 1.00	BH4 1.25	BH4 1.50	BH4 1.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-031	EB2220427-033	EB2220427-034	EB2220427-035	EB2220427-036
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.8	5.9	----	5.7	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	9	2	----	3	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.027	0.223	----	0.187	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	17	139	----	116	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	0.04	0.23	----	0.19	----
Net Acidity (acidity units)	----	10	mole H+ / t	26	142	----	120	----
Liming Rate	----	1	kg CaCO3/t	2	11	----	9	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.23	----	0.19	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	26	142	----	120	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	11	----	9	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	7.2	7.2	7.2	7.0	6.9
ø pH (Fox)	----	0.1	pH Unit	4.1	1.4	1.6	2.0	1.6
ø Reaction Rate	----	1	-	2	4	4	4	4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH4 2.00	BH4 2.25	BH5 0.0	BH5 0.50	BH5 0.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-037	EB2220427-038	EB2220427-039	EB2220427-040	EB2220427-041
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.0	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.151	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	94	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.15	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	94	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	7	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.15	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	94	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	7	----	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	6.8	7.4	6.5	6.7	6.4
ø pH (Fox)	----	0.1	pH Unit	1.9	1.9	4.6	5.3	5.3
ø Reaction Rate	----	1	-	4	4	3	1	1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH5 1.00	BH5 1.25	BH5 1.50	BH5 1.75	BH6 0.0
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-042	EB2220427-043	EB2220427-044	EB2220427-045	EB2220427-048
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	5.3
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	12
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	----	----	----	0.022
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	----	----	----	14
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	0.04
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	26
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	----	0.04
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	----	26
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	----	2
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.6	5.1	5.0	5.4	5.6
ø pH (Fox)	----	0.1	pH Unit	3.3	1.8	2.0	1.8	2.9
ø Reaction Rate	----	1	-	2	4	4	4	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH6 0.25	BH6 0.50	BH6 0.75	BH6 1.00	BH6 1.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-049	EB2220427-050	EB2220427-051	EB2220427-052	EB2220427-053
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	4.7	----	5.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	45	----	15	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.07	----	0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.027	----	0.020	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	16	----	12	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	0.10	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	61	----	27	----
Liming Rate	----	1	kg CaCO3/t	----	5	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.10	----	0.04	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	61	----	27	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	5	----	2	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	5.7	5.6	5.8	6.1	5.7
ø pH (Fox)	----	0.1	pH Unit	2.6	2.5	3.1	4.1	3.0
ø Reaction Rate	----	1	-	3	3	3	2	2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH6 1.50	BH6 1.75	BH6 2.00	BH6 2.25	BH6 2.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-054	EB2220427-055	EB2220427-056	EB2220427-057	EB2220427-058
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.3	----	----	----	5.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	10	----	----	----	8
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.141	----	----	----	0.161
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	88	----	----	----	100
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.16	----	----	----	0.17
Net Acidity (acidity units)	----	10	mole H+ / t	97	----	----	----	108
Liming Rate	----	1	kg CaCO3/t	7	----	----	----	8
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.16	----	----	----	0.17
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	97	----	----	----	108
Liming Rate excluding ANC	----	1	kg CaCO3/t	7	----	----	----	8
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	6.0	6.2	6.3	6.3	6.2
ø pH (Fox)	----	0.1	pH Unit	1.9	1.8	2.0	2.0	2.1
ø Reaction Rate	----	1	-	4	4	4	4	4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH6 2.75	BH7 0.0	BH7 0.25	BH7 0.50	BH7 0.75
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2220427-059	EB2220427-060	EB2220427-061	EB2220427-062	EB2220427-063
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**5.6**	**5.4**	**5.8**	**5.4**	**6.0**
ø pH (Fox)	----	0.1	pH Unit	**1.8**	**3.5**	**3.8**	**4.7**	**4.6**
ø Reaction Rate	----	1	-	**4**	**3**	**2**	**2**	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH7 1.00	BH7 1.25	BH7 1.50	BH7 1.75	----
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	----
Compound	CAS Number	LOR	Unit	EB2220427-064	EB2220427-065	EB2220427-066	EB2220427-067	--------
				Result	Result	Result	Result	----
EA037: Ass Field Screening Analysis								
ø **pH (F)**	----	0.1	pH Unit	**5.5**	**5.6**	**5.9**	**6.0**	**----**
ø **pH (Fox)**	----	0.1	pH Unit	**2.1**	**1.7**	**1.8**	**1.6**	**----**
ø **Reaction Rate**	----	1	-	**4**	**4**	**4**	**4**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB2220427**	Page	: 1 of 4
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022
Order number	: PE3394.22	Date Analysis Commenced	: 18-Jul-2022
C-O-C number	: ----	Issue Date	: 20-Jul-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 64		
No. of samples analysed	: 64		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 4465208)									
EB2220272-010	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	14	12	17.2	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.2	5.2	0.0	0% - 20%
EB2220427-033	BH4 1.00	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	2	2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.9	5.9	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4465208)									
EB2220272-010	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.136	0.134	1.4	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	85	84	1.4	No Limit
EB2220427-033	BH4 1.00	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.223	0.210	6.2	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	139	131	6.2	0% - 50%
EA037: Ass Field Screening Analysis (QC Lot: 4461683)									
EB2220427-001	BH1 0.0	EA037: pH (F)	----	0.1	pH Unit	5.9	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.9	2.9	0.0	0% - 20%
EB2220427-011	BH1 2.50	EA037: pH (F)	----	0.1	pH Unit	7.4	7.5	1.3	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.0	2.0	0.0	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 4461684)									
EB2220427-021	BH3 0.0	EA037: pH (F)	----	0.1	pH Unit	6.1	6.0	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.8	2.7	0.0	0% - 20%
EB2220427-031	BH4 0.50	EA037: pH (F)	----	0.1	pH Unit	7.2	7.1	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	4.1	4.2	0.0	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA037: Ass Field Screening Analysis (QC Lot: 4461685)									
EB2220427-042	BH5 1.00	EA037: pH (F)	----	0.1	pH Unit	5.6	5.5	2.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.3	3.4	5.1	0% - 20%
EB2220427-054	BH6 1.50	EA037: pH (F)	----	0.1	pH Unit	6.0	6.1	2.2	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	1.9	1.9	0.0	0% - 50%
EA037: Ass Field Screening Analysis (QC Lot: 4461686)									
EB2220427-064	BH7 1.00	EA037: pH (F)	----	0.1	pH Unit	5.5	5.6	0.0	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	2.1	2.1	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 4465208)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	102	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	19 mole H+ / t	88.7	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4465208)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.246 % S	92.2	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2220427**	Page	: 1 of 6
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR CHRIS BUTLER	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 14-Jul-2022
Site	: ----	Issue Date	: 20-Jul-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER	No. of samples received	: 64
Order number	: PE3394.22	No. of samples analysed	: 64

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)							
BH1 - 0.0, BH1 - 0.50, BH1 - 1.00, BH1 - 1.50, BH1 - 2.50, BH4 - 0.0, BH4 - 0.50, BH4 - 1.00, BH4 - 1.50, BH4 - 2.25, BH6 - 0.0, BH6 - 0.50, BH6 - 1.00, BH6 - 1.50, BH6 - 2.50	**12-Jul-2022**	**19-Jul-2022**	12-Jul-2023	✓	**19-Jul-2022**	17-Oct-2022	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH1 - 0.0, BH1 - 0.50, BH1 - 1.00, BH1 - 1.50, BH1 - 2.50, BH4 - 0.0, BH4 - 0.50, BH4 - 1.00, BH4 - 1.50, BH4 - 2.25, BH6 - 0.0, BH6 - 0.50, BH6 - 1.00, BH6 - 1.50, BH6 - 2.50	**12-Jul-2022**	**19-Jul-2022**	12-Jul-2023	✓	**19-Jul-2022**	17-Oct-2022	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)							
BH1 - 0.0, BH1 - 0.50, BH1 - 1.00, BH1 - 1.50, BH1 - 2.50, BH4 - 0.0, BH4 - 0.50, BH4 - 1.00, BH4 - 1.50, BH4 - 2.25, BH6 - 0.0, BH6 - 0.50, BH6 - 1.00, BH6 - 1.50, BH6 - 2.50	**12-Jul-2022**	**19-Jul-2022**	12-Jul-2023	✓	**19-Jul-2022**	17-Oct-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH1 - 0.0, BH1 - 0.50, BH1 - 1.00, BH1 - 1.50, BH1 - 2.50, BH4 - 0.0, BH4 - 0.50, BH4 - 1.00, BH4 - 1.50, BH4 - 2.25, BH6 - 0.0, BH6 - 0.50, BH6 - 1.00, BH6 - 1.50, BH6 - 2.50	**12-Jul-2022**	**19-Jul-2022**	12-Jul-2023	✓	**19-Jul-2022**	17-Oct-2022	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH1 - 0.0, BH1 - 0.50, BH1 - 1.00, BH1 - 1.50, BH1 - 2.50, BH4 - 0.0, BH4 - 0.50, BH4 - 1.00, BH4 - 1.50, BH4 - 2.25, BH6 - 0.0, BH6 - 0.50, BH6 - 1.00, BH6 - 1.50, BH6 - 2.50	**12-Jul-2022**	**19-Jul-2022**	12-Jul-2023	✓	**19-Jul-2022**	17-Oct-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037)							
BH1 - 0.0, BH1 - 0.25, BH1 - 0.50, BH1 - 0.75, BH1 - 1.00, BH1 - 1.25, BH1 - 1.50, BH1 - 1.75, BH1 - 2.00, BH1 - 2.25, BH1 - 2.50, BH1 - 2.75, BH2 - 0.0, BH2 - 0.25, BH2 - 0.50, BH2 - 0.75, BH2 - 1.00, BH2 - 1.25, BH2 - 1.50, BH2 - 1.75, BH3 - 0.0, BH3 - 0.25, BH3 - 0.50, BH3 - 0.75, BH3 - 1.00, BH3 - 1.25, BH3 - 1.50, BH3 - 1.75, BH4 - 0.0, BH4 - 0.25, BH4 - 0.50, BH4 - 1.00, BH4 - 1.25, BH4 - 1.50, BH4 - 1.75, BH4 - 2.00, BH4 - 2.25, BH5 - 0.0, BH5 - 0.50, BH5 - 0.75, BH5 - 1.00, BH5 - 1.25, BH5 - 1.50, BH5 - 1.75, BH6 - 0.0, BH6 - 0.25, BH6 - 0.50, BH6 - 0.75, BH6 - 1.00, BH6 - 1.25, BH6 - 1.50, BH6 - 1.75, BH6 - 2.00, BH6 - 2.25, BH6 - 2.50, BH6 - 2.75, BH7 - 0.0, BH7 - 0.25, BH7 - 0.50, BH7 - 0.75, BH7 - 1.00, BH7 - 1.25, BH7 - 1.50, BH7 - 1.75	**12-Jul-2022**	**18-Jul-2022**	08-Jan-2023	✓	**18-Jul-2022**	08-Jan-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	7	64	**10.94**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB2222068**

Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: RESULTS & INVOICE	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@preciseenvironmental.com.au	E-mail	: nidhi.bhimani@alsglobal.com
Telephone	: +61 07 5593 7848	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 5593 7020	Facsimile	: +61-7-3243 7218
Project	: PE3394.22	Page	: 1 of 2
Order number	: PE3394.22	Quote number	: EB2019PREENV0003 (BN/031/16 V5)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CHRIS BUTLER, SEAN GARDINER		

Dates

Date Samples Received	: 25-Jul-2022 15:29	Issue Date	: 28-Jul-2022
Client Requested Due Date	: 04-Aug-2022	Scheduled Reporting Date	: **04-Aug-2022**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	: REBATCH	No. of samples received / analysed	: 18 / 18

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order was created to rebatch samples from EB2220427 and EB2220520.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB2222068-001	12-Jul-2022 00:00	BH2 0.0	✓
EB2222068-002	12-Jul-2022 00:00	BH3 0.0	✓
EB2222068-003	12-Jul-2022 00:00	BH7 0.0	✓
EB2222068-004	12-Jul-2022 00:00	BH8 0.0	✓
EB2222068-005	12-Jul-2022 00:00	BH8 0.25	✓
EB2222068-006	12-Jul-2022 00:00	BH8 0.50	✓
EB2222068-007	12-Jul-2022 00:00	BH9 0.0	✓
EB2222068-008	12-Jul-2022 00:00	BH9 0.50	✓
EB2222068-009	12-Jul-2022 00:00	BH9 1.00	✓
EB2222068-010	12-Jul-2022 00:00	BH9 1.50	✓
EB2222068-011	12-Jul-2022 00:00	BH10 0.0	✓
EB2222068-012	12-Jul-2022 00:00	BH11 0.75	✓
EB2222068-013	12-Jul-2022 00:00	BH12 0.0	✓
EB2222068-014	12-Jul-2022 00:00	BH13 0.0	✓
EB2222068-015	12-Jul-2022 00:00	BH14 0.0	✓
EB2222068-016	12-Jul-2022 00:00	BH14 0.50	✓
EB2222068-017	12-Jul-2022 00:00	BH14 1.00	✓
EB2222068-018	12-Jul-2022 00:00	BH14 1.50	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

RESULTS & INVOICE

- *AU Certificate of Analysis - NATA (COA)	Email	mail@preciseenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@preciseenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@preciseenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@preciseenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	mail@preciseenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	mail@preciseenvironmental.com.au
- EDI Format - XTab (XTAB)	Email	mail@preciseenvironmental.com.au

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Perl** Ph: 08
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Lau** Ph: 03

Environmental Division
Brisbane
Work Order Reference
EB2222068

Telephone : + 61-7-3243 7222

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7
ORDER NUMBER:	PE3394.22		OF: 1 2 3 4 5 6 7
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	RELINQUISHED BY: CHRIS BUTLER
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	DATE/TIME: Chris Butler 25.07.22 3pm
Email Reports to: mail@preciseenvironmental.com.au			RECEIVED BY: DATE/TIME:
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			RELINQ DATE/TIME: DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH2	0.0	12.07.22	S	BAG/<4°C	1		X							
2	BH3	0.0	12.07.22	S	BAG/<4°C	1		X							
3	BH7	0.0	12.07.22	S	BAG/<4°C	1		X							
4	BH8	0.0	12.07.22	S	BAG/<4°C	1		X							
5	BH8	0.25	12.07.22	S	BAG/<4°C	1		X							
6	BH8	0.50	12.07.22	S	BAG/<4°C	1		X							
7	BH9	0.0	12.07.22	S	BAG/<4°C	1		X							
8	BH9	0.50	12.07.22	S	BAG/<4°C	1		X							
9	BH9	1.00	12.07.22	S	BAG/<4°C	1		X							
10	BH9	1.50	12.07.22	S	BAG/<4°C	1		X							
11															
					TOTAL	10									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY CHAIN OF CUSTODY

ALS Laboratory: please tick → ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176 Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Brisbane**: 32 Shand St, Stafford QLD 4053 Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171 Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Perth**: 10 Hod Way, Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Newcastle**: 5 Rosegum Rd, Warabrook NSW 2304 Ph:02 4968 9433 E:samples.newcastle@alsenviro.com
☐ **Townsville**: 14-15 Desma Ct, Bohle QLD 4818 Ph:07 4796 0600 E: townsville.environmental@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095 Ph: 08 8359 0890 E:adelaide@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT:	PRECISE ENVIRONMENTAL	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):
OFFICE:	7/14 FREMANTLE ST, BURLEIGH HEADS 4220		
PROJECT:	PE3394.22	ALS QUOTE NO.: BN031/16 v4	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7
ORDER NUMBER:	PE3394.22		OF: 1 2 3 4 5 6 7
PROJECT MANAGER:	CHRIS BUTLER	CONTACT: 0431 565 210	
SAMPLER:	CHRIS BUTLER / SEAN GARDINER	SAMPLER MOBILE: 0409 827 396	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: mail@preciseenvironmental.com.au			
Mail Invoice to: PO Box 4424, Robina Town Centre 4230			

FOR LABORATORY USE ONLY (Circle)			
RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
CHRIS BUTLER			
DATE/TIME: 25.07.22 3pm	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (Water(W))			MATRIX: Solid(S)	CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	SAMPLE DESCRIPTION	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037 (pHF and pHFOX)	EA033 (Chromium suite)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
C1	BH10	0.0	12.07.22	S	BAG/<4°C	1		X							
C1	BH11	0.75	12.07.22	S	BAG/<4°C	1		X							
13	BH12	0.0	12.07.22	S	BAG/<4°C	1		X							
14	BH13	0.0	12.07.22	S	BAG/<4°C	1		X							
15	BH14	0.0	12.07.22	S	BAG/<4°C	1		X							
16	BH14	0.50	12.07.22	S	BAG/<4°C	1		X							
17	BH14	1.00	12.07.22	S	BAG/<4°C	1		X							
18	BH14	1.50	12.07.22	S	BAG/<4°C	1		X							
					TOTAL	8									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2222068**	Page	: 1 of 6
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: RESULTS & INVOICE	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5593 7848	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 25-Jul-2022 15:29
Order number	: PE3394.22	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: ----	Issue Date	: 03-Aug-2022 15:26
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: BN/031/16 V5		
No. of samples received	: 18		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH2 0.0	BH3 0.0	BH7 0.0	BH8 0.0	BH8 0.25
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2222068-001	EB2222068-002	EB2222068-003	EB2222068-004	EB2222068-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	4.9	4.5	4.6	4.8	4.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	66	128	106	40	44
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.10	0.20	0.17	0.06	0.07
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.013	0.016	0.018	0.014	0.018
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	10	11	<10	11
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.12	0.22	0.19	0.08	0.09
Net Acidity (acidity units)	----	10	mole H+ / t	74	138	117	49	55
Liming Rate	----	1	kg CaCO3/t	6	10	9	4	4
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.12	0.22	0.19	0.08	0.09
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	74	138	117	49	55
Liming Rate excluding ANC	----	1	kg CaCO3/t	6	10	9	4	4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH8 0.50	BH9 0.0	BH9 0.50	BH9 1.00	BH9 1.50
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2222068-006	EB2222068-007	EB2222068-008	EB2222068-009	EB2222068-010
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.8	4.6	5.8	5.6	5.2
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	79	<2	3	7
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.13	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.019	0.030	0.015	0.037	0.124
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	12	18	<10	23	77
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	0.16	<0.02	0.04	0.14
Net Acidity (acidity units)	----	10	mole H+ / t	12	98	<10	26	84
Liming Rate	----	1	kg CaCO3/t	<1	7	<1	2	6
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.16	<0.02	0.04	0.14
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	12	98	<10	26	84
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	7	<1	2	6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH10 0.0	BH11 0.75	BH12 0.0	BH13 0.0	BH14 0.0
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00
Compound	CAS Number	LOR	Unit	EB2222068-011	EB2222068-012	EB2222068-013	EB2222068-014	EB2222068-015
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	4.8	4.8	4.6	4.6	4.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	42	49	66	87	124
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.07	0.08	0.11	0.14	0.20
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.023	0.012	0.012	0.015	0.024
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	14	<10	<10	<10	15
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.09	0.09	0.12	0.15	0.22
Net Acidity (acidity units)	----	10	mole H+ / t	56	57	74	96	138
Liming Rate	----	1	kg CaCO3/t	4	4	6	7	10
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.09	0.09	0.12	0.15	0.22
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	56	57	74	96	138
Liming Rate excluding ANC	----	1	kg CaCO3/t	4	4	6	7	10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH14 0.50	BH14 1.00	BH14 1.50	----	----
			Sampling date / time	12-Jul-2022 00:00	12-Jul-2022 00:00	12-Jul-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EB2222068-016	EB2222068-017	EB2222068-018	--------	--------
				Result	Result	Result	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.6**	**5.3**	**5.0**	**----**	**----**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	**7**	**11**	**----**	**----**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	**----**	**----**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.015**	**0.108**	**0.094**	**----**	**----**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**67**	**58**	**----**	**----**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**----**	**----**
Net Acidity (sulfur units)	----	0.02	% S	**0.02**	**0.12**	**0.11**	**----**	**----**
Net Acidity (acidity units)	----	10	mole H+ / t	**13**	**74**	**69**	**----**	**----**
Liming Rate	----	1	kg CaCO3/t	<1	**6**	**5**	**----**	**----**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	**0.12**	**0.11**	**----**	**----**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**13**	**74**	**69**	**----**	**----**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	**6**	**5**	**----**	**----**

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB2222068**	Page	: 1 of 4
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: RESULTS & INVOICE	Contact	: Nidhi Bhimani
Address	: PO BOX 4424 ROBINA TOWN CENTRE QLD, AUSTRALIA 4230	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5593 7848	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 25-Jul-2022
Order number	: PE3394.22	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: ----	Issue Date	: 03-Aug-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER		
Site	: ----		
Quote number	: BN/031/16 V5		
No. of samples received	: 18		
No. of samples analysed	: 18		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA033-A: Actual Acidity (QC Lot: 4494355)									
EB2221902-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.08	0.08	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	48	47	0.0	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.5	4.5	0.0	0% - 20%
EB2222060-005	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	19	18	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.9	4.9	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 4494356)									
EB2222068-010	BH9 1.50	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	7	7	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.2	5.2	0.0	0% - 20%
EB2222247-002	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.0	7.0	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 4494355)									
EB2221902-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.033	0.030	7.8	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	20	19	7.8	No Limit
EB2222060-005	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.025	0.024	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	15	15	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 4494356)									
EB2222068-010	BH9 1.50	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.124	0.126	1.3	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	77	78	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA033-B: Potential Acidity (QC Lot: 4494356) - continued									
EB2222247-002	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.025	0.024	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	16	15	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 4494355)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	99.2	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	16 mole H+ / t	102	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 4494356)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	99.2	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	16 mole H+ / t	98.4	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4494355)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.246 % S	92.4	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 4494356)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.246 % S	88.7	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB2222068**	Page	: 1 of 5
Client	: **PRECISE ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: RESULTS & INVOICE	Telephone	: +61-7-3243 7222
Project	: PE3394.22	Date Samples Received	: 25-Jul-2022
Site	: ----	Issue Date	: 03-Aug-2022
Sampler	: CHRIS BUTLER, SEAN GARDINER	No. of samples received	: 18
Order number	: PE3394.22	No. of samples analysed	: 18

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
80* dried soil (EA033)							
BH2 - 0.0, BH3 - 0.0, BH7 - 0.0, BH8 - 0.0, BH8 - 0.25, BH8 - 0.50, BH9 - 0.0, BH9 - 0.50, BH9 - 1.00, BH9 - 1.50, BH10 - 0.0, BH11 - 0.75, BH12 - 0.0, BH13 - 0.0, BH14 - 0.0, BH14 - 0.50, BH14 - 1.00, BH14 - 1.50	**12-Jul-2022**	**03-Aug-2022**	12-Jul-2023	✓	**03-Aug-2022**	01-Nov-2022	✓
EA033-B: Potential Acidity							
80* dried soil (EA033)							
BH2 - 0.0, BH3 - 0.0, BH7 - 0.0, BH8 - 0.0, BH8 - 0.25, BH8 - 0.50, BH9 - 0.0, BH9 - 0.50, BH9 - 1.00, BH9 - 1.50, BH10 - 0.0, BH11 - 0.75, BH12 - 0.0, BH13 - 0.0, BH14 - 0.0, BH14 - 0.50, BH14 - 1.00, BH14 - 1.50	**12-Jul-2022**	**03-Aug-2022**	12-Jul-2023	✓	**03-Aug-2022**	01-Nov-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
80* dried soil (EA033)							
BH2 - 0.0, BH3 - 0.0, BH7 - 0.0, BH8 - 0.0, BH8 - 0.25, BH8 - 0.50, BH9 - 0.0, BH9 - 0.50, BH9 - 1.00, BH9 - 1.50, BH10 - 0.0, BH11 - 0.75, BH12 - 0.0, BH13 - 0.0, BH14 - 0.0, BH14 - 0.50, BH14 - 1.00, BH14 - 1.50	**12-Jul-2022**	**03-Aug-2022**	12-Jul-2023	✓	**03-Aug-2022**	01-Nov-2022	✓
EA033-D: Retained Acidity							
80* dried soil (EA033)							
BH2 - 0.0, BH3 - 0.0, BH7 - 0.0, BH8 - 0.0, BH8 - 0.25, BH8 - 0.50, BH9 - 0.0, BH9 - 0.50, BH9 - 1.00, BH9 - 1.50, BH10 - 0.0, BH11 - 0.75, BH12 - 0.0, BH13 - 0.0, BH14 - 0.0, BH14 - 0.50, BH14 - 1.00, BH14 - 1.50	**12-Jul-2022**	**03-Aug-2022**	12-Jul-2023	✓	**03-Aug-2022**	01-Nov-2022	✓
EA033-E: Acid Base Accounting							
80* dried soil (EA033)							
BH2 - 0.0, BH3 - 0.0, BH7 - 0.0, BH8 - 0.0, BH8 - 0.25, BH8 - 0.50, BH9 - 0.0, BH9 - 0.50, BH9 - 1.00, BH9 - 1.50, BH10 - 0.0, BH11 - 0.75, BH12 - 0.0, BH13 - 0.0, BH14 - 0.0, BH14 - 0.50, BH14 - 1.00, BH14 - 1.50	**12-Jul-2022**	**03-Aug-2022**	12-Jul-2023	✓	**03-Aug-2022**	01-Nov-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

APPENDIX G – CROSS SECTION SCHEMATICS

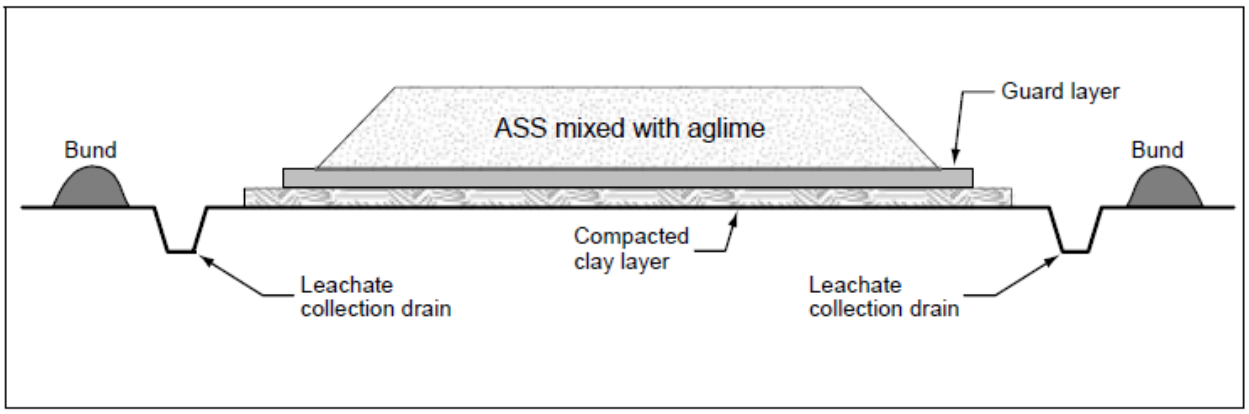


Figure 1. Schematic cross-section of a treatment pad, including a compacted clay layer, guard layer, leachate collection system and containment with bunding (Source: Soil Management Guidelines, DNRM, 2002).

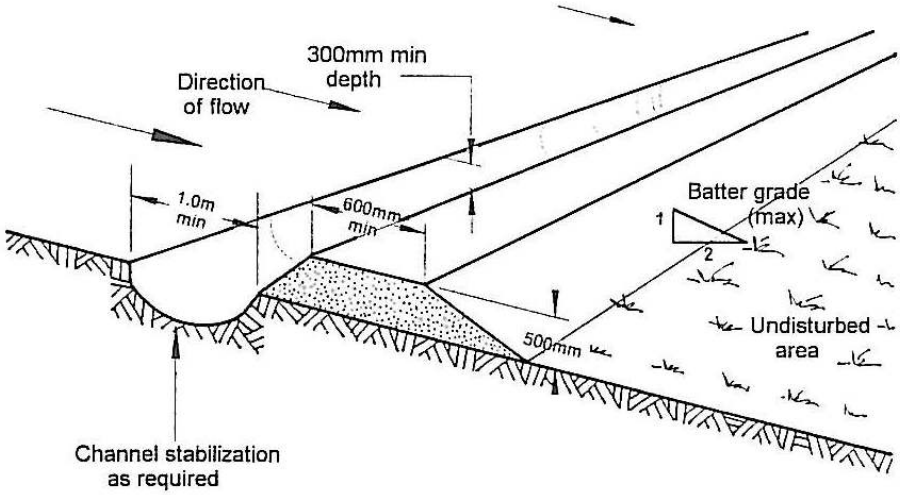


Figure 2. Cross-section of typical catch drain (Source: IE Aust, 1996).

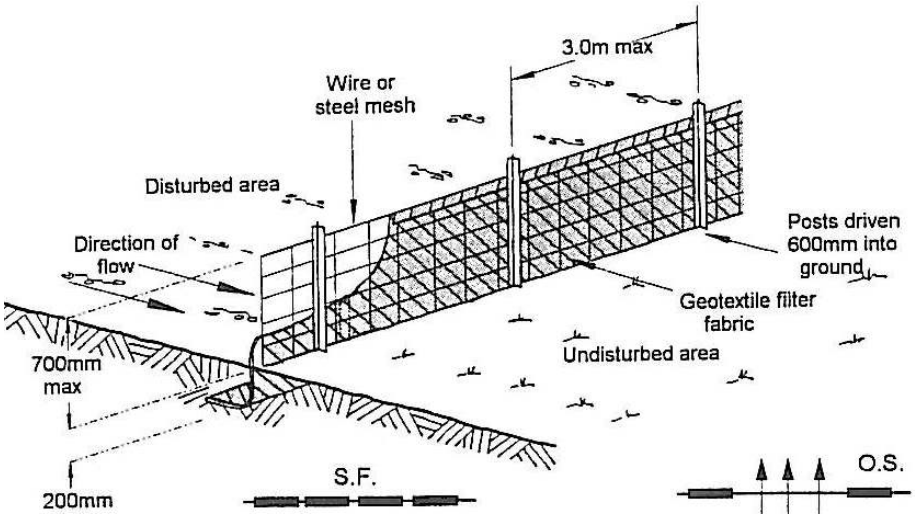
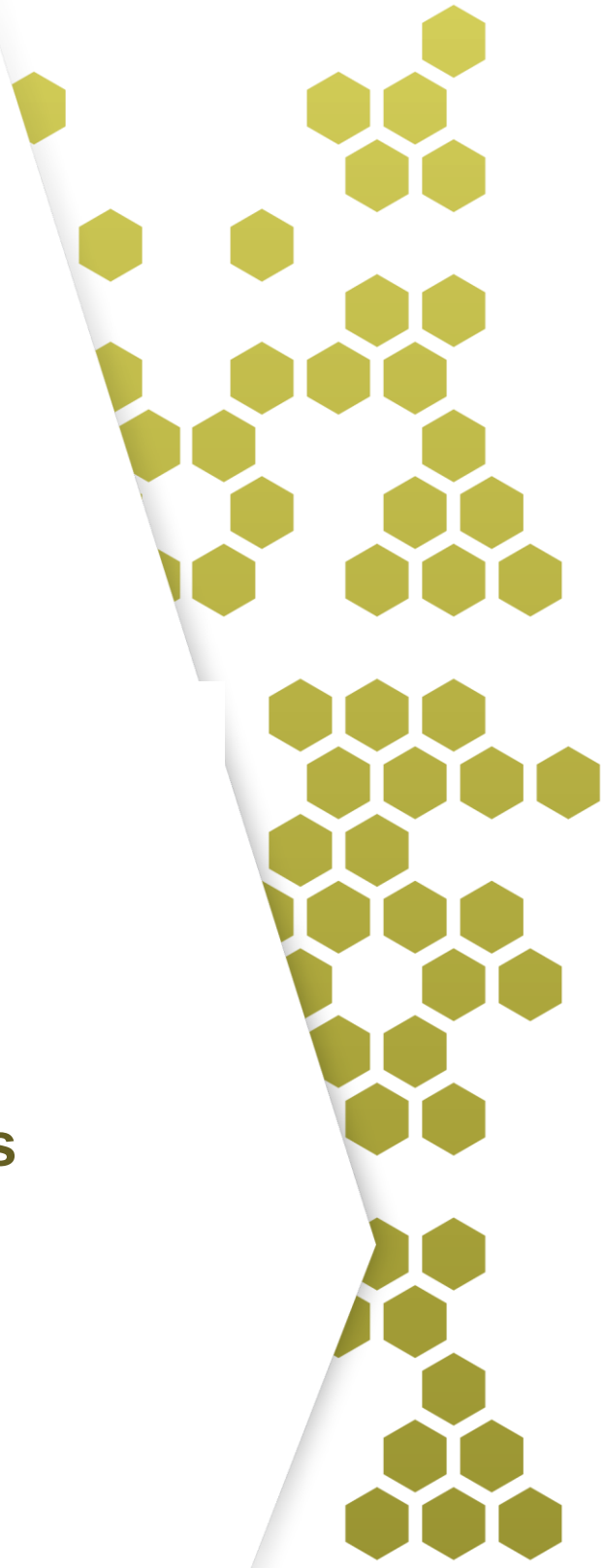


Figure 3. Cross-section of typical sediment fence (Source: IE Aust, 1996).

APPENDIX H – NSW WASTE CLASSIFICATION GUIDELINES

Waste classification guidelines

Part 4: Acid sulfate soils



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Handling potential acid sulfate soils prior to disposal 1
Disposal of potential acid sulfate soils *below* the water table 2
Disposal of potential acid sulfate soils *above* the water table 2
Actual acid sulfate soils **2**
Treatment of actual acid sulfate soils prior to disposal 2
Disposal of actual acid sulfate soils 3

Classifying wastes into groups that pose similar risks to the environment and human health facilitates their management and appropriate disposal. It is the responsibility of those who generate waste to classify that waste. To assist waste generators classify the wastes they produce, the EPA has developed the *Waste Classification Guidelines* ('the Guidelines') which are a step-by-step process for classifying waste.

Generators and waste facilities must carefully follow the procedures in these Guidelines to ensure they comply with applicable laws in classifying their waste and safeguard protection of the environment and human health.

The Guidelines are comprised of the following sections, of which this document is Part 4:

Overview of the Guidelines

Part 1: Classifying waste

Part 2: Immobilisation of waste

Part 3: Waste containing radioactive material

Part 4: Acid sulfate soils

All sections of the Guidelines are available for download from the EPA website at www.epa.nsw.gov.au/waste/classification.htm.

Introduction

Acid sulfate soils (ASS) are those naturally occurring sediments and soils which contain sulfides, mainly iron sulfide and iron disulfide or their precursors. Exposure of these sulfides in the soil to oxygen – often as a result of drainage or excavation – can produce sulfuric acid, which may have a significant impact on the environment. Leaching of sulfuric acid into waterways can cause serious water quality problems, resulting in fish kills and damage to infrastructure, such as floodgates and bridges.

ASS are most commonly found in NSW along the coast and they need to be managed appropriately to avoid major environmental damage.

The NSW *Acid Sulfate Soils Manual*[1] (the ASS Manual) provides 'best practice' guidance for planning, assessing and managing activities in areas prone to developing ASS. The manual is available from the NSW Department of Planning: phone 1300 305 695.

Using this part of the Guidelines

This part of the EPA Waste Classification Guidelines (the Guidelines) applies to acid sulfate soils which are unable to be managed on-site. In these cases, off-site disposal to landfill is often the most appropriate management option.

Waste generators need to assess the status of ASS at their point of generation, using the techniques outlined in the ASS Manual. The ASS Manual also provides guidance for on-site management, while this part of the Waste Classification Guidelines details disposal requirements for ASS that need to be transported and managed off-site.

This document has advice on dealing with both 'potential' ASS and 'actual' ASS. The two types are often found together in the same soil profile, with actual ASS generally overlying potential ASS horizons.

Potential acid sulfate soils

Potential ASS are soils that contain iron sulfides or sulfidic materials that have not been exposed to air and thus are not oxidised. The pH of these soils in their undisturbed state is 5.5 or more, making them neutral or slightly alkaline. If not managed appropriately, potential ASS pose a considerable environmental risk: disturbance and exposure to air may render them severely acidic.

Handling potential acid sulfate soils prior to disposal

Potential ASS must be kept wet at all times during excavation and subsequent handling, transport and storage, until they can be disposed of safely. They must be received at the proposed disposal point within 16 hours of being dug up.

[1] Stone Y, Ahem, CR and Blunden, B 1998. *Acid Sulphate Soils Manual 1998*. Acid Sulphate Soils Management Advisory Committee (ASSMAC), Wollongbar, NSW.

Disposal of potential acid sulfate soils *below* the water table

Potential ASS may be disposed of in water below the permanent water table, provided:

- this occurs before they have had a chance to oxidise, i.e. within 24 hours of excavation

and

- they meet the definition of 'virgin excavated natural material' (VENM) under the *Protection of the Environment Operations Act 1997*, even though they contain sulfidic ores or soils.

Landfills must be licensed by the EPA to dispose of potential ASS below the water table. EPA's Environment Line has details on facilities able to accept this waste: phone 131 555.

Potential ASS must be disposed of within 8 hours of their receipt at a landfill and kept wet at all times until their burial at least two metres below the lowest historical level of the water table at the disposal site.

Documentation must be provided to the occupier of the landfill for each truckload of potential ASS received, indicating that the soil's excavation, transport and handling have been in accordance with the ASS Manual, thus preventing the generation of acid.

The occupier of the disposal site must also test the pH of each load of soil received immediately prior to its placement under water using the test method(s) in the ASS Manual (Methods 21A and/or 21Af). These details, together with the pH of the soil recorded at the time of its extraction, must be retained by the occupier of the landfill site.

The disposal site's licence will outline what documentation needs to be kept and for how long.

Soil that has dried out, undergone any oxidation of its sulfidic minerals, or which has a pH of less than 5.5 must be treated by neutralisation and disposed of at a landfill that can lawfully accept it (see **Disposal of actual acid sulfate soils** below).

The pH of the water at the landfill into which the potential ASS is placed must not be less than 6.0 at any time. Landfill licence conditions require the occupiers of potential ASS disposal sites to regularly monitor the pH of ground and surface waters at their premises.

Disposal of potential acid sulfate soils *above* the water table

Where potential ASS cannot be classified as VENM or a suitable underwater disposal site at a landfill is not available, the soil must be treated in accordance with the neutralising techniques in the ASS Manual. After treatment the soil should be chemically assessed in accordance with Step 5 in Part 1 of the Waste Classification Guidelines, available at www.epa.nsw.gov.au/waste/classification.htm. This will determine whether any other contaminants are present in the material. When the classification has been established, the soil should be disposed of to a landfill that can lawfully accept that class of waste.

Actual acid sulfate soils

Actual ASS contain highly acidic soil horizons or layers resulting from the aeration of soil materials that are rich in sulfides, primarily iron sulfide. This oxidation produces more hydrogen ions than the sediment is able to neutralise, resulting in soils with a pH of 5.5 or less when measured in dry season conditions. These soils can usually be identified by the presence of pale yellow mottles and coatings of jarosite.

Treatment of actual acid sulfate soils prior to disposal

Actual ASS must be treated by the generator of the waste before they can be considered for disposal. Treatment should be in accordance with the neutralising techniques outlined in the ASS Manual.

Disposal of actual acid sulfate soils

Following neutralisation, the generator of the waste must chemically assess the soil in accordance with Step 5 of Part 1 of the Waste Classification Guidelines. This will determine whether there are any other contaminants that may affect how the waste is classified for disposal.

Once classified, the waste must be taken to a landfill licensed to accept that class of waste.

Prior arrangements should be made with the occupier of the landfill to ensure that it is licensed to accept the waste. The landfill should be informed that the actual ASS has been treated in accordance with the neutralising techniques outlined in the ASS Manual and that the waste has also been classified in accordance with Part 1 of the Waste Classification Guidelines.