

Appendix O - Pit Stratification Study





Pit lake water quality profiling – 2020-2021 Rustlers Roost Primary Gold Pty Ltd



DOCUMENT CONTROL RECORD

Job	EZ21105
Document ID	202842-29
Author(s)	Gisela Lamche, Jack Dymalla, Andrew Lewis, Bill Dwyer

DOCUMENT HISTORY

Rev	Reviewed by	Approved by	Issued to	Date
1	Helen Dwyer	Helen Dwyer	Charles Hastie	27 July 2021

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EcOz Pty Ltd.
 ABN: 81 143 989 039
 Level 1, 70 Cavenagh Street
 DARWIN NT 0800
 GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
 Email: eco@eco.com.au
 Internet: www.eco.com.au



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ACRONYMS

DO	Dissolved oxygen
EC	Electrical conductivity
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
LOR	Limit of reporting
MCP	Mine Closure Plan
NT	Northern Territory
PAF	potentially acid forming
PGO	Primary Gold Ltd
RRPA	Rustlers Roost project area
TN	total nitrogen
TP	total phosphorus
WDL	wastewater discharge licence

EXECUTIVE SUMMARY

Primary Gold Pty engaged EcOz Environmental Consultants to undertake water quality profile sampling of the Rustlers Roost pit lake in November 2020 and June 2021. These dates covered seasonal variation and the lake was found to be strongly stratified in November 2020 and almost completely mixed in June 2021.

The scope of the study was to:

- investigate whether the pit water was of acidic quality
- assess pit water quality against applicable guideline values in preparation for pit dewatering
- establish baseline information of the pit lake water quality prior to dewatering and mining for the preparation of the mine closure plan (MCP).

The field parameters revealed the Rustlers Roost pit lake to be of good water quality:

- Temperature profiles describe the usual stratification and mixing of a healthy lake with dissolved oxygen (DO) changing throughout the water column and seasons accordingly
- pH displayed a relatively wide but healthy range explained by the low alkalinity of the water
- Electrical conductivity was overall low and increased at depth during stratification due to evaporative concentration
- Turbidity was well below guideline values even at depth on both dates.

Few metals exceeded the applicable guideline values, and no trend or pattern, spatially or temporarily, was identified. Total metals exceedances were recorded for arsenic (once), chromium (once), copper (six measurements) and zinc (once), whilst only one dissolved metals exceedance (copper) was recorded. The latter is considered of greater relevance as the dissolved metals are understood as the biologically available fraction. Metals were, in general, of low concentration.

Lake stratification as recorded in November 2020 caused increased ammonia concentrations at depth, which were in the process of being metabolised via nitrite and nitrate to nitrogen gas in June 2021. While total nitrogen concentrations were still elevated above guideline values in June, it is expected that these will decrease due to nitrogen gas leaving the lake water in the coming weeks. Total phosphorus concentrations showed several guideline exceedances.

Dewatering of the pit in the forthcoming wet season would not be expected to result in exceedances of metal and nutrient concentrations in the receiving environment, as concentrations within the pit are relatively low, and pit water will be diluted with wet season rainfall. Comparison water quality data from the two receiving creeks (upper Marrakai Creek and upper Mount Bunday Creek tributaries) were measured during 2020 / 2021 and found to frequently record elevated concentrations of metals (dissolved and total) as well as nutrients – higher than those reported here for the pit lake.

Thus, the environmental impact of the dewatering is anticipated to be low to the receiving environment. In accordance with the waste discharge licence, water quality monitoring is required during dewatering to confirm complying metal and nutrient concentrations or to allow for adjustments of the dilution rates in order to achieve compliance.

The water quality of Rustlers Roost pit lake is overall assessed as good and this data collection will serve as baseline water quality to restore the pit lake to during mine closure following dewatering and mining.

1 INTRODUCTION

Primary Gold Ltd. (PGO) are preparing an Environmental Impact Statement (EIS) for the redevelopment and expansion of the former open pit gold mine operation at the Rustlers Roost project area (RRPA) in the Mount Bunday locality, approx. 100 km south-east of Darwin, Northern Territory (NT). The terms of reference for the EIS (NT EPA 2021) require the Mine Closure Plan (MCP) to provide detailed considerations on return of waste rock to pits and the need to address post-closure pit lake water quality.

The current study investigated the limnology and water quality in the Rustlers Roost pit lake prior to dewatering and recommencement of mining operations. The data will provide the baseline data to inform the MCP on water quality the pit lake should be restored to at the end of the mining process.

1.1 Purpose and scope

EcOz Environmental Consultants (EcOz) was engaged to undertake depth profile sampling in the pit lake in November 2020 and June 2021 to capture seasonal aspects of water quality changes in order to best describe pre-discharge water quality and limnology of the lake. PGO have been granted a waste discharge license (WDL247) from the NT EPA to dewater the pit into the headwater of Marrakai Creek to the west and Mound Bunday Creek to the east, which will commence in the 2021/22 wet season.

The information collected:

- provided information on whether the pit water was of acidic quality
- assessed pit water quality against applicable guideline values in preparation for pit dewatering
- will be used as baseline information for the preparation of the mine closure plan (MCP).

This report only assesses the water quality in the pit *in-situ*, prior to dewatering. Discharge water quality will be monitored once dewatering commences during the wet season in accordance with wastewater discharge license WDL247 commencing 22 June 2021 valid until 21 June 2023.

1.2 Pit lake description

The current Rustlers Roost pit lake was originally four separate pits that were termed – from north to south – Sweat Ridge, Dolly Pot, Beef Bucket and Backhoe (Figure 1-1). They merged into one waterbody after mining ceased in 1998 and the pit filled with water (Figure 1-2, Plate 1-1). The water body is surrounded by steep ridges (pit walls) that extend approximately 10 m above the waterline, which was between 2-3 m higher in June 2021 than in November 2020.

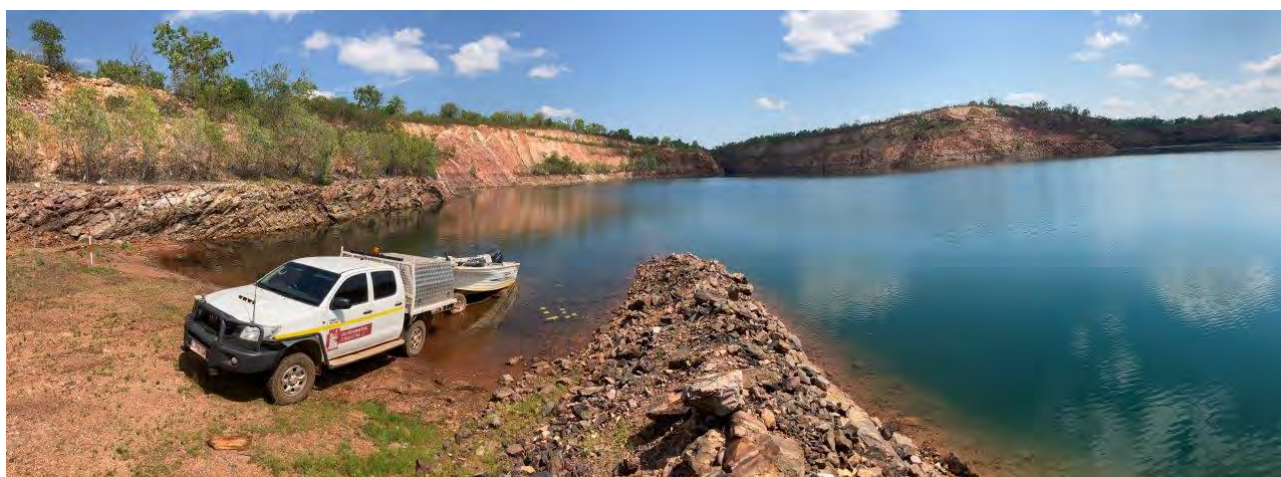


Plate 1-1. View from boat access point onto Rustlers Roost pit lake on 18 November 2020

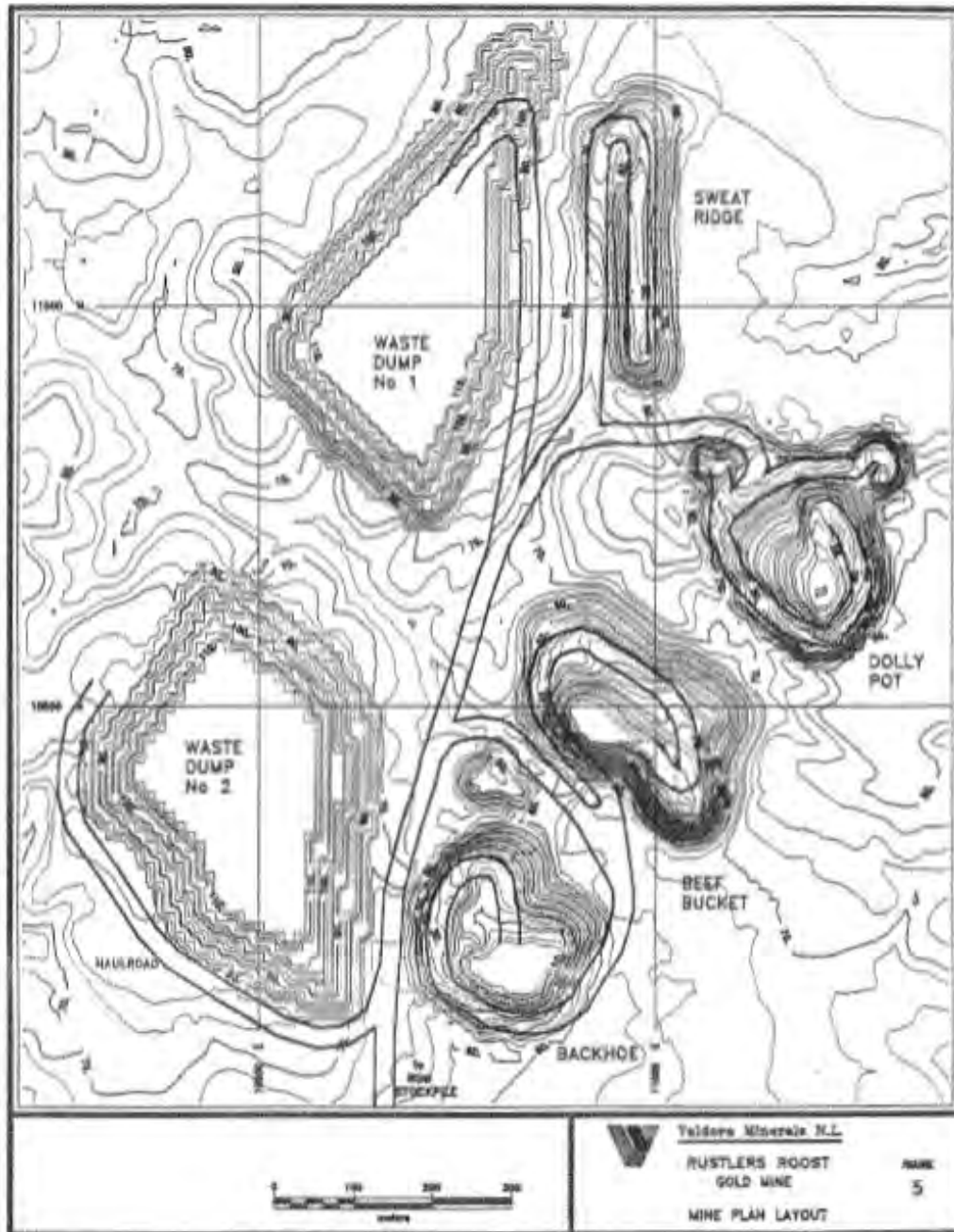
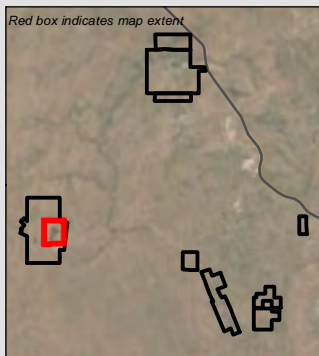
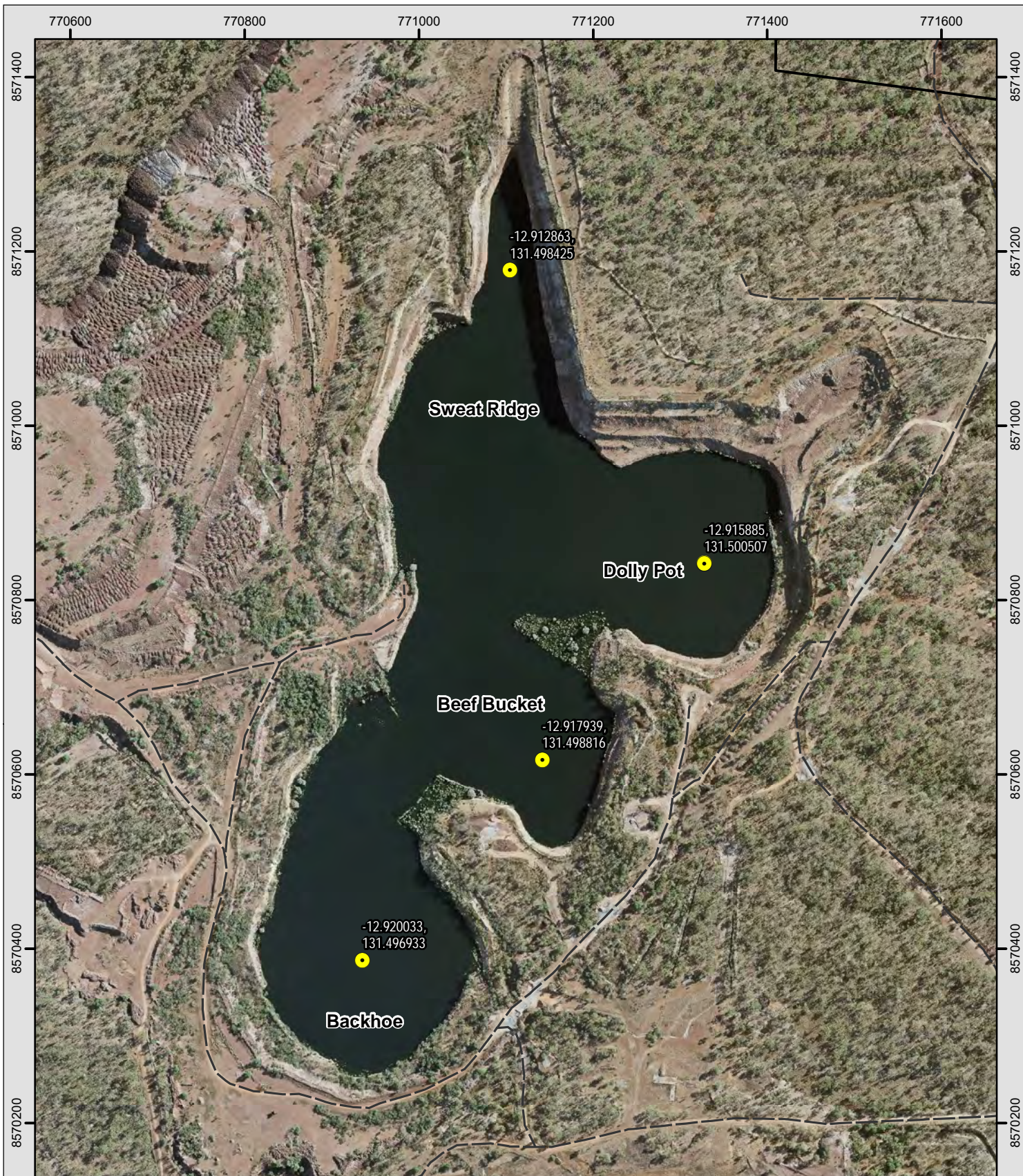





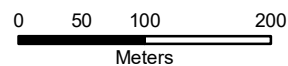
Figure 1-1. The four pits Sweat Ridge, Dolly Pot, Beef Bucket and Backhoe and mine layout (Valdora 1994) from Primary Gold - Interim Mine Closure Plan (2020)

The lake is located in the upper part of a tributary to Upper Mount Bundey Creek and receives surface water inflow from a very small catchment area only (Figure 1-3). Due to its small catchment and the water levels observed during field work, it is assumed that the lake never overflows (see Plate 1-1, Plate 1-2).



Project data

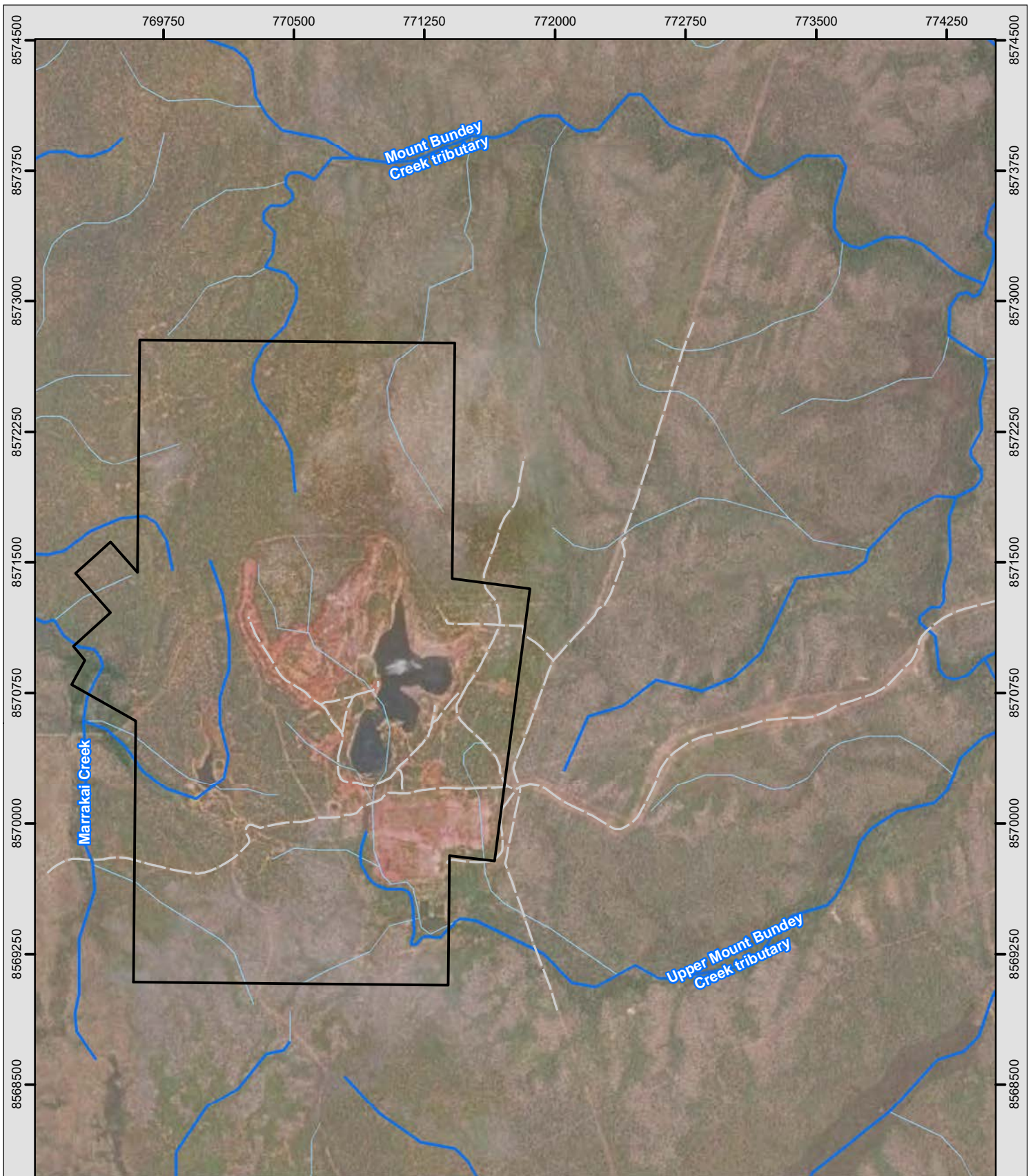
-  Sampling locations
-  Existing access
-  Mining title boundary







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 Mapper: DC

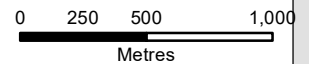
DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: CLIENT
 Imagery: ESRI

Figure 1-2. Rustlers Roost pit lake depth profile sampling sites



Legend

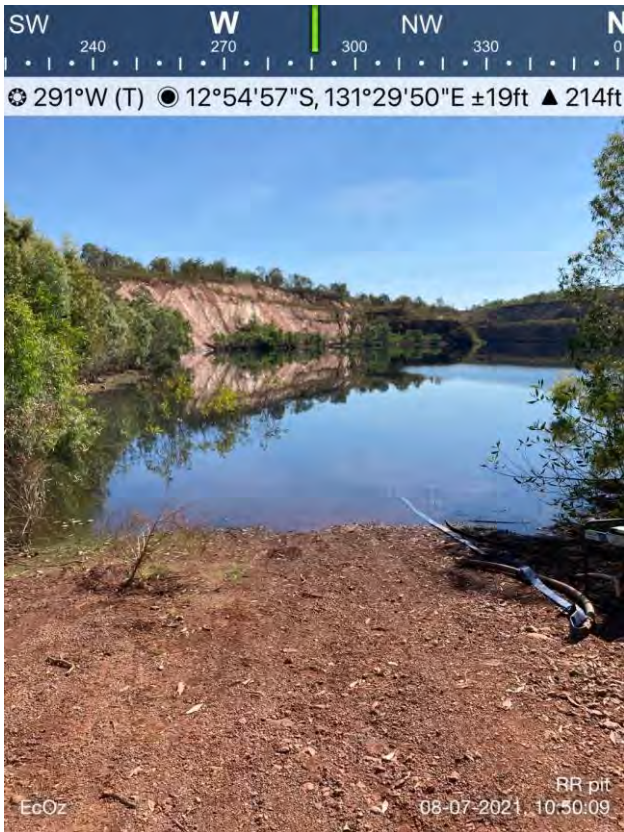
-  Mining title
-  Existing track
-  Minor watercourse
-  Streams



MAP INFORMATION
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 Date Saved: 30/11/2020
 Client: Hanking Australia
 Mapper: AF

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: Client
 Imagery: Shaded relief, Landsat

Figure 1-3. Rustlers Roost pit lake and nearby streams



View from boat ramp towards Sweat Ridge.



View to the north eastern side of the pit lake.



View from southern end of the pit lake to the east.



View from southern end of the pit lake to the north.

Plate 1-2. View over the pit lake from the east (top) and from the south (bottom) on 8 July 2021

2 METHODS

2.1 Sampling sites and frequency

Sample sites were located in the deepest sections of the pit, based on the profiles of the four former pits (Dolly Pot, Beef Bucket, Backhoe and Sweat Ridge), to capture water quality information from the surface to the deepest parts of the lake.

Sampling was performed in November to capture the status of stratification towards the end of the build-up/early wet season when water quality can become poor in the deep water. The June sampling was targeting the description of water quality in the early dry season when the lake might be mixed after the cooling of air temperature and associated cooling of water temperatures.

2.2 Sampling procedures

Water sampling was undertaken in accordance with EcOz's *Procedure for Surface Water Sampling*, which complies with industry standards and guidelines, including:

- Australian/New Zealand Standard on Water Quality Sampling - Part 1: *Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples* (AS/NZS 5667.1:1998), Standards Australia, New South Wales.
- Australian/New Zealand Standard on Water Quality Sampling - Part 4: *Guidance on sampling from lakes, natural and manmade* (AS/NZS 5667.4:1998), Standards Australia, New South Wales.
- ANZG (2018): Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.

2.3 Sampling methods - sample collection

Field work was undertaken on 18 November 2020 and 17 June 2021. Sample sites were accessed by boat (Plate 1-1).

Physical chemical parameters were measured *in situ* using a set of YSI EcoSense probes. Turbidity was measured using a Hach turbidity metre 2100Q. All instruments were calibrated on the day before sampling.

Samples were taken from the surface and 10 m, 15 m, 20 m, 25 m or 27 m depth near the bed, as well as 5 m depth on 17 June 2021. A van Dorn sampler was used to collect water samples at depth, with the content poured into a bucket. Field readings were taken in the bucket and laboratory supplied sample containers were filled from the bucket. The bucket and water quality metre were rinsed three times with sample water prior to collection of the sample. Laboratory samples were stored in an esky with ice bricks. Field metre readings and collection of laboratory samples was repeated per site and depth.

Sample bottles were submitted to the NATA accredited analysis laboratory, ALS, on the day of sampling.

2.4 Sampling parameters and assessment criteria

2.4.1 Field parameters

The field parameters measured were temperature, dissolved oxygen (DO), electrical conductivity (EC), pH, total dissolved solids (TDS), salinity, oxygen reduction potential (ORP), and turbidity.

2.4.2 Laboratory analytes

The following analyses were performed in the laboratory:

- Major ions (calcium, magnesium, sodium, potassium, hardness, chloride, sulphate, alkalinity)
- Dissolved and total metals (aluminium, arsenic, cadmium, chromium, cobalt, copper, iron, ferrous iron, lead, manganese, nickel, selenium, tin, uranium, zinc)
- Suspended solids
- Turbidity
- Acidity
- Nutrients (ammonia, nitrite + nitrate, total Kjeldahl nitrogen (TKN), total nitrogen (TN), total phosphorus (TP).

2.4.3 Assessment criteria and limnology

The water quality in the lake was assessed against the ANZG (2018) for 95 % species protection with the objective of evaluating the water proposed for discharge into the local creeks during pit dewatering. The second guidelines applied were the ANZECC (2000) guidelines for upland rivers in tropical Australia, as opposed to the ANZECC (2000) guidelines for tropical freshwater lakes and reservoirs as the water will be discharged into the local creeks. Generally, there are few differences between those two guidelines (upland river / freshwater lakes).

Additionally, the limnology of the lake and seasonal changes were described based on results obtained.

3 RESULTS AND DISCUSSION

The surface extent of the lake is approximately 1.1 km long (north/south) and a maximum 0.47 km wide (east west in the region of Dolly Pot). In November 2020 the deepest point in the lake was 25.8 m at Dolly Pot, 25.7 m at Beef Bucket and 25.5 m at Backhoe, while in June 2021 it was 28.5 m at Beef Bucket after rainfall inflow over the wet season. The Sweat Ridge section was much shallower (13.1 m in November 2020, 15 m in June 2021). The water appeared clear on both sampling days.

3.1 Climatic factors

The Rustlers Roost Project Area (RRPA) is located within a region that experiences a subtropical climate with a distinct dry season (May to October) and wet season (November to April).

The stratification status of the pit lake in November and June is influenced by the temperatures, rainfall and wind in the months prior. No weather station is maintained on RRPA, thus the station #014090 at Middle Point Rangers, located 7 km to the south-east of RRPA, and station #014041 Middle Point, another 3.4 km from Middle Point Rangers, were used, as well as general information from the Bureau of Meteorology (BoM; BoM 2021a, b, c, d, e).

The monthly rainfall totals between July 2020 and June 2021 show that rainfall received in December 2020 and January 2021 was well above average, while rainfall in all other months was comparable to the long term average (Figure 3-1).

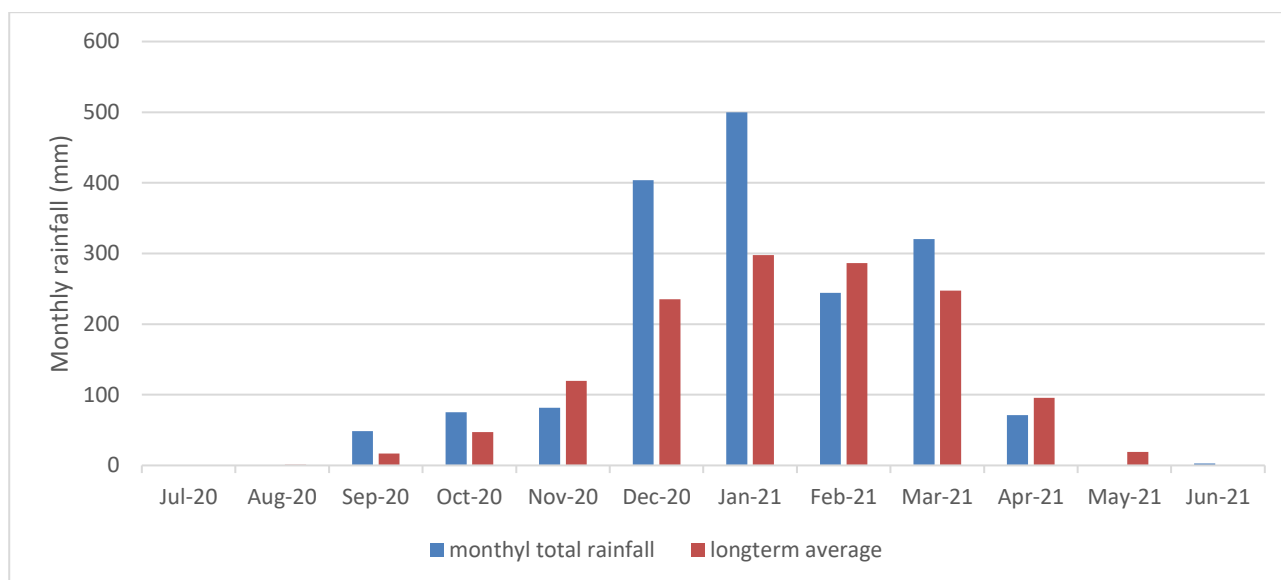


Figure 3-1. Monthly rainfall at BoM station 014041 Middle Point from July 2020 to June 2021

The temperatures in the dry season leading up to the November sampling were overall warmer than average (BoM 2021e). During the wet season, both, day time and night time average temperatures were marginally above the long term average across the Territory.

The average wind direction vectors for November 2020 show an almost balanced rose with some more frequent wind from the north-west (Figure 3-2 left). The average June wind rose displays winds mostly coming from south-east, and also south and east, with greater speed than in November (Figure 3-2 right). These stronger south-easterly winds combined with lower air temperatures are the main cause for lake stratification to weaken and the thermocline to erode as described in section 3.2.1 below.

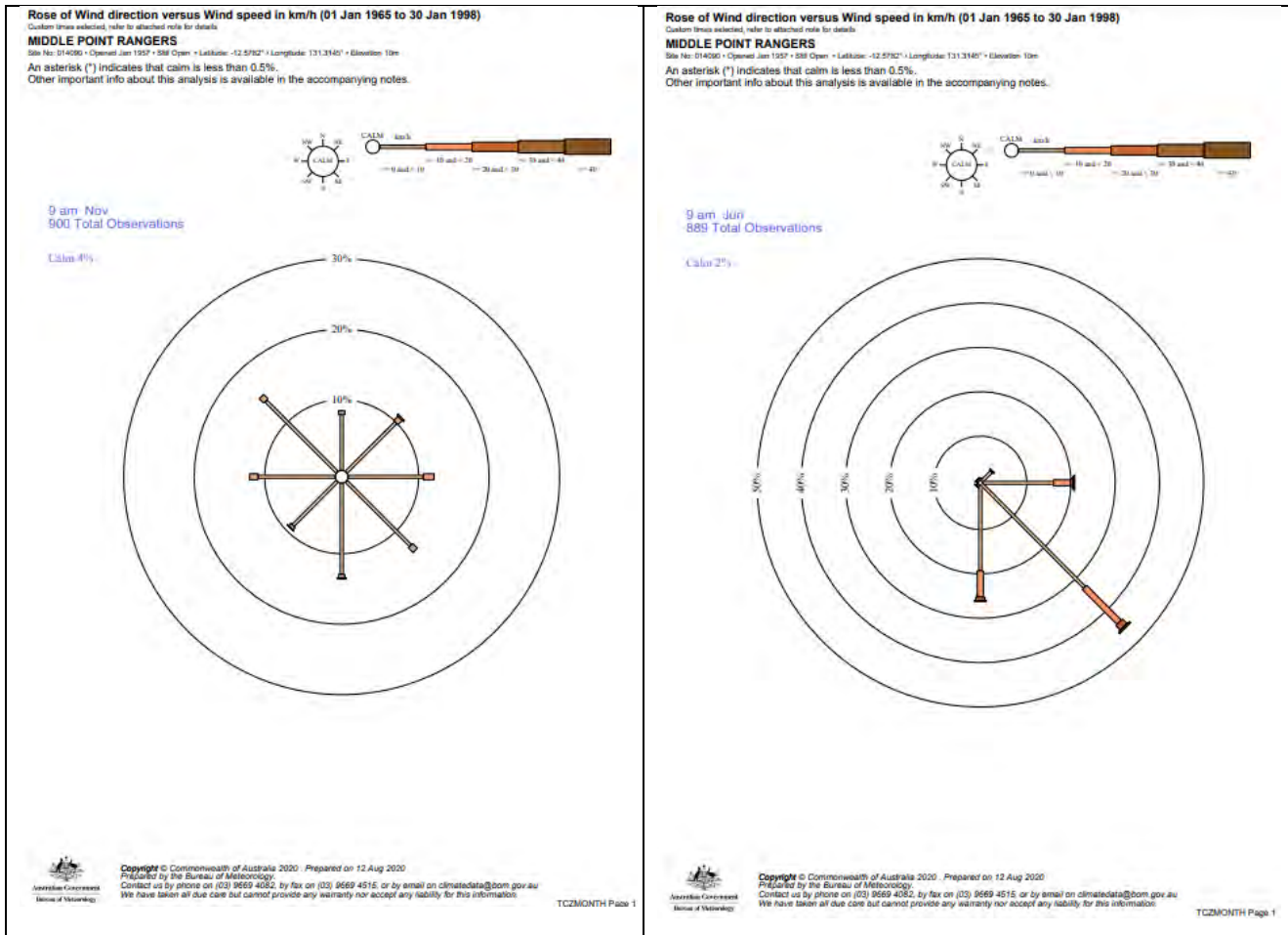


Figure 3-2. Wind rose average direction versus wind speed (km/h) for November 2020 (left) and June 2021 (right) at Middle Point Rangers station (014090)

3.2 Field parameters

The physico-chemical data are presented in graphical form together for the two sampling dates to allow for easy comparison. The field data can be found in Appendix A and Appendix C.

3.2.1 Temperature

The temperature profiles for November 2020 ranged from 32.9°C at the surface to 26.2°C near the bed, describing a stably stratified water body (Figure 3-3, top). The surface was slightly warmer at Sweat Ridge and Backhoe at the northern and southern ends of the lake respectively. At depth, Backhoe and Beef Bucket measured the lowest temperature. The deep water at Sweat Ridge was at 30°C at 12 m depth.

The thermocline of the strongly stratified lake was located somewhere between 10 and 15 m depth. There would have been no exchange between the upper and lower water layers for a period of time. This temperature profile reflects the prevailing weather conditions: high solar intensity under mostly still conditions – typical for build-up weather – causes the heating up of the water from the top to the depth that the light can penetrate (10-15 m) with the upper water being the warmest. The deep water where solar radiation does not reach remains cool. Due to the higher density of cooler water, the thermocline is strong and can only be interrupted through strong winds and storms or monsoonal conditions. However, stratification usually re-establishes soon after the end of a storm or monsoon. The rainfall events prior to 18 November of 31.4 mm (20 September), 22.4 mm (8 October), 26.6 mm (29 October) would likely have contributed to stratification as these early rains are warm and runoff flows over hot surfaces towards the lake. The water entering the pit

lake would have been of low density and remained at the surface water. However, these rainfall data are from several kilometres away and localised rain events at RRPA could have been quite different.

In contrast, the temperature profiles measured in June 2021 displayed a small amplitude between the surface water temperature – ranging between 27.9 and 28.2°C – and the water near the bed with temperatures of 26.8°C at Backhoe to 27.7°C at Beef Bucket (Figure 3-3, bottom). The water column was almost mixed with the Backhoe site being the only one displaying a weak thermocline between 20 and 27 m depth. The Beef Bucket site was almost entirely mixed with a nonlinear temperature curve and an overall difference of 0.4 °C throughout the water column.

The change of season after the hot humid conditions of the wet season to the dry windy conditions from the southeast of the dry season, results in the rapidly cooling of the air temperature, which gradually cools down the water from the surface. As cooler water is denser than warm water, these cooling surface waters sink creating vertical turbulence transport, and eventually result in the mixing of the water column and the entire water body. The profiles in June show that water movement was in process as the profiles at Dolly Pot and Beef Bucket are not following a continuous temperature decline from surface to bed. From the present data, it cannot be fully concluded whether complete mixing of the lake had already occurred or was going to take place.

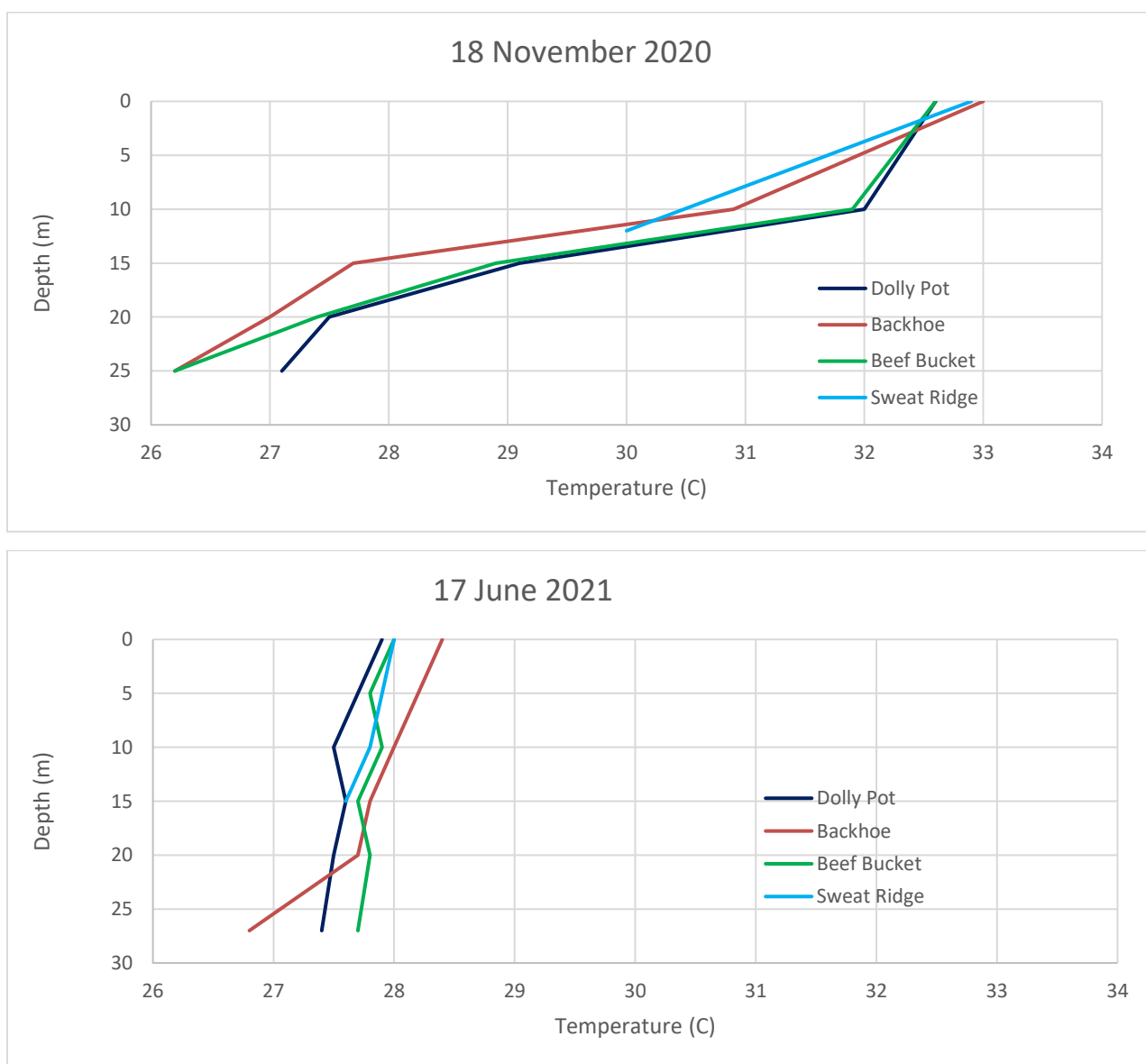


Figure 3-3. Temperature profiles in Rustlers Roost pit lake

3.2.2 Dissolved oxygen

The November dissolved oxygen profiles confirm the presence of a strong thermocline between 15 and 20 m depth (Figure 3-4, top). Saturation at the surface was between 56.9 % at Dolly Pot and 73.8 % at Sweat Ridge, while near the bed of the reservoir it was between 19.7 % to 22 % at a depth of 25 m. The upper water layer (also referred to as epilimnion) remains in contact with air and is thus fairly saturated in oxygen. The lower water layer or hypolimnion is not able to be enriched with oxygen from the air and decomposing conditions from bacterial activity on organic material slowly but steadily consume oxygen until it is present in very low concentrations only or entirely absent.

In June the surface water was oxygen saturated at concentrations between 94.3 and 96.9 % (Figure 3-4, bottom). The decrease in saturation with depth was small to the depth of 20 m with concentrations between 85.3 to 88.6 %. In the deep water at 25 m, DO concentrations varied greatly with 78.8 % at Beef Bucket, 67.3 % at Dolly Pot and 39.7 % at Backhoe. These low DO saturations in the deep water indicate that full mixing had not yet occurred following the stratification during the build-up and wet season, as the consumption of oxygen in the deep water after establishment of a barrier in form of a thermocline is a process that establishes over the period of several weeks to months in a lake of this depth.

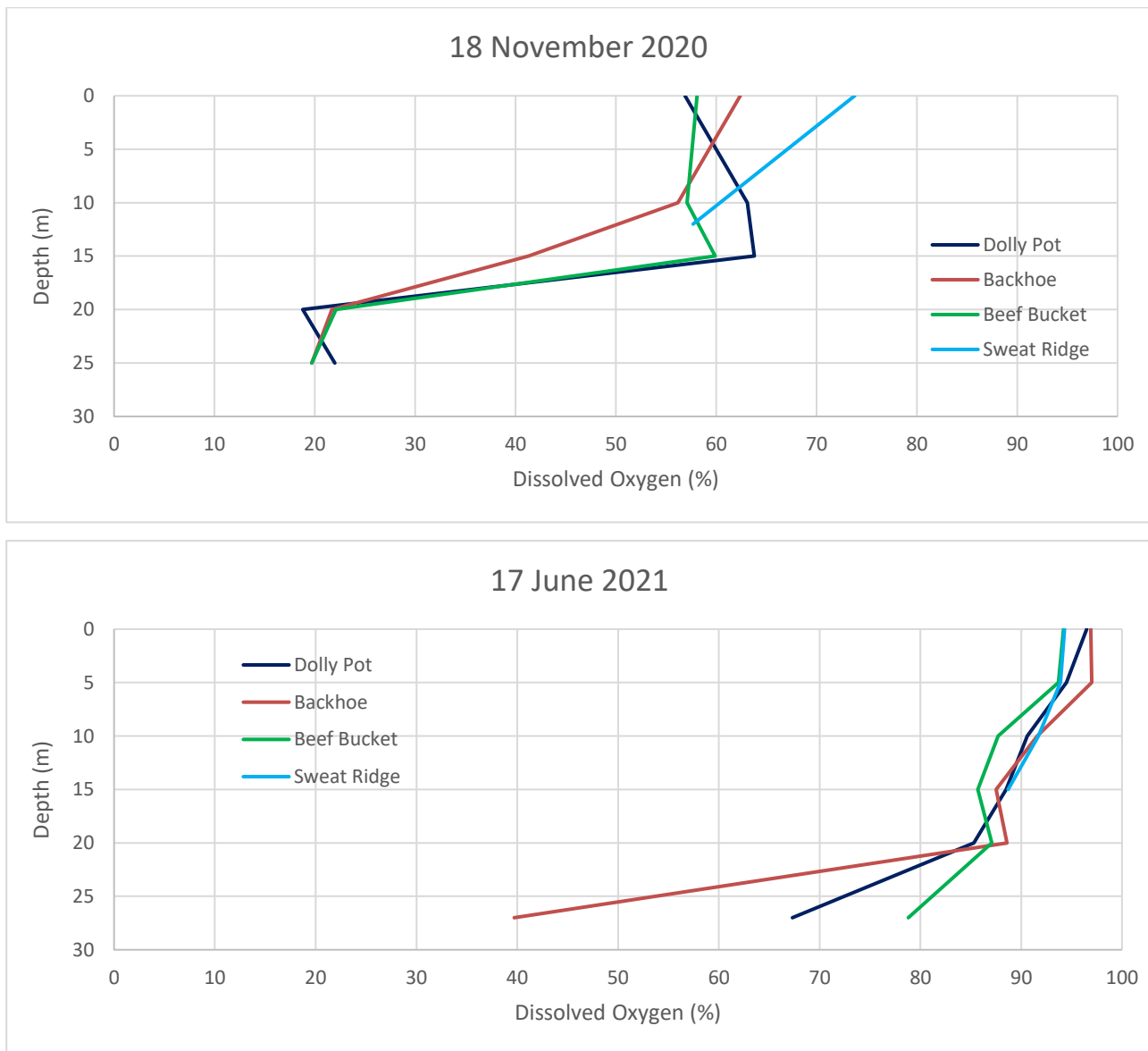


Figure 3-4. Dissolved oxygen profiles in Rustlers Roost pit lake

3.2.3 Electrical conductivity

Electrical conductivity (EC) measures the sum of the salts in water. In November 2020 EC was approximately 28 $\mu\text{S}/\text{cm}$ across the lake from the surface to 15 m depth with the exception of Dolly Pot, where it was higher with a peak of 35.7 $\mu\text{S}/\text{cm}$ at 10 m depth (Figure 3-5, top). EC gradually rose below 15 m depth to approx. 44 $\mu\text{S}/\text{cm}$ at 25 m depth. These EC concentrations indicated relatively low salt concentrations that increased near the bed and are a general occurrence due to evaporative concentration. The higher EC concentrations and irregular profile at Dolly Pot points to some recent inflow of runoff transporting higher conductivity material from localised precipitation.

In June 2021 EC was overall lower than in November at approx. 25 $\mu\text{S}/\text{cm}$ throughout the water column at Dolly Pot and Beef Bucket after dilution from the inflow of rain (Figure 3-5, bottom). At Backhoe EC increased at depth to 52.4 $\mu\text{S}/\text{cm}$, which is consistent with the presence of a weak thermocline at this site. At Sweat Ridge EC was overall slightly higher at 30.4 $\mu\text{S}/\text{cm}$ near the surface, 26.2 $\mu\text{S}/\text{cm}$ at 10 m depth and 29.5 $\mu\text{S}/\text{cm}$ at its deepest point of 15 m.

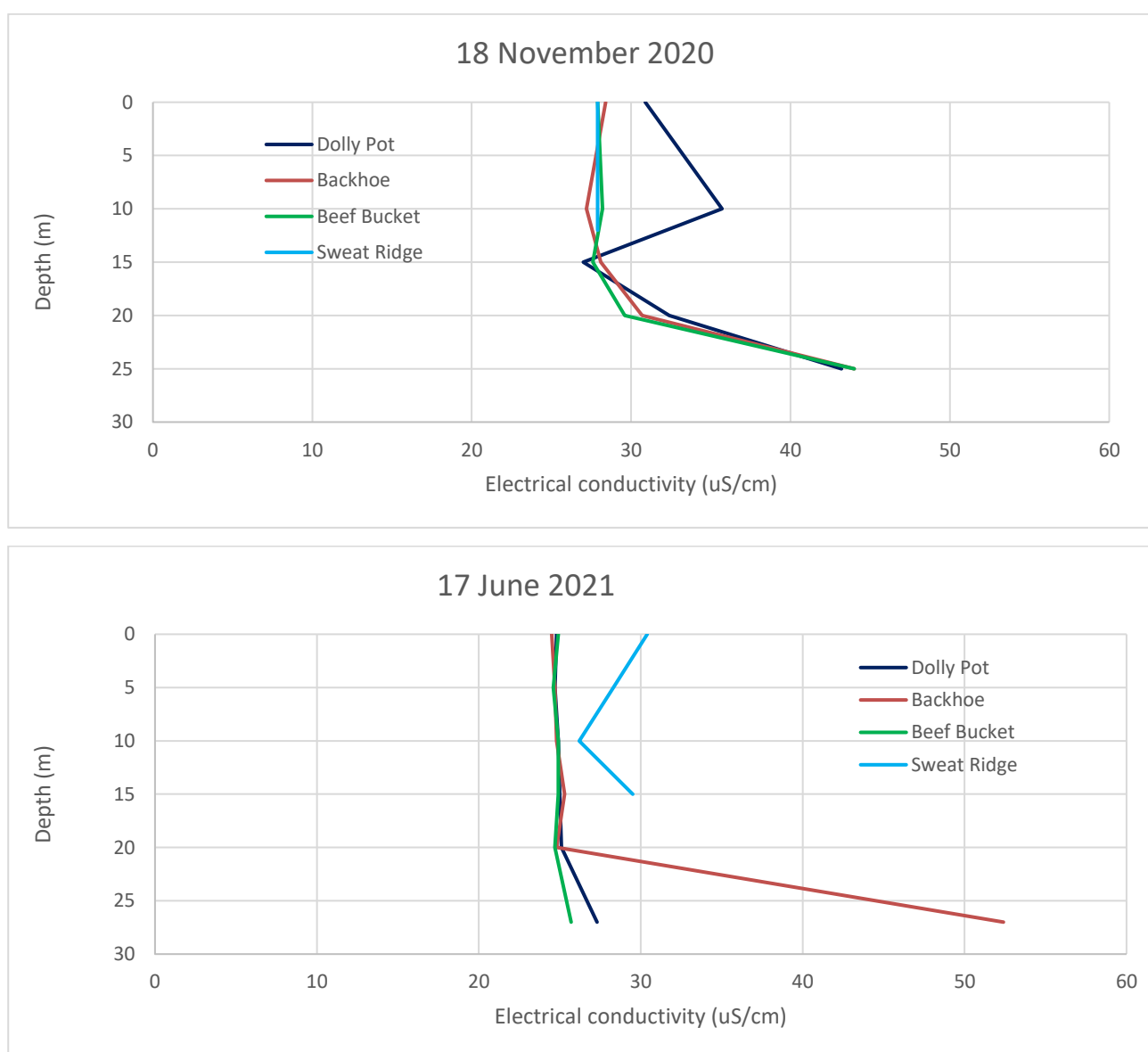


Figure 3-5. Electrical conductivity profiles in Rustlers Roost pit lake

3.2.4 pH

The surface water pH displayed a wide range in November from 7.34 at Sweat Ridge to 8.47 at Dolly Pot (Figure 3-6, top). The three deep sites showed a more similar pH profile at 10 m depth (range 7.72 - 8.05) decreasing sharply to a depth of 15 m and then showing no large change to measure between 6.45 – 6.52 at 25 m depth near the bed. The pH profile at Sweat Ridge was overall lower with 7.34 at the surface and 6.72 at 12 m depth.

This wide range in pH reflects the low alkalinity of the pit water (see section 3.3.3), which causes pH to change quickly in reaction to minor change as the buffer capacity of the water is very low. The relatively high surface pH at Dolly Pot might indicate some phytoplankton activity, which generally causes a rise in pH.

In June 2021 the pH profiles were relatively similar at the deep sites with a range of 6.51 - 6.74 at the surface and 5.99 – 6.35 near the bed. Surface pH at Sweat Ridge was higher at 7.55 and also higher at its deepest point of 15 m at 6.75. As stated above, the wide range of pH is natural in lakes of low alkalinity.

All pH data collected indicate an overall healthy water body.

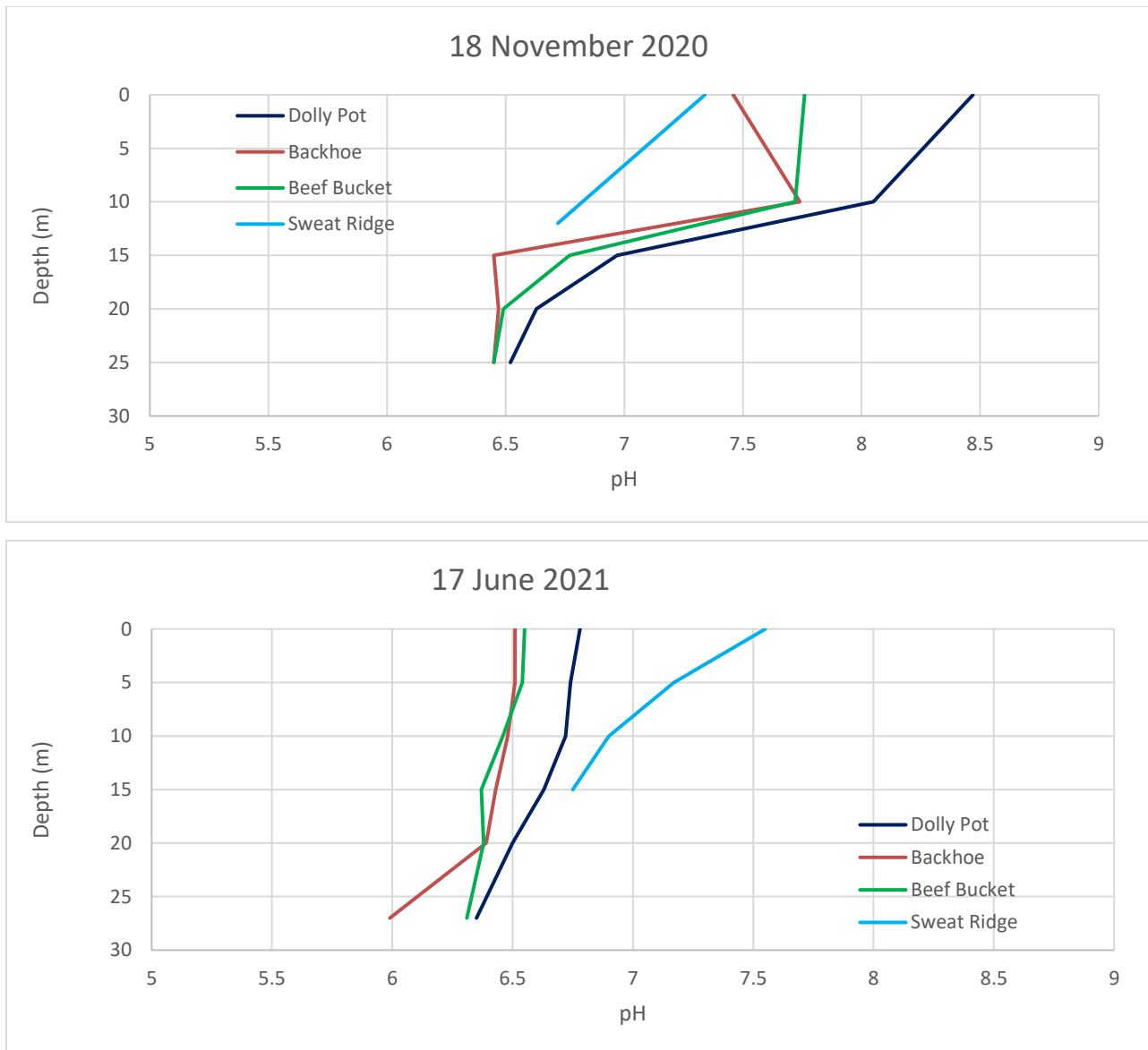


Figure 3-6. pH profiles in Rustlers Roost pit lake

3.2.5 Turbidity

In November turbidity profiles were low near the surface (range 0.4 – 0.6 NTU) and to a depth of 20 m with a small increase near the bed at 25 m (range 0.9 – 2.3 NTU) (Figure 3-7, top). This indicates a healthy stratified lake with overall low turbidity that was higher in the deep water during stratification. The variability in the Dolly Pot profile supports the possibility of recent inflow from localised rain in this area, transporting material into the lake and manifested at around 10 m depth at the time of sampling.

In June, turbidity showed higher variability throughout the water column and across the four sites (Figure 3-7, bottom). At the surface the measured turbidity ranged from 0.15 – 0.67 NTU and the profiles for each site did not align. Beef Bucket recorded the overall lowest turbidity and measured 1.06 NTU near the bed. Dolly Pot displayed the highest turbidity near the bed at 2.34 NTU. Sweat Ridge also recorded its highest turbidity of 2.75 NTU at its deep point at 15 m. The highest variability and also the highest turbidity value of the day was measured at Backhoe, which was 4.11 NTU at 15 m depth and 4.08 NTU at 20 m depth, while a lower 1.16 NTU was recorded in the deep water at 25 m. It is likely that these varying turbidity records were caused by the vertical turbulence described in section 3.2.1. Wind induced cooling might have moved turbidity rich water from the bed into the depths where they were recorded at the time of sampling. This would represent a snapshot in time and different profiles would have likely been obtained a day prior or later. Generally, turbidity was overall low.

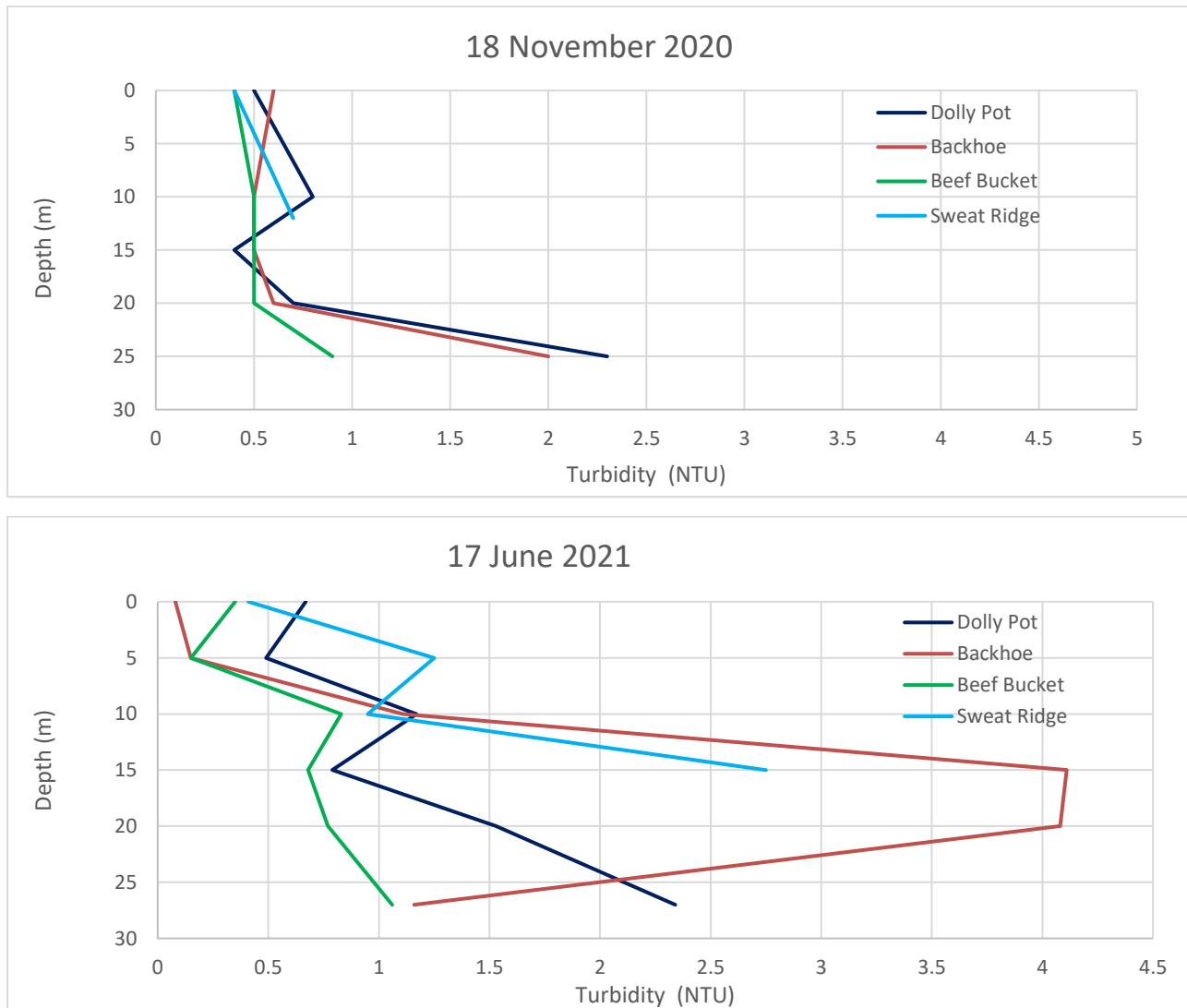


Figure 3-7. Turbidity profiles in Rustlers Roost pit lake

3.3 Laboratory analysis results

Results of most analytes are displayed in tabular form in this section with the exception of ammonia, profiles of which are shown in section 3.3.2, and alkalinity shown in section 3.3.3.

3.3.1 Metals

Most dissolved and total metal concentrations were below their limit of reporting (LOR) and the concentrations above LOR are highlighted in bold (Table 3-1, Table 3-2). Concentrations exceeding the applicable guideline concentrations are highlighted in red. Dissolved metals are generally regarded as the fraction of the total metals that is biologically accessible. Of all dissolved metals, only copper exceeded the ANZG (2018) for 95 % species protection once at Sweat Ridge at 5 m depth on 17 June 2021 (Table 3-1).

Table 3-1. Dissolved metals in Rustlers Roost pit lake

Site ID	Date	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Zinc (mg/L)
ANZG (2018) 95 % species protection		0.055	0.013	0.0002	-	0.001	0.0014	-	0.0034	1.9	0.011	0.011	-	0.0005	0.008
DOLLY POT 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 10m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.006
DOLLY POT 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 20m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	0.0010	<0.05	<0.001	0.203	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 25m	18-11-20	<0.01	0.007	<0.0001	<0.001	<0.001	<0.001	1.2	<0.001	0.622	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.003	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 10m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.002	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.048	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 20m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.193	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 25m	18-11-20	<0.01	0.008	<0.0001	<0.001	<0.001	<0.001	0.98	<0.001	0.584	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.001	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 10m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 20m	18-11-20	0.02	<0.001	<0.0001	<0.001	<0.001	0.0010	<0.05	<0.001	0.112	<0.001	<0.01	<0.001	<0.001	0.006
BEEF BUCKET 25m	18-11-20	<0.01	0.005	<0.0001	<0.001	<0.001	<0.001	0.72	<0.001	0.481	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.005

Site ID	Date	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Zinc (mg/L)
ANZG (2018) 95 % species protection		0.055	0.013	0.0002	-	0.001	0.0014	-	0.0034	1.9	0.011	0.011	-	0.0005	0.008
SWEAT RIDGE 12m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.052	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.016	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.012	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.009	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.014	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.016	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 27m	17-06-21	<0.01	<0.001	0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.259	0.002	<0.01	<0.001	<0.001	<0.005
BACKHOE 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.043	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.022	0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.022	0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.033	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.034	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 27m	17-06-21	<0.01	0.009	<0.0001	<0.001	0.001	<0.001	2.56	<0.001	0.78	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 0m	17-06-21	<0.01	<0.001	0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.018	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.017	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.015	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.03	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.024	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 27m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.071	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 0m	17-06-21	<0.01	<0.001	0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.017	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.002	<0.05	<0.001	0.014	<0.001	<0.01	<0.001	<0.001	0.006
SWEAT RIDGE 10m	17-06-21	<0.01	<0.001	0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.012	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.05	<0.001	0.014	<0.001	<0.01	<0.001	<0.001	<0.005

When regarding total metal concentrations, there were several exceedances of the ANZG (2018) guidelines for 95 % species protection (Table 3-2):

- The arsenic concentration at Backhoe at 25 m depth on 18 November 2020
- Chromium concentration at Backhoe at 27 m depth on 17 June 2021
- Copper concentrations at Dolly Pot at 10 m and 20 m depth and Beef Bucket at 25 m depth – all on 18 November 2021, and at Beef Bucket at 10 m depth and Sweat Ridge at 5 m and 15 m depth on 17 June 2021
- Zinc concentration at Dolly Pot at 10 m depth on 18 November 2021.

None of these exceedances displayed a trend with depth, nor throughout the lake or over time. Additionally, most of these concentrations only exceeded guideline values slightly. As the lake water will be discharged during the wet season and diluted from rain during the process, it is anticipated that concentrations during discharge are likely to be below the guideline values. Most importantly, the dissolved metals, the assumed bioavailable fraction, exceeded the guideline concentration on one occasion only, in a relatively low concentration which would be diluted during discharge, likely to be below the guideline value.

Water quality measured in 2020/21 in the upper sections of the receiving Mount Bunday and Marrakai Creeks show that total and dissolved metal concentrations were occasionally elevated above the guideline concentrations for arsenic (maximum of 0.084 mg/L in Mt Bunday Creek), chromium (maximum of 0.006 mg/L in Mt Bunday Creek), copper (maximum of 0.007 mg/L in Mt Bunday Creek) and zinc (maximum of 0.045 mg/L in Mt Bunday Creek). Additionally, relatively high aluminium concentrations were frequently measured in the tributaries to Mt Bunday and also Marrakai Creek (maximum recorded 5.54 mg/L). Overall, the receiving environment has thus concentrations that are higher than the water to be discharged. Consequently, the water quality in the receiving environment is likely to be improved rather than decrease from the discharge.

Table 3-2. Total metals in Rustlers Roost pit lake

Site ID	Date	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Zinc (mg/L)
ANZG (2018) 95 % species protection		0.055	0.013	0.0002	-	0.001	0.0014	-	0.0034	1.9	0.011	0.011	-	0.0005	0.008
DOLLY POT 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.004	<0.001	<0.01	<0.01	<0.001	<0.001
DOLLY POT 10m	18-11-20	0.02	<0.001	<0.0001	<0.001	<0.001	0.002	<0.05	<0.001	0.006	<0.001	<0.01	<0.001	<0.001	0.010
DOLLY POT 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.001
DOLLY POT 20m	18-11-20	<0.01	0.001	<0.0001	<0.001	<0.001	0.002	0.06	<0.001	0.219	<0.001	<0.01	<0.001	<0.001	<0.001
DOLLY POT 25m	18-11-20	<0.01	0.01	<0.0001	0.001	<0.001	<0.001	1.9	<0.001	0.671	<0.001	<0.01	<0.001	<0.001	<0.001
BACKHOE 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.006	<0.001	<0.01	<0.001	<0.001	<0.001
BACKHOE 10m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.001
BACKHOE 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.05	<0.001	0.061	<0.001	<0.01	<0.001	<0.001	<0.001
BACKHOE 20m	18-11-20	<0.01	0.001	<0.0001	<0.001	<0.001	0.001	0.11	<0.001	0.24	<0.001	<0.01	<0.001	<0.001	<0.001
BACKHOE 25m	18-11-20	<0.01	0.016	<0.0001	0.001	<0.001	<0.001	2	<0.001	0.677	<0.001	<0.01	<0.001	<0.001	<0.001
BEEF BUCKET 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.001

Site ID	Date	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Zinc (mg/L)
ANZG (2018) 95 % species protection		0.055	0.013	0.0002	-	0.001	0.0014	-	0.0034	1.9	0.011	0.011	-	0.0005	0.008
BEEF BUCKET 10m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.001
BEEF BUCKET 15m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.01	<0.001	<0.01	<0.001	<0.001	<0.001
BEEF BUCKET 20m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.05	<0.001	0.123	<0.001	<0.01	<0.001	<0.001	<0.001
BEEF BUCKET 25m	18-11-20	<0.01	0.006	<0.0001	0.001	<0.001	0.002	1.09	<0.001	0.535	<0.001	<0.01	<0.001	<0.001	<0.001
SWEAT RIDGE 0m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.005	<0.001	<0.01	<0.001	<0.001	<0.001
SWEAT RIDGE 12m	18-11-20	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.061	<0.001	<0.01	<0.001	<0.001	<0.001
DOLLY POT 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.035	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.032	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.001	<0.05	<0.001	0.037	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.043	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.037	<0.001	<0.01	<0.001	<0.001	<0.005
DOLLY POT 27m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	0.16	<0.001	0.263	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.02	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.052	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.059	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.064	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.068	<0.001	<0.01	<0.001	<0.001	<0.005
BACKHOE 27m	17-06-21	<0.01	0.012	<0.0001	<0.001	0.002	<0.001	3.97	<0.001	0.849	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.04	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.047	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.003	<0.05	<0.001	0.042	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.054	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 20m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.059	<0.001	<0.01	<0.001	<0.001	<0.005
BEEF BUCKET 27m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	0.12	<0.001	0.108	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 0m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.049	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 5m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.002	<0.05	<0.001	0.048	<0.001	<0.01	<0.001	<0.001	0.007
SWEAT RIDGE 10m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.05	<0.001	0.048	<0.001	<0.01	<0.001	<0.001	<0.005
SWEAT RIDGE 15m	17-06-21	<0.01	<0.001	<0.0001	<0.001	<0.001	0.002	0.05	<0.001	0.06	<0.001	<0.01	<0.001	<0.001	<0.005

3.3.2 Nutrients

With regards to nutrient concentrations, the pit lake displayed exceedances for all analytes except total Kjeldahl nitrogen (TKN) (Table 3-3). The NO_x fraction (nitrite plus nitrate) was below the LOR for most data points and only recorded above the detection limit three times in June 2021, with one of these measurements, Dolly Pot at 27 m depth, exceeding the ANZECC Guidelines (2000) for tropical upland rivers.

Table 3-3. Nutrients in Rustlers Roost pit lake

Site ID	Date	Ammonia as N (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Nitrogen as N (mg/L)	Total Phosphorus as P (mg/L)
ANZG (2018) 95 % species protection		0.9	-	-	-	-
ANZECC (2000) Tropical Australia, upland rivers		0.006	0.03	-	0.15	0.01
DOLLY POT 0m	18-11-20	0.03	<0.01	0.2	0.2	0.03
DOLLY POT 10m	18-11-20	<0.01	<0.01	0.2	0.2	<0.01
DOLLY POT 15m	18-11-20	<0.01	<0.01	<0.1	<0.1	0.02
DOLLY POT 20m	18-11-20	<0.01	<0.01	<0.1	<0.1	0.02
DOLLY POT 25m	18-11-20	0.26	<0.01	0.3	0.3	0.02
BACKHOE 0m	18-11-20	0.03	<0.01	0.1	0.1	<0.01
BACKHOE 10m	18-11-20	<0.01	<0.01	0.1	0.1	<0.01
BACKHOE 15m	18-11-20	<0.01	<0.01	<0.1	<0.1	<0.01
BACKHOE 20m	18-11-20	<0.01	<0.01	0.1	0.1	<0.01
BACKHOE 25m	18-11-20	0.27	<0.01	0.3	0.3	0.01
BEEF BUCKET 0m	18-11-20	<0.01	<0.01	<0.1	<0.1	<0.01
BEEF BUCKET 10m	18-11-20	<0.01	<0.01	<0.1	<0.1	0.03
BEEF BUCKET 15m	18-11-20	<0.01	<0.01	0.1	0.1	<0.01
BEEF BUCKET 20m	18-11-20	<0.01	<0.01	0.2	0.2	0.08
BEEF BUCKET 25m	18-11-20	0.08	<0.01	0.2	0.2	<0.01
SWEAT RIDGE 0m	18-11-20	<0.01	<0.01	<0.1	<0.1	<0.01
SWEAT RIDGE 12m	18-11-20	<0.01	<0.01	<0.1	<0.1	<0.01
DOLLY POT 0m	17-06-21	0.02	0.02	0.1	0.1	0.01
DOLLY POT 5m	17-06-21	0.01	0.02	0.1	0.1	<0.01
DOLLY POT 10m	17-06-21	0.08	<0.01	0.2	0.2	0.01
DOLLY POT 15m	17-06-21	0.06	<0.01	0.2	0.2	<0.01
DOLLY POT 20m	17-06-21	0.04	<0.01	0.2	0.2	0.01
DOLLY POT 27m	17-06-21	0.08	0.04	0.2	0.2	0.01
BACKHOE 0m	17-06-21	<0.01	<0.01	0.1	0.1	<0.01
BACKHOE 5m	17-06-21	<0.01	<0.01	0.2	0.2	0.01
BACKHOE 10m	17-06-21	0.05	<0.01	0.2	0.2	0.02
BACKHOE 15m	17-06-21	0.06	<0.01	0.2	0.2	<0.01
BACKHOE 20m	17-06-21	0.09	<0.01	0.4	0.4	<0.01
BACKHOE 27m	17-06-21	0.57	<0.01	0.7	0.7	0.02
BEEF BUCKET 0m	17-06-21	0.01	<0.01	0.2	0.2	0.01
BEEF BUCKET 5m	17-06-21	<0.01	<0.01	0.2	0.2	0.01

Site ID	Date	Ammonia as N (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Nitrogen as N (mg/L)	Total Phosphorus as P (mg/L)
ANZG (2018) 95 % species protection		0.9	-	-	-	-
ANZECC (2000) Tropical Australia, upland rivers		0.006	0.03	-	0.15	0.01
BEEF BUCKET 10m	17-06-21	0.02	<0.01	0.2	0.2	0.01
BEEF BUCKET 15m	17-06-21	0.04	<0.01	0.2	0.2	0.01
BEEF BUCKET 20m	17-06-21	0.05	<0.01	0.2	0.2	<0.01
BEEF BUCKET 27m	17-06-21	0.16	<0.01	0.2	0.2	0.03
SWEAT RIDGE 0m	17-06-21	<0.01	<0.01	0.2	0.2	0.03
SWEAT RIDGE 5m	17-06-21	0.03	<0.01	0.2	0.2	0.02
SWEAT RIDGE 10m	17-06-21	0.03	<0.01	0.1	0.1	0.01
SWEAT RIDGE 15m	17-06-21	0.07	<0.01	0.4	0.4	0.01

Ammonia was recorded above the ANZECC (2000) guidelines for tropical upland rivers, but not above the ANZG (2018) guidelines for 95 % species protection. This means that while concentrations were elevated to contribute to nutrient enrichment in the receiving environment, they were likely not high enough to cause toxicity to species inhabiting this environment (Table 3-3).

The ammonia profiles on 18 November 2020 show slightly elevated ammonia concentrations near the surface at Dolly Pot and Backhoe and very high ammonia concentrations at the bed at all three deep sites Beef Bucket, Dolly Pot and Backhoe, while they were below LOR between 10 m and 20 m depth (Figure 3-8, top). These very high ammonia concentrations at depth confirm the low oxygen concentrations present at this time (see section 3.2.2): Organic material deposited at the bed is decomposed by bacteria via ammonia to nitrite, then to nitrate and finally to nitrogen, which leaves the water in its gaseous state. This process consumes oxygen and as the hypolimnion is deprived from fresh oxygen at times of stratification, the oxygen concentrations decrease further and further until the process comes to a halt. At this stage, ammonia concentrations increase, reaching those high values recorded.

In June 2021, the lake had undergone mixing as described but oxygen had only slightly increased in the deep section at Backhoe (see section 3.2.2, Figure 3-8, bottom). Thus, the ammonia concentration in this area was even higher than in November 2020, while at the same time, it was decreasing at Dolly Pot and remained approximately the same at Beef Bucket. Another difference to the profile in November was that in June, the ammonia concentrations in the middle of the water columns, between 10 and 20 m depth, were displaying varying concentrations, while they were below LOR in November, indicating the vertical turbulence the lake was undergoing on the June sampling day: although the middle sections of the water column were rich in oxygen, the process of converting ammonia to nitrite and nitrate was just underway, meaning that all three analytes were measured.

As discussed in the supporting documentation for the waste discharge licence application (EcOz 2020), the water to be discharged will be drawn from the upper section of the water column, which is oxygenated even during strong stratification and thus ammonia concentrations are relatively low and expected to be below guideline concentrations during discharge. As the water level decreases during the dewatering process, and the water body becomes shallower, the deep water will become oxygenated and ammonia will be converted to nitrite and nitrate. It has to be emphasised that even the highest ammonia concentration of 0.57 mg/L (Backhoe, 27 m depth, on 17 June 2021) was well below the ANZG (2018) for 95 % species protection of 0.9 mg/L.

Total nitrogen and total phosphorus concentrations frequently exceeded the ANZECC (2000) guidelines in November 2020 and June 2021. For nitrogen, it is anticipated that the increases from November 2020 to June 2021 are related to the processing of the accumulated ammonia to nitrogen gas, some of which

eventually leaves the water body and overall concentrations will likely be lower several weeks after the June sampling date.

The phosphorus cycle does not include a stage when the nutrient naturally leaves a water body and thus there was no substantial difference between the records in November 2020 and June 2021.

The nutrient concentrations in the receiving upper Marrakai and Mt Bundey Creeks exceeded the ANZECC (2000) guidelines for tropical upland rivers for ammonia, even exceeding the ANZG (2018) for 95 % species protection on three occasions in upstream Marrakai Creek (maximum 1.06 mg/L). Total nitrogen exceeded the guideline on all occasions and total phosphorus in approximately 50 % of samples. It is thus concluded that the pit water discharge could contribute to reduction of current nutrient concentrations in the receiving environment. This means that, similarly to the metals, the dewatering of the pit lake will contribute to improving nutrient concentrations by overall reduction.

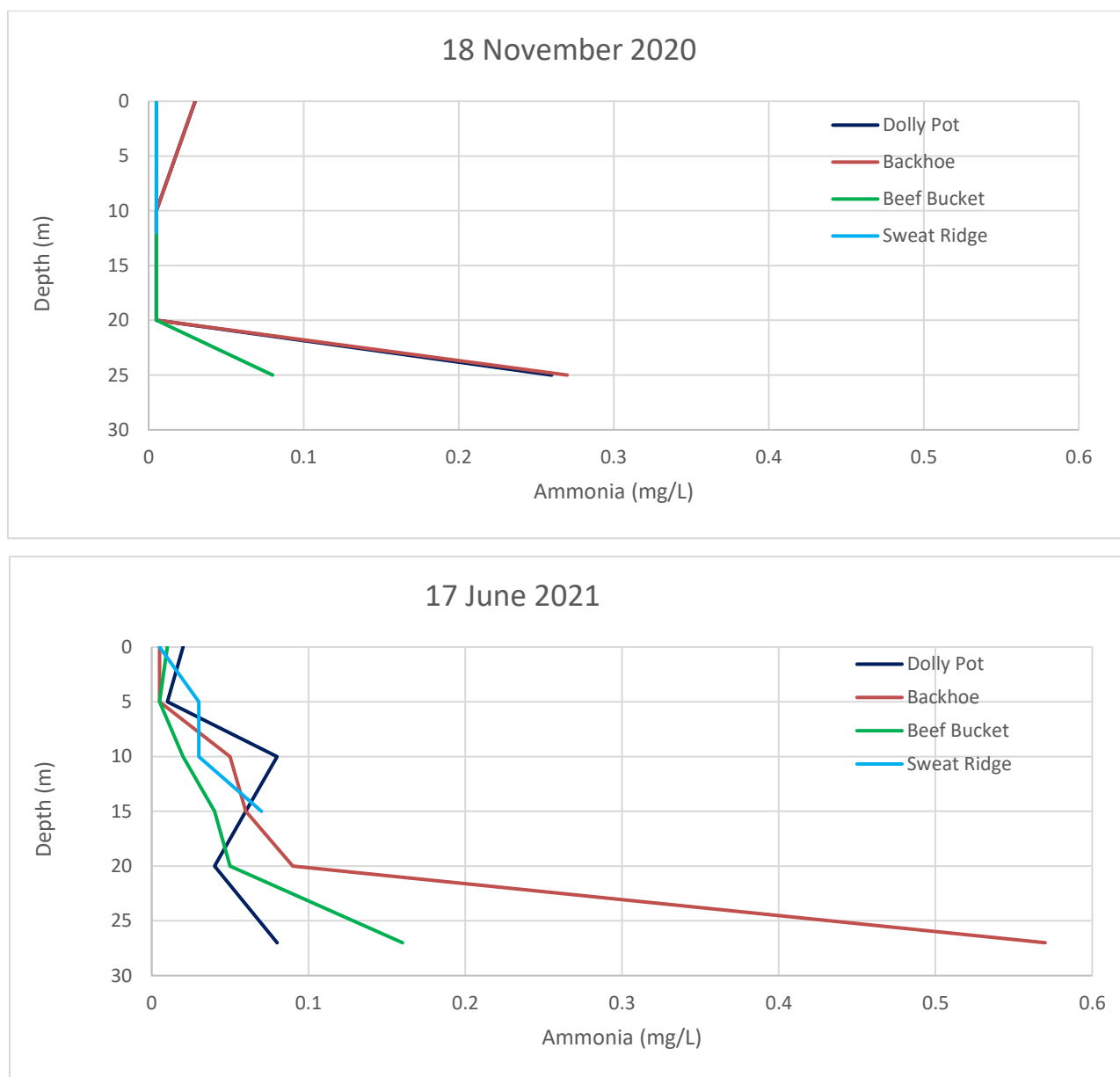


Figure 3-8. Ammonia profiles in Rustlers Roost pit lake. Concentrations below LOR were plotted as half of the LOR concentration

3.3.3 Major ions

The alkalinity measured between 6-8 mg/L at the surface was stable to a depth of 20 m on 18 November 2020 (Figure 3-9, top). An increase to 10-14 mg/L was recorded at 25 m depth.

In June 2021 alkalinity was slightly higher at the surface (range 8-13 mg/L) with minor increases in variability within the water column to 20 m depth (Figure 3-9, bottom). Near the bed alkalinity increased only slightly at Beef Bucket and Dolly Pot, but at Backhoe a greater increase to 24 mg/L was measured. This large change at the Backhoe site near the bed was also apparent for the parameters DO, EC and total dissolved solids and confirms the presence of a thermocline at this depth.

Overall, the alkalinity in the pit lake is low, meaning that the water was of low buffer capacity, which is reflected in a relatively higher variability of pH (section 3.2.4). There are no guideline values for alkalinity.

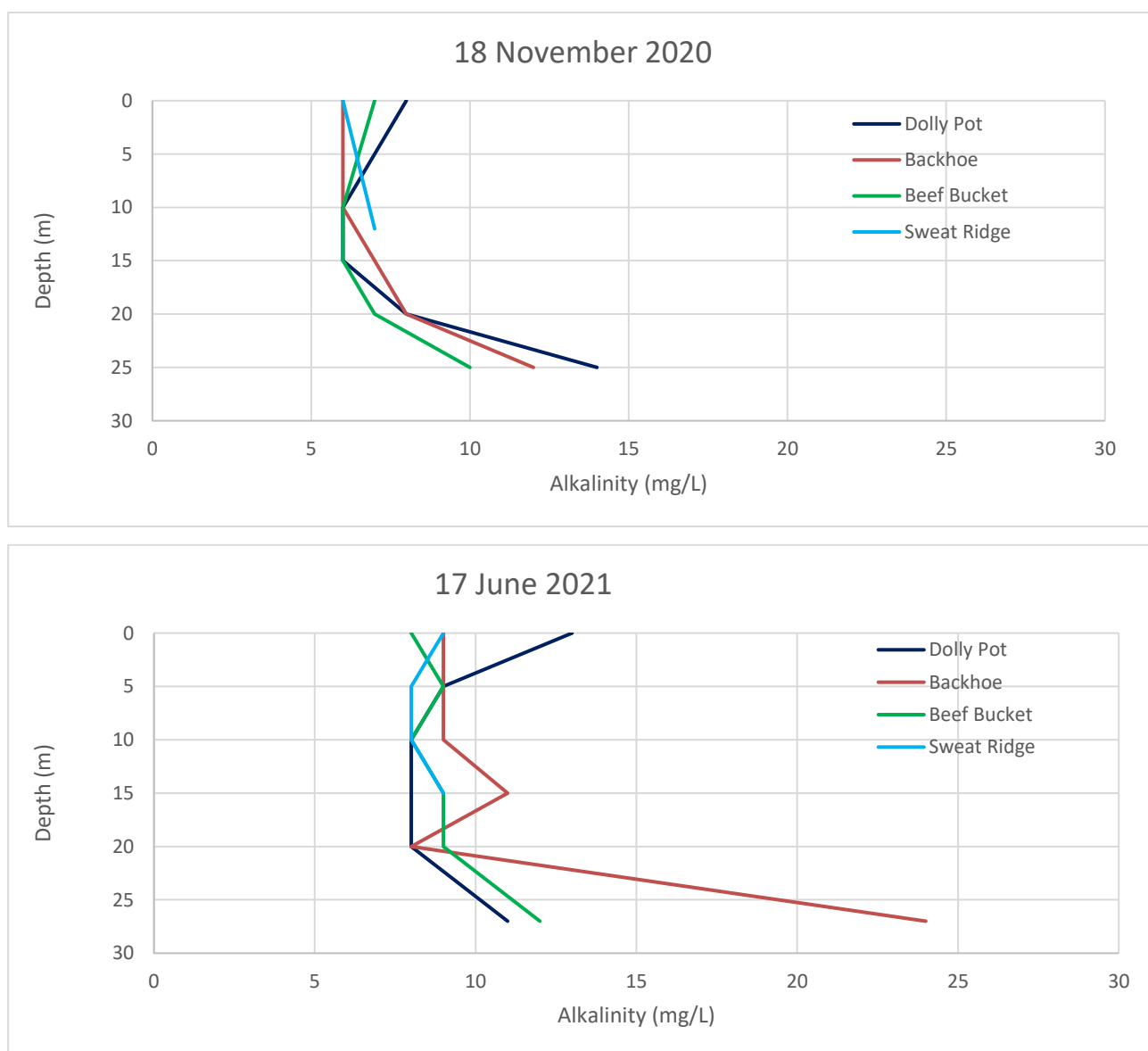


Figure 3-9. Alkalinity profiles in Rustlers Roost pit lake

The results of the major ions and analytes not shown as profile are summarised in Table 3-4. Total dissolved solids (TDS) were low throughout the lake on both dates and so were the ions measured. Acidity is a measure of the hydrogen ions (which are also measured as pH) plus the mineral acidity. The latter is the potential concentration of hydrogen ions that could be generated by the precipitation of a metal hydroxide by

oxidation or neutralisation. In general, acidity increases as pH decreases. Acidity of <800mg CaCO₃ is considered low and the concentrations recorded in Rustlers Roost pit lake were substantially lower (Table 3-4) (Australian Government 2016). Thus, presently there is no indication of acidity in the pit lake. This does not exclude the possibility that potentially acid forming (PAF) layers might be exposed in the empty pit or during mining operations. It is strongly recommended to include considerations on PAF materials in the mine management planning.

There are no guideline values for the ions and other chemical parameters shown in Table 3-4, so the Australian Water Quality Guideline values for sulphate and chloride – both 250 mg/L for aesthetic reasons, give an indication that these analytes were very low in the pit lake on both sampling occasions.

Table 3-4. Major ions and other laboratory analytes in Rustlers Roost pit lake

Site ID	Date	TSS (mg/L)	Acidity as CaCO ₃ (mg/L)	Dissolved major anions		Dissolved major cations				Total Hardness (mg/L)
				Sulfate as SO ₄ (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	
ANZG (2018) 95 % species protection		-	-	-	-	-	-	-	-	-
ANZECC (2000) Tropical Australia, upland rivers		-	-	-	-	-	-	-	-	-
DOLLY POT 0m	18-11-20	<5	3	<1	3	<1	<1	1	2	<1
DOLLY POT 10m	18-11-20	<5	3	<1	4	<1	<1	1	2	<1
DOLLY POT 15m	18-11-20	<5	5	<1	2	<1	<1	1	2	<1
DOLLY POT 20m	18-11-20	<5	4	<1	3	<1	<1	1	2	<1
DOLLY POT 25m	18-11-20	<5	9	<1	2	<1	<1	1	2	<1
BACKHOE 0m	18-11-20	<5	5	<1	2	<1	<1	1	2	<1
BACKHOE 10m	18-11-20	<5	4	<1	2	<1	<1	1	2	<1
BACKHOE 15m	18-11-20	<5	4	<1	2	<1	<1	1	2	<1
BACKHOE 20m	18-11-20	<5	8	<1	2	<1	<1	1	2	<1
BACKHOE 25m	18-11-20	<5	8	<1	2	<1	<1	1	2	<1
BEEF BUCKET 0m	18-11-20	<5	5	<1	2	<1	<1	1	2	<1
BEEF BUCKET 10m	18-11-20	<5	5	<1	3	<1	<1	1	2	<1
BEEF BUCKET 15m	18-11-20	<5	3	<1	2	<1	<1	1	2	<1
BEEF BUCKET 20m	18-11-20	<5	5	<1	3	<1	<1	1	2	<1
BEEF BUCKET 25m	18-11-20	<5	7	<1	2	<1	<1	1	2	<1
SWEAT RIDGE 0m	18-11-20	<5	3	<1	2	<1	<1	1	2	<1
SWEAT RIDGE 12m	18-11-20	<5	3	<1	2	<1	<1	1	2	<1
DOLLY POT 0m	17-06-21	<5	8	<1	2	<1	<1	2	1	<1
DOLLY POT 5m	17-06-21	<5	4	<1	2	<1	<1	2	1	<1
DOLLY POT 10m	17-06-21	5	4	<1	2	<1	<1	2	<1	<1
DOLLY POT 15m	17-06-21	<5	5	<1	2	<1	<1	2	1	<1
DOLLY POT 20m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1
DOLLY POT 27m	17-06-21	6	4	<1	2	<1	<1	2	1	<1
BACKHOE 0m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1
BACKHOE 5m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1
BACKHOE 10m	17-06-21	<5	5	<1	2	<1	<1	2	1	<1
BACKHOE 15m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1

Site ID	Date	Dissolved major anions				Dissolved major cations				Total Hardness (mg/L)
		TSS (mg/L)	Acidity as CaCO ₃ (mg/L)	Sulfate as SO ₄ (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	
ANZG (2018) 95 % species protection		-	-	-	-	-	-	-	-	-
ANZECC (2000) Tropical Australia, upland rivers		-	-	-	-	-	-	-	-	-
BACKHOE 20m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1
BACKHOE 27m	17-06-21	6	10	<1	2	<1	<1	2	1	<1
BEEF BUCKET 0m	17-06-21	<5	4	<1	2	<1	<1	2	<1	<1
BEEF BUCKET 5m	17-06-21	<5	3	<1	2	<1	<1	2	1	<1
BEEF BUCKET 10m	17-06-21	<5	5	<1	2	<1	<1	2	<1	<1
BEEF BUCKET 15m	17-06-21	<5	4	<1	2	<1	<1	2	1	<1
BEEF BUCKET 20m	17-06-21	<5	4	<1	2	<1	<1	2	1	<1
BEEF BUCKET 27m	17-06-21	<5	4	<1	2	<1	<1	2	1	<1
SWEAT RIDGE 0m	17-06-21	6	4	<1	2	<1	<1	2	<1	<1
SWEAT RIDGE 5m	17-06-21	6	3	<1	2	<1	<1	2	1	<1
SWEAT RIDGE 10m	17-06-21	<5	8	<1	2	<1	<1	2	1	<1
SWEAT RIDGE 15m	17-06-21	<5	4	<1	2	<1	<1	2	1	<1

4 CONCLUSION

Based on the field parameters, the water quality of Rustlers Roost pit lake was good. Temperature profiles describe the usual stratification and mixing of a healthy lake with DO changing throughout the water column and seasons accordingly. The low surface water DO in November might indicate some unknown influence. pH displayed a relatively wide but healthy range explained by the low alkalinity of the water. EC was overall low and increased at depth during stratification due to evaporative concentration. Turbidity was well below guideline values even at depth. Water quality was considered good, and healthy, during both wet season and dry season sampling events.

Few metals exceeded the guidelines, and no trend or pattern, spatially or temporally, was identified.

Lake stratification as recorded in November 2020 caused increased ammonia concentrations at depth, which were in the process of being metabolised via nitrite and nitrate to nitrogen gas in June 2021. While total nitrogen concentrations were still elevated above guideline values in June, it is expected that these will decrease due to nitrogen gas leaving the lake water in the coming weeks. Dewatering of the pit in the forthcoming wet season would not be expected to result in exceedances of metal and nutrient concentrations in the receiving environment, as concentrations within the pit were relatively low, and pit water will be somewhat diluted from rain and inflow.

The water quality in the receiving tributaries of Mount Bundey and Marrakai Creeks was slightly poorer in regards to metal (dissolved and total) and nutrient concentrations. The dewatering of the pit lake will thus more so improve than decrease the water quality in those receiving creeks.

In accordance with the waste discharge licence, water quality monitoring will be undertaken during dewatering to confirm complying metal and nutrient concentrations or to allow for adjustments of the dilution rates in order to achieve compliance.

The water quality of Rustlers Roost pit lake is overall assessed as good and this data collection will serve as baseline water quality to restore the pit lake to during mine closure following dewatering and mining.

5 REFERENCES

- ANZG (2018): Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines [Accessed 22 June 2021].
- Australian Government (2016): Preventing Acid and Metalliferous Drainage. Leading Practice Sustainable Development Program of the Mining Industry. Available at: <https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-preventing-acid-and-metalliferous-drainage-handbook-english.pdf> [Accessed 6 July 2021].
- Australian/New Zealand Standard on Water Quality Sampling - Part 1: *Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples* (AS/NZS 5667.1:1998), Standards Australia, New South Wales.
- Australian /New Zealand Standard on Water Quality Sampling - Part 4: *Guidance on sampling from lakes, natural and manmade* (AS/NZS 5667.4:1998), Standards Australia, New South Wales.
- BoM (2021a): Summary Statistics for Middle Point Rangers. Available at: http://www.bom.gov.au/climate/averages/tables/cw_014090.shtml [Accessed 1 July 2021].
- BoM (2021b): Summary Statistics for Middle Point. Available at: http://www.bom.gov.au/climate/averages/tables/cw_014041.shtml [Accessed 1 July 2021].
- BoM (2021c): Daily Rainfall Middle Point. Available at: http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=2021&p_c=-39485847&p_stn_num=014041 [Accessed 1 July 2021].
- BoM (2021d): Northern Territory wet season in October to April 2020-21: highest rainfall since 2016-17. Available at: <http://www.bom.gov.au/climate/current/season/nt/summary.shtml> [Accessed 1 July 2021].
- BoM (2021e): Northern Territory in May to September 2020: warm days and nights during the dry season; below average rainfall across most areas. Available at <http://www.bom.gov.au/climate/current/season/nt/archive/202009.summary.shtml> [Accessed 1 July 2021].
- EcOz (2020): Supporting Documentation – Waste Discharge Licence Rustlers Roost. Report for Primary Gold Ltd, submitted to the NT EPA 4 December 2020.
- NT EPA (2021): Terms of Reference for an EIS - Rustlers Roost and Quest 29 Open-cut Mine Redevelopment. Primary Gold Limited. Mount Bundey locality (Unincorporated [Marrakai-Douglas Daly] Area. Available at: https://ntepa.nt.gov.au/_data/assets/pdf_file/0005/1006799/terms-of-reference-for-an-eis-primary-gold-rustlers-roost-quest-29.pdf [Accessed 22 June 2021].
- Primary Gold (2020): Rustlers Roost Project Area – Interim Mine Closure Plan. Version 2.0 – 10 July 2020; authorisation Number 0738-01; MLN 1083. Available at: <https://www.hankingmining.com/uploads/soft/pdf/2020%20-%20RRPA-%20Mine%20Closure%20Plan.pdf> [Accessed 22 June 2021].

APPENDIX A FIELD DATA

Table 5-1. Physico-chemical parameters measured in the field

Site ID	Date	pH	Temp (°C)	ORP (mV)	EC µS/cm	TDS (mg/L)	Salinity (ppt)	Dissolved Oxygen (%)	Turbidity (NTU)
ANZECC (2000) Tropical Australia, upland rivers		6-7.5	-	-	20-250	-	-	90-120	15
DOLLY POT 0m	18-11-20	8.47	32.6	33.4	30.9	20.15	0.01	56.9	0.5
DOLLY POT 10m	18-11-20	8.05	32	51.7	35.7	23.4	0.01	63.1	0.8
DOLLY POT 15m	18-11-20	6.97	29.1	45.5	27	17.55	0.01	63.8	0.4
DOLLY POT 20m	18-11-20	6.63	27.5	76.9	32.4	20.8	0.01	18.8	0.7
DOLLY POT 25m	18-11-20	6.52	27.1	-8.3	43.2	27.95	0.02	22	2.3
BACKHOE 0m	18-11-20	7.46	33	13.6	28.4	18.2	0.01	62.4	0.6
BACKHOE 10m	18-11-20	7.74	30.9	12.3	27.2	17.55	0.01	56.2	0.5
BACKHOE 15m	18-11-20	6.45	27.7	80.4	28.1	18.2	0.01	41.3	0.5
BACKHOE 20m	18-11-20	6.47	27	76.4	30.7	20.15	0.01	21.7	0.6
BACKHOE 25m	18-11-20	6.45	26.2	-49.2	44	28.6	0.02	19.7	2
BEEF BUCKET 0m	18-11-20	7.76	32.6	56.4	27.9	18.2	0.01	58.1	0.4
BEEF BUCKET 10m	18-11-20	7.72	31.9	51	28.2	18.2	0.01	57.1	0.5
BEEF BUCKET 15m	18-11-20	6.77	28.9	32.6	27.6	18.2	0.01	59.9	0.5
BEEF BUCKET 20m	18-11-20	6.49	27.4	76.7	29.6	19.5	0.01	22.1	0.5
BEEF BUCKET 25m	18-11-20	6.45	26.2	-49.2	44	28.6	0.02	19.7	0.9
SWEAT RIDGE 0m	18-11-20	7.34	32.9	-1.01	27.9	18.2	0.01	73.8	0.4
SWEAT RIDGE 12m	18-11-20	6.72	30	51.5	27.9	18.2	0.01	57.7	0.7
DOLLY POT 0m	17-06-21	6.78	27.9	221.3	24.8	16	0.01	96.5	0.67
DOLLY POT 5m	17-06-21	6.74	27.7	228.6	24.7	16	0.01	94.5	0.49
DOLLY POT 10m	17-06-21	6.72	27.5	232.3	24.9	16	0.01	90.6	1.17
DOLLY POT 15m	17-06-21	6.63	27.6	238	25	16	0.01	88.5	0.79
DOLLY POT 20m	17-06-21	6.5	27.5	246.1	25.1	16	0.01	85.3	1.53
DOLLY POT 27m	17-06-21	6.35	27.4	258.1	27.3	18	0.01	67.3	2.34
BACKHOE 0m	17-06-21	6.51	28.4	244.2	24.5	16	0.01	96.9	0.08
BACKHOE 5m	17-06-21	6.51	28.2	245.2	24.7	16	0.01	97	0.15
BACKHOE 10m	17-06-21	6.48	28	249.4	24.8	16	0.01	91.6	1.11
BACKHOE 15m	17-06-21	6.43	27.8	254	25.3	16	0.01	87.5	4.11
BACKHOE 20m	17-06-21	6.39	27.7	259.2	24.8	16	0.01	88.6	4.08
BACKHOE 27m	17-06-21	5.99	26.8	115.2	52.4	34	0.2	39.7	1.16
BEEF BUCKET 0m	17-06-21	6.55	28	241.8	24.9	16	0.01	94.2	0.35
BEEF BUCKET 5m	17-06-21	6.54	27.8	254.9	24.6	16	0.01	93.7	0.15
BEEF BUCKET 10m	17-06-21	6.46	27.9	251.1	24.9	16	0.01	87.7	0.83
BEEF BUCKET 15m	17-06-21	6.37	27.7	257.1	24.9	16	0.01	85.7	0.68
BEEF BUCKET 20m	17-06-21	6.38	27.8	257.2	24.7	16	0.01	87.1	0.77
BEEF BUCKET 27m	17-06-21	6.31	27.7	261.5	25.7	17	0.01	78.8	1.06
SWEAT RIDGE 0m	17-06-21	7.55	28	184.7	30.4	20	0.01	94.3	0.41

Site ID	Date	pH	Temp (°C)	ORP (mV)	EC μ S/cm	TDS (mg/L)	Salinity (ppt)	Dissolved Oxygen (%)	Turbidity (NTU)
ANZECC (2000) Tropical Australia, upland rivers		6-7.5	-	-	20-250	-	-	90-120	15
SWEAT RIDGE 5m	17-06-21	7.17	27.9	206	28.3	18	0.01	93.9	1.25
SWEAT RIDGE 10m	17-06-21	6.9	27.8	219.4	26.2	18	0.01	91.7	0.95
SWEAT RIDGE 15m	17-06-21	6.75	27.6	228.1	29.5	19	0.01	88.7	2.75

APPENDIX B LABORATORY DOCUMENTATION



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2040616

Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: corinne.hutchinson@ecoz.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 89811102	Facsimile	: +61-2-8784 8500
Project	: EZ20182 Rustler Roost WDL	Page	: 1 of 4
Order number	: ----	Quote number	: ES2020ECOZENV0002 (SY/400/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: AL & JD		

Dates

Date Samples Received	: 20-Nov-2020 07:30	Issue Date	: 20-Nov-2020
Client Requested Due Date	: 24-Nov-2020	Scheduled Reporting Date	: 24-Nov-2020

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 10.2' C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

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
- **Sample BACKHOE 60m (ALS #11) was not received.**
- **Unable to conduct Ferrous Iron analysis, as bottle was not supplied.**
- **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 absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- 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.



Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
DOLLY POT 20m	- Clear Plastic Bottle - Unspecified; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite B : EG020B-F		
DOLLY POT 20m	- Clear Plastic Bottle - Unspecified; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered
Major Cations - Dissolved : ED093F		
DOLLY POT 20m	- Clear Plastic Bottle - Unspecified; Lab-acidified	- Clear Plastic Bottle - Nitric Acid; Filtered

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES2040616-004	: [18-Nov-2020]	: DOLLY POT 60m - Received as DOLLY POT 15m
ES2040616-005	: [18-Nov-2020]	: DOLLY POT 70m - Received as DOLLY POT 25m
ES2040616-009	: [18-Nov-2020]	: BACKHOE 30m - Received as BACKHOE 15m
ES2040616-010	: [18-Nov-2020]	: BACKHOE 40m - Received as BACKHOE 25m
ES2040616-015	: [18-Nov-2020]	: BEEF BUCKET 30m - Received as BEEF BUCKET 15m
ES2040616-016	: [18-Nov-2020]	: BEEF BUCKET 60m - Received as BEEF BUCKET 25m
ES2040616-018	: [18-Nov-2020]	: SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m

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: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA045 Turbidity	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - NT-11 Total Nitrogen and Total Phosphorus	WATER - W-01 7 Metals	WATER - W-01T 7 metals (Total)
ES2040616-001	18-Nov-2020 00:00	DOLLY POT 0m	✓	✓	✓	✓	✓	✓	✓
ES2040616-002	18-Nov-2020 00:00	DOLLY POT 10m	✓	✓	✓	✓	✓	✓	✓
ES2040616-003	18-Nov-2020 00:00	DOLLY POT 20m	✓	✓	✓	✓	✓	✓	✓
ES2040616-004	18-Nov-2020 00:00	DOLLY POT 60m Recei...	✓	✓	✓	✓	✓	✓	✓
ES2040616-005	18-Nov-2020 00:00	DOLLY POT 70m Recei...	✓	✓	✓	✓	✓	✓	✓
ES2040616-006	18-Nov-2020 00:00	BACKHOE 0m	✓	✓	✓	✓	✓	✓	✓
ES2040616-007	18-Nov-2020 00:00	BACKHOE 10m	✓	✓	✓	✓	✓	✓	✓
ES2040616-008	18-Nov-2020 00:00	BACKHOE 20m	✓	✓	✓	✓	✓	✓	✓
ES2040616-009	18-Nov-2020 00:00	BACKHOE 30m Receive...	✓	✓	✓	✓	✓	✓	✓
ES2040616-010	18-Nov-2020 00:00	BACKHOE 40m Receive...	✓	✓	✓	✓	✓	✓	✓
ES2040616-012	18-Nov-2020 00:00	BEEF BUCKET 0m	✓	✓	✓	✓	✓	✓	✓
ES2040616-013	18-Nov-2020 00:00	BEEF BUCKET 10m	✓	✓	✓	✓	✓	✓	✓
ES2040616-014	18-Nov-2020 00:00	BEEF BUCKET 20m	✓	✓	✓	✓	✓	✓	✓
ES2040616-015	18-Nov-2020 00:00	BEEF BUCKET 30m Rec...	✓	✓	✓	✓	✓	✓	✓
ES2040616-016	18-Nov-2020 00:00	BEEF BUCKET 60m Rec...	✓	✓	✓	✓	✓	✓	✓
ES2040616-017	18-Nov-2020 00:00	SWEAT RIDGE 0m	✓	✓	✓	✓	✓	✓	✓
ES2040616-018	18-Nov-2020 00:00	SWEAT RIDGE 10m Rec...	✓	✓	✓	✓	✓	✓	✓



Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - ED038P Acidity (All parameters)	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
ES2040616-001	18-Nov-2020 00:00	DOLLY POT 0m	✓	✓	✓	✓
ES2040616-002	18-Nov-2020 00:00	DOLLY POT 10m	✓	✓	✓	✓
ES2040616-003	18-Nov-2020 00:00	DOLLY POT 20m	✓	✓	✓	✓
ES2040616-004	18-Nov-2020 00:00	DOLLY POT 60m Recei...	✓	✓	✓	✓
ES2040616-005	18-Nov-2020 00:00	DOLLY POT 70m Recei...	✓	✓	✓	✓
ES2040616-006	18-Nov-2020 00:00	BACKHOE 0m	✓	✓	✓	✓
ES2040616-007	18-Nov-2020 00:00	BACKHOE 10m	✓	✓	✓	✓
ES2040616-008	18-Nov-2020 00:00	BACKHOE 20m	✓	✓	✓	✓
ES2040616-009	18-Nov-2020 00:00	BACKHOE 30m Receive...	✓	✓	✓	✓
ES2040616-010	18-Nov-2020 00:00	BACKHOE 40m Receive...	✓	✓	✓	✓
ES2040616-012	18-Nov-2020 00:00	BEEF BUCKET 0m	✓	✓	✓	✓
ES2040616-013	18-Nov-2020 00:00	BEEF BUCKET 10m	✓	✓	✓	✓
ES2040616-014	18-Nov-2020 00:00	BEEF BUCKET 20m	✓	✓	✓	✓
ES2040616-015	18-Nov-2020 00:00	BEEF BUCKET 30m Rec...	✓	✓	✓	✓
ES2040616-016	18-Nov-2020 00:00	BEEF BUCKET 60m Rec...	✓	✓	✓	✓
ES2040616-017	18-Nov-2020 00:00	SWEAT RIDGE 0m	✓	✓	✓	✓
ES2040616-018	18-Nov-2020 00:00	SWEAT RIDGE 10m Rec...	✓	✓	✓	✓

Proactive Holding Time Report

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



Requested Deliverables

ANDREW LEWIS

- *AU Certificate of Analysis - NATA (COA) Email andrew.lewis@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email andrew.lewis@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email andrew.lewis@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email andrew.lewis@ecoz.com.au
- Chain of Custody (CoC) (COC) Email andrew.lewis@ecoz.com.au
- EDI Format - ENMRG (ENMRG) Email andrew.lewis@ecoz.com.au

CORINNE HUTCHINSON

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

INVOICE ADDRESS

- A4 - AU Tax Invoice (INV) Email ecoz@ecoz.com.au

JACK DYMALLA

- *AU Certificate of Analysis - NATA (COA) Email jack.dymalla@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email jack.dymalla@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email jack.dymalla@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email jack.dymalla@ecoz.com.au
- Chain of Custody (CoC) (COC) Email jack.dymalla@ecoz.com.au
- EDI Format - ENMRG (ENMRG) Email jack.dymalla@ecoz.com.au

24-11-20

ALS Environmental
CHAIN OF CUSTODY
 ALS Laboratory please tick →

JAGELAI02 21 Durma Road Peoria SA 5004
 Ph: 08 8520 9888 E: jak@als.com.au
 Ph: 08 8520 9889 E: jordan@als.com.au
 Ph: 08 8520 9890 E: jordan@als.com.au
 Ph: 08 8520 9891 E: jordan@als.com.au
 Ph: 08 8520 9892 E: jordan@als.com.au
 Ph: 08 8520 9893 E: jordan@als.com.au
 Ph: 08 8520 9894 E: jordan@als.com.au
 Ph: 08 8520 9895 E: jordan@als.com.au
 Ph: 08 8520 9896 E: jordan@als.com.au
 Ph: 08 8520 9897 E: jordan@als.com.au
 Ph: 08 8520 9898 E: jordan@als.com.au
 Ph: 08 8520 9899 E: jordan@als.com.au
 Ph: 08 8520 9900 E: jordan@als.com.au

JMACRAY 16 Harbour Town Mackay QLD 4740
 Ph: 07 4564 3127 E: mackay@als.com.au
 Ph: 07 4564 3128 E: mackay@als.com.au
 Ph: 07 4564 3129 E: mackay@als.com.au
 Ph: 07 4564 3130 E: mackay@als.com.au
 Ph: 07 4564 3131 E: mackay@als.com.au
 Ph: 07 4564 3132 E: mackay@als.com.au
 Ph: 07 4564 3133 E: mackay@als.com.au
 Ph: 07 4564 3134 E: mackay@als.com.au
 Ph: 07 4564 3135 E: mackay@als.com.au
 Ph: 07 4564 3136 E: mackay@als.com.au
 Ph: 07 4564 3137 E: mackay@als.com.au
 Ph: 07 4564 3138 E: mackay@als.com.au
 Ph: 07 4564 3139 E: mackay@als.com.au
 Ph: 07 4564 3140 E: mackay@als.com.au

JNEWCASTLE 5 Howe Green Road Newcastle NSW 2284
 Ph: 02 4988 5033 E: newcastle@als.com.au
 Ph: 02 4988 5034 E: newcastle@als.com.au
 Ph: 02 4988 5035 E: newcastle@als.com.au
 Ph: 02 4988 5036 E: newcastle@als.com.au
 Ph: 02 4988 5037 E: newcastle@als.com.au
 Ph: 02 4988 5038 E: newcastle@als.com.au
 Ph: 02 4988 5039 E: newcastle@als.com.au
 Ph: 02 4988 5040 E: newcastle@als.com.au
 Ph: 02 4988 5041 E: newcastle@als.com.au
 Ph: 02 4988 5042 E: newcastle@als.com.au
 Ph: 02 4988 5043 E: newcastle@als.com.au
 Ph: 02 4988 5044 E: newcastle@als.com.au
 Ph: 02 4988 5045 E: newcastle@als.com.au
 Ph: 02 4988 5046 E: newcastle@als.com.au
 Ph: 02 4988 5047 E: newcastle@als.com.au
 Ph: 02 4988 5048 E: newcastle@als.com.au
 Ph: 02 4988 5049 E: newcastle@als.com.au
 Ph: 02 4988 5050 E: newcastle@als.com.au

LISYDNEY 277-289 Woodpark Road Swinburn NSW 2161
 Ph: 02 8712 8005 E: lisysd@als.com.au
 Ph: 02 8712 8006 E: lisysd@als.com.au
 Ph: 02 8712 8007 E: lisysd@als.com.au
 Ph: 02 8712 8008 E: lisysd@als.com.au
 Ph: 02 8712 8009 E: lisysd@als.com.au
 Ph: 02 8712 8010 E: lisysd@als.com.au
 Ph: 02 8712 8011 E: lisysd@als.com.au
 Ph: 02 8712 8012 E: lisysd@als.com.au
 Ph: 02 8712 8013 E: lisysd@als.com.au
 Ph: 02 8712 8014 E: lisysd@als.com.au
 Ph: 02 8712 8015 E: lisysd@als.com.au
 Ph: 02 8712 8016 E: lisysd@als.com.au
 Ph: 02 8712 8017 E: lisysd@als.com.au
 Ph: 02 8712 8018 E: lisysd@als.com.au
 Ph: 02 8712 8019 E: lisysd@als.com.au
 Ph: 02 8712 8020 E: lisysd@als.com.au

WOLLONGONG 89 Kinross Street Wollongong NSW 2500
 Ph: 02 4226 5126 E: wollongong@als.com.au
 Ph: 02 4226 5127 E: wollongong@als.com.au
 Ph: 02 4226 5128 E: wollongong@als.com.au
 Ph: 02 4226 5129 E: wollongong@als.com.au
 Ph: 02 4226 5130 E: wollongong@als.com.au
 Ph: 02 4226 5131 E: wollongong@als.com.au
 Ph: 02 4226 5132 E: wollongong@als.com.au
 Ph: 02 4226 5133 E: wollongong@als.com.au
 Ph: 02 4226 5134 E: wollongong@als.com.au
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 Ph: 02 4226 5136 E: wollongong@als.com.au
 Ph: 02 4226 5137 E: wollongong@als.com.au
 Ph: 02 4226 5138 E: wollongong@als.com.au
 Ph: 02 4226 5139 E: wollongong@als.com.au
 Ph: 02 4226 5140 E: wollongong@als.com.au

CLIENT: EcOz Environmental Consultants
 OFFICE: Darwin
 PROJECT: Rustler Roost WDL
 PROJECT NUMBER: E220182
 PROJECT MANAGER: Corinne Hulchinson
 CONTACT PH: 8981 1100
 SAMPLER: AL & JD
 SAMPLER MOBILE: 0419 478 875
 COC emailed to ALS? (YES/NO)
 EDD FORMAT:
 Email Reports to: Corinne.Hulchinson@ecoz.com.au; andrew.lewis@ecoz.com.au; jack.dymally@ecoz.com.au
 Email Invoice to: ecoz@ecoz.com.au, Corinne.hulchinson@ecoz.com.au

TURNAROUND REQUIREMENTS:
 Standard TAT (List due date):
 Non Standard or urgent TAT (List due date): **2 days TAT**

ALS QUOTE NO.: SY/400/20 V2

FOR LABORATORY USE ONLY (Circle)
 CQC SEQUENCE NUMBER (Circle)
 coc: 1 2 3 4 5 6 7
 or: 1 2 3 4 5 6 7
 RECEIVED BY: **115**
 RECEIVED BY: **102**
 RECEIVED BY: **Tim**
 DATE/TIME: **20-11-20**
 DATE/TIME: **7:32am**

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (undisturbed bottle required) or Dissolved (field filtered bottle required)												Additional Information
	MATRIX	DATE / TIME	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	NT-10 - Major Cations (Ca, Mg, Na, K, NH ₄)	NT-12 - Major Anions (Chloride, Sulphate, Alkalinity)	W-01 - 7 Metals - As, Cd, Cr, Cu, Pb, Ni, Zn	EC020F - Additional Dissolved Metals by ICP/MS - Al, Co, Fe, Mn, Se, Sn, U	W-07T - 7 metals (total) - As	EC020T - Additional Total Metals by ICP/MS (including digestion) - Al, Co, Fe, Mn, Se, Sn, U	EC021G - Ferrous Iron	EA02PH - Suspended Solids - standard level	ED02B - Acidity (at parameters)	EA02S - Turbidity	EX02SG - Ammonia as N by Discrete Analyser	NT-11 - Total Nitrogen and Total Phosphorus	
1	DOLLY POT 0m	18.11.20	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	DOLLY POT 10m	↓	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	DOLLY POT 20m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DOLLY POT 30m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DOLLY POT 40m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DOLLY POT 50m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	DOLLY POT 60m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	DOLLY POT 70m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	BACKHOE 0m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	BACKHOE 10m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	BACKHOE 20m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	BACKHOE 30m	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
10	BACKHOE 40m	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BACKHOE 50m	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				TOTAL													

Water Container Codes: F = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cl 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 Spatulation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Salts; B = Unpreserved Bag

Environmental Division
 Sydney
 Work Order Reference
ES2040616



Telephone : + 61-2-8784 8555

#3

TAT

LAB OF ORIGIN:
DARWIN



CHAIN OF CUSTODY

ALS Laboratory
please tick →

ADELAIDE 21 Berna Road Paraetta SA 5095
Ph: 08 8559 0800 E: adelaide@alsglobal.com
BREMENBURG 32 Seaview Street Glenelg SA 5015
Ph: 07 3213 1222 E: bremensburg@alsglobal.com
GLADSTONE 10 The Esplanade Gladstone QLD 4260
Ph: 07 7471 5600 E: gladstone@alsglobal.com

DMACKAY 78 Marlbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: dmackay@alsglobal.com
LIVELONG 24 Wessell Road Springvale VIC 3171
Ph: 03 8549 9900 E: livelong@alsglobal.com
MELBOURNE 27 Sydney Road Victoria 3000
Ph: 02 6372 6735 E: melb@alsglobal.com

CNEWCASTLE 6 Rose Gum Road Warneford NSW 2304
Ph: 02 4968 9033 E: cnewcastle@alsglobal.com
NEWCASTLE 2-3 Cooney Place North Newcastle NSW 2290
Ph: 02 4423 2105 E: newcastle@alsglobal.com
DUNEDIN 111 North Way Kelsoe WA 6000
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-288 Woodpark Road Smithfield NSW 2164
Ph: 02 8764 8555 E: samples.syd@alsglobal.com
TOWNSVILLE 14-15 Dalmar Court QLD 4818
Ph: 07 4756 0300 E: townsville@alsglobal.com
LONDON 100 Cannon Street London EC6A 3DF
Ph: 02 4223 3125 E: portkemba@alsglobal.com

CLIENT: EcOz Environmental Consultants	TURNAROUND REQUIREMENTS: <input type="checkbox"/> Standard TAT (List due date):	FOR LABORATORY USE ONLY: (Circle) Custody Seal Intact? Yes No N/A Freezer frozen ice probe present (upon receipt) Yes No N/A Random Sample Temperature on Receipt: °C
OFFICE: Darwin	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	
PROJECT: Rustler Roost WDL	ALS QUOTE NO.: SY/400/20 V2	
PROJECT NUMBER: EZZ0182		

PROJECT MANAGER: Corinne Hutchinson	CONTACT PH: 8981 1100	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7	RECEIVED BY: <i>Kim</i>
SAMPLER: AL & JD	SAMPLER MOBILE: 0419 478 875	OF: 1 2 3 4 5 6 7	DATE/TIME: <i>20.11.20</i>
COC emailed to ALS? (YES/NO)	EDD FORMAT:	RELINQUISHED BY:	DATE/TIME:
Email Reports to: Corinne.Hutchinson@ecoz.com.au; andrew.lewis@ecoz.com.au; jack.dymalla@ecoz.com.au		DATE/TIME:	
Email Invoice to: ecoz@ecoz.com.au; Corinne.hutchinson@ecoz.com.au			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS		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	
	MATRIX: SOLID (S)/WATER (W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>(refer to codes below)</i>	TOTAL CONTAINERS	NT-01 - Major Cations (Ca Mg, Na, K) + Hardness	NT-02 - Major Anions (Chloride, Sulphate, Alkalinity)	W-01 - 7 Metals - As, Cd, Cr, Cu, Pb, Ni, Zn	EG020F - Additional Dissolved Metals by ICP/MS - Al, Co, Fe, Mn, Se, Sn, U	W-01T - 7 metals (total) - As, ...	EG020T - Additional Total Metals by ICP/MS (including digestion) - Al, Co, Fe, Mn, Se, Sn, U	EG0516 - Fairbus Iron	EA025H - Suspended Solids - standard level	ED038 - Acidity (all parameters)	EA045 - Turbidity	EK0556 - Ammonia as N by Discrete Analyser	NT-11 - Total Nitrogen and Total Phosphorus		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BACKHOE 60m	SNR	18.11.20	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	BEEF BUCKET 0m		↓	W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	BEEF BUCKET 10m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 20m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 30m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 40m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 50m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 60m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 60m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 60m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	BEEF BUCKET 60m			W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	SWEAT RIDGE 0m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SWEAT RIDGE 10m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SWEAT RIDGE 20m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SWEAT RIDGE 30m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SWEAT RIDGE 40m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SWEAT RIDGE 50m		W	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TOTAL:																			

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 Separation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Aspartate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag



CHAIN OF CUSTODY

ALS Laboratory
please tick →

ADELAIDE 21 Barossa Road Pooka SA 5095
Ph: 08 8358 8890 E: info@alsglab.com
JEREBBERG 33 Grand Street Balford SA 5203
Ph: 07 3243 7222 E: samples.jer@alsglab.com
LISLAKESTONE 40 Callaghan Drive Clinton SA 5174
Ph: 07 7471 6600 F: gluckstone@alsglab.com

MACKAY 78 Harbour Road Mackay QLD 4749
Ph: 07 4944 9177 E: mackay@alsglab.com
MELBOURNE 24 Wexley Road Springvale VIC 3171
Ph: 05 8549 5900 E: samples.mel@alsglab.com
MURFRESB 29 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6736 E: mudgee@mail@alsglab.com

NEWCASTLE 3 Ross Gum Road Warabrook NSW 2301
Ph: 02 4968 5438 E: samples.newcastle@alsglab.com
NEWCASTLE 113 Seely Place North Newcastle NSW 2291
Ph: 024423 2063 E: north@alsglab.com
PERTH 111 Wood Way Malaga WA 6099
Ph: 08 9299 7555 E: samples.perth@alsglab.com

SYDNEY 277-283 Woodruff Road Smithfield NSW 2164
Ph: 02 8744 8555 E: samples.sydney@alsglab.com
TOWNSVILLE 14-15 Debra Court Bribie QLD 4818
Ph: 07 4756 0900 E: samples.townsville@alsglab.com
WOLLONGONG 13 Kenny Street Wollongong NSW 2522
Ph: 02 4235 3126 E: parkenbla@alsglab.com

CLIENT: EcOz Environmental Consultants	TURNAROUND REQUIREMENTS: <input type="checkbox"/> Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle) Colours: See Table? Yes No N/A Free Ice / Frozen Ice bottles present upon receipt? Yes No N/A Random Sample Temperature on Receipt Other Comments:
OFFICE: Darwin	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	
PROJECT: Rustler Roost WDL	ALS QUOTE NO.: SY/400/20 V2	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
PROJECT NUMBER: EZ20182	CONTACT PH: 8981 1100	RECEIVED BY: Kim
PROJECT MANAGER: Corinne Hutchinson	SAMPLER MOBILE: 0419 478 875	RECEIVED DATE/TIME: 20.11.20
SAMPLER: AL & JD	RELINQUISHED BY:	RECEIVED BY: Kim
COC emailed to ALS? (YES/NO)	EDD FORMAT:	RECEIVED DATE/TIME: 20.11.20
Email Reports to: Corinne.Hutchinson@ecoz.com.au; andrew.lewis@ecoz.com.au; jack.dymalla@ecoz.com.au	DATE/TIME:	7.30am
Email Invoice to: ecoz@ecoz.com.au, Corinne.hutchinson@ecoz.com.au	DATE/TIME:	

ALS USE		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	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	NT-01D - Major Cations (Ca Mg, Na, K) + Hardness	NT-02 - Major Anions (Chloride, Sulphate, Alkalinity)	W-01 - 7 Metals - As, Cd, Cr, Cu, Pb, Ni, Zn	EG020F - Additional Dissolved Metals by ICP/MS - Al, Co, Fe, Mn, Se, Sn, U	W-01T - 7 metals (total) - As, ...	EG020T - Additional Total Metals by ICP/MS (including digestion) - Al, Co, Fe, Mn, Se, Sn, U	EG051G - Ferrous Iron	EA025H - Suspended Solids - standard level	ED038 - Acidity (all parameters)	EA045 - Turbidity	EX055G - Ammonia as N by Discrete Analyser	NT-11 - Total Nitrogen and Total Phosphorus	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SWEAT RIDGE 60m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	SWEAT RIDGE 70m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
					TOTAL													

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 SO = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Special 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

CERTIFICATE OF ANALYSIS

Work Order : **ES2040616**
Client : **ECOZ ENVIRONMENTAL SERVICES**
Contact : MS CORINNE HUTCHINSON
Address : PO BOX 381
 DARWIN NT, AUSTRALIA 0801
Telephone : +61 08 89811100
Project : EZ20182 Rustler Roost WDL
Order number : ----
C-O-C number : ----
Sampler : AL & JD
Site : ----
Quote number : SY/400/20
No. of samples received : 17
No. of samples analysed : 17

Page : 1 of 10
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 20-Nov-2020 07:30
Date Analysis Commenced : 20-Nov-2020
Issue Date : 24-Nov-2020 11:49



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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 Contact 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.

- EG020 : It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				DOLLY POT 0m	DOLLY POT 10m	DOLLY POT 20m	DOLLY POT 60m Received as DOLLY POT 15m	DOLLY POT 70m Received as DOLLY POT 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-001	ES2040616-002	ES2040616-003	ES2040616-004	ES2040616-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.5	0.8	0.7	0.4	2.3
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8	6	8	6	14
Total Alkalinity as CaCO3	----	1	mg/L	8	6	8	6	14
ED038: Acidity								
Acidity as CaCO3	----	1	mg/L	3	3	4	5	9
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	3	3	4	5	9
Acidity as H2SO4	----	1	mg/L	3	3	4	5	9
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3	4	3	2	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1
Sodium	7440-23-5	1	mg/L	2	2	2	2	2
Potassium	7440-09-7	1	mg/L	1	1	1	1	1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.007
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				DOLLY POT 0m	DOLLY POT 10m	DOLLY POT 20m	DOLLY POT 60m Received as DOLLY POT 15m	DOLLY POT 70m Received as DOLLY POT 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-001	ES2040616-002	ES2040616-003	ES2040616-004	ES2040616-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.203	0.002	0.622
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	1.20
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.02	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.001	<0.001	0.010
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	0.002	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.010	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.004	0.006	0.219	0.005	0.671
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.06	<0.05	1.90
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	<0.01	<0.01	<0.01	0.26
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	<0.1	<0.1	0.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.2	0.2	<0.1	<0.1	0.3
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.03	<0.01	0.02	0.02	0.02



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BACKHOE 0m	BACKHOE 10m	BACKHOE 20m	BACKHOE 30m Received as BACKHOE 15m	BACKHOE 40m Received as BACKHOE 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-006	ES2040616-007	ES2040616-008	ES2040616-009	ES2040616-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.6	0.5	0.6	0.5	2.0
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6	6	8	7	12
Total Alkalinity as CaCO3	----	1	mg/L	6	6	8	7	12
ED038: Acidity								
Acidity as CaCO3	----	1	mg/L	5	4	8	4	8
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	5	4	8	5	8
Acidity as H2SO4	----	1	mg/L	5	4	8	5	8
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2	2	2	2	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1
Sodium	7440-23-5	1	mg/L	2	2	2	2	2
Potassium	7440-09-7	1	mg/L	1	1	1	1	1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.008
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BACKHOE 0m	BACKHOE 10m	BACKHOE 20m	BACKHOE 30m Received as BACKHOE 15m	BACKHOE 40m Received as BACKHOE 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-006	ES2040616-007	ES2040616-008	ES2040616-009	ES2040616-010
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.003	0.002	0.193	0.048	0.584
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.98
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.001	<0.001	0.016
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.006	0.005	0.240	0.061	0.677
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.11	<0.05	2.00
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	<0.01	<0.01	<0.01	0.27
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.1	<0.1	0.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.1	<0.1	0.3
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.01



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BEEF BUCKET 0m	BEEF BUCKET 10m	BEEF BUCKET 20m	BEEF BUCKET 30m Received as BEEF BUCKET 15m	BEEF BUCKET 60m Received as BEEF BUCKET 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-012	ES2040616-013	ES2040616-014	ES2040616-015	ES2040616-016
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.4	0.5	0.5	0.5	0.9
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	6	7	6	10
Total Alkalinity as CaCO3	----	1	mg/L	7	6	7	6	10
ED038: Acidity								
Acidity as CaCO3	----	1	mg/L	5	5	5	3	7
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	5	5	6	4	7
Acidity as H2SO4	----	1	mg/L	5	5	6	4	7
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2	3	3	2	2
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1
Sodium	7440-23-5	1	mg/L	2	2	2	2	2
Potassium	7440-09-7	1	mg/L	1	1	1	1	1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.005
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BEEF BUCKET 0m	BEEF BUCKET 10m	BEEF BUCKET 20m	BEEF BUCKET 30m Received as BEEF BUCKET 15m	BEEF BUCKET 60m Received as BEEF BUCKET 25m
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00	18-Nov-2020 00:00
Compound	CAS Number	LOR	Unit	ES2040616-012	ES2040616-013	ES2040616-014	ES2040616-015	ES2040616-016
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.006	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.112	0.005	0.481
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.72
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.006
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	<0.001	0.002
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.123	0.010	0.535
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	1.09
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.08
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.2	0.1	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.2	0.1	0.2
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	0.08	<0.01	<0.01



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				SWEAT RIDGE 0m	SWEAT RIDGE 10m Received as SWEAT RIDGE 12m	----	----	----
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2040616-017	ES2040616-018	-----	-----	-----
				Result	Result	---	---	---
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.4	0.7	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6	7	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	6	7	----	----	----
ED038: Acidity								
Acidity as CaCO3	----	1	mg/L	3	3	----	----	----
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	----	----	----
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	3	3	----	----	----
Acidity as H2SO4	----	1	mg/L	3	3	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2	2	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	<1	<1	----	----	----
Sodium	7440-23-5	1	mg/L	2	2	----	----	----
Potassium	7440-09-7	1	mg/L	1	1	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				SWEAT RIDGE 0m	SWEAT RIDGE 10m Received as SWEAT RIDGE 12m	----	----	----
Sampling date / time				18-Nov-2020 00:00	18-Nov-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2040616-017	ES2040616-018	-----	-----	-----
				Result	Result	---	---	---
EG020F: Dissolved Metals by ICP-MS - Continued								
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	0.052	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.005	0.061	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	----	----	----

QUALITY CONTROL REPORT

Work Order	: ES2040616	Page	: 1 of 10
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ20182 Rustler Roost WDL	Date Samples Received	: 20-Nov-2020
Order number	: ----	Date Analysis Commenced	: 20-Nov-2020
C-O-C number	: ----	Issue Date	: 24-Nov-2020
Sampler	: AL & JD		
Site	: ----		
Quote number	: SY/400/20		
No. of samples received	: 17		
No. of samples analysed	: 17		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



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

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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3376439)									
ES2040563-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	8	43.1	No Limit
ES2040616-005	DOLLY POT 70m Received as DOLLY POT 25m	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3376440)									
ES2040616-016	BEEF BUCKET 60m Received as BEEF BUCKET 25m	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES2040700-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	92	89	3.05	0% - 50%
EA045: Turbidity (QC Lot: 3375598)									
ES2040615-001	Anonymous	EA045: Turbidity	----	0.1	NTU	879	875	0.456	0% - 20%
ES2040615-010	Anonymous	EA045: Turbidity	----	0.1	NTU	0.6	0.6	0.00	No Limit
EA045: Turbidity (QC Lot: 3375599)									
ES2040616-008	BACKHOE 20m	EA045: Turbidity	----	0.1	NTU	0.6	0.6	0.00	No Limit
ES2040616-018	SWEAT RIDGE 10m Received as SWEAT RIDGE 12m	EA045: Turbidity	----	0.1	NTU	0.7	0.7	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3377098)									
ES2040615-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	9	12	19.5	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	9	12	19.5	0% - 50%
ES2040615-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	97	99	1.93	0% - 20%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3377098) - continued									
ES2040615-010	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	97	99	1.93	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3377100)									
ES2040748-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ES2041113-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	216	217	0.711	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	216	217	0.711	0% - 20%
ED038: Acidity (QC Lot: 3377099)									
ES2040615-002	Anonymous	ED038-P: Acidity as CaCO3	----	1	mg/L	9	10	10.5	0% - 50%
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.00	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	9	10	10.5	0% - 50%
		ED038-P: Acidity as H2SO4	----	1	mg/L	9	10	10.5	0% - 50%
ES2040615-011	Anonymous	ED038-P: Acidity as CaCO3	----	1	mg/L	27	25	4.99	0% - 20%
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.00	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	27	25	7.69	0% - 20%
		ED038-P: Acidity as H2SO4	----	1	mg/L	26	24	8.00	0% - 20%
ED038: Acidity (QC Lot: 3377101)									
ES2040616-008	BACKHOE 20m	ED038-P: Acidity as CaCO3	----	1	mg/L	8	11	31.6	0% - 50%
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.00	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	8	11	31.6	0% - 50%
		ED038-P: Acidity as H2SO4	----	1	mg/L	8	11	31.6	0% - 50%
ES2041051-001	Anonymous	ED038-P: Acidity as CaCO3	----	1	mg/L	7	3	80.0	No Limit
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.00	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	0.00	No Limit
		ED038-P: Acidity as H2SO4	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3375806)									
ES2040616-001	DOLLY POT 0m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3375807)									
ES2040616-001	DOLLY POT 0m	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3376529)									
ES2040616-001	DOLLY POT 0m	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 3376529) - continued									
ES2040616-001	DOLLY POT 0m	ED093F: Sodium	7440-23-5	1	mg/L	2	2	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
ES2040616-012	BEEF BUCKET 0m	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	2	2	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3376526)									
ES2040616-001	DOLLY POT 0m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES2040616-012	BEEF BUCKET 0m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3376528)									
ES2040616-001	DOLLY POT 0m	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES2040616-012	BEEF BUCKET 0m	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3376530)									
ES2040616-013	BEEF BUCKET 10m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3376530) - continued									
ES2040616-013	BEEF BUCKET 10m	EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES2041126-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.138	0.140	1.13	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.021	0.022	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.04	0.05	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.10	0.10	0.00	No Limit
		EG020T: Total Metals by ICP-MS (QC Lot: 3376558)							
ES2040568-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.247	0.249	0.654	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	22.6	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.94	0.95	1.67	0% - 50%
		ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001
EG020A-T: Arsenic	7440-38-2			0.001	mg/L	0.016	0.016	0.00	0% - 50%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3376558) - continued									
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.677	0.685	1.25	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	2.00	2.06	2.58	0% - 20%		
EG020T: Total Metals by ICP-MS (QC Lot: 3376559)									
ES2040568-001	Anonymous	EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3375633)									
ES2040616-001	DOLLY POT 0m	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.00	No Limit
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.27	0.26	0.00	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3375632)									
ES2040616-001	DOLLY POT 0m	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES2040616-010	BACKHOE 40m Received as BACKHOE 25m	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3375638)									
ES2040616-001	DOLLY POT 0m	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
ES2040616-012	BEEF BUCKET 0m	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3375637)									
ES2040616-001	DOLLY POT 0m	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	34.5	No Limit
ES2040616-012	BEEF BUCKET 0m	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3376439)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	106	83.0	129	
				<5	1000 mg/L	100	82.0	110	
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3376440)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	100	83.0	129	
				<5	1000 mg/L	95.1	82.0	110	
EA045: Turbidity (QCLot: 3375598)									
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	99.2	91.0	105	
EA045: Turbidity (QCLot: 3375599)									
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	99.2	91.0	105	
ED037P: Alkalinity by PC Titrator (QCLot: 3377098)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	81.0	111	
				----	50 mg/L	118	70.0	130	
ED037P: Alkalinity by PC Titrator (QCLot: 3377100)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	108	81.0	111	
				----	50 mg/L	127	70.0	130	
ED038: Acidity (QCLot: 3377099)									
ED038-P: Acidity as CaCO3	----	1	mg/L	<1	100 mg/L	89.0	70.0	130	
ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as H2SO4	----	1	mg/L	<1	----	----	----	----	
ED038: Acidity (QCLot: 3377101)									
ED038-P: Acidity as CaCO3	----	1	mg/L	<1	100 mg/L	82.0	70.0	130	
ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as H2SO4	----	1	mg/L	<1	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3375806)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82.0	122	
				<1	500 mg/L	91.7	82.0	122	
ED045G: Chloride by Discrete Analyser (QCLot: 3375807)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	93.7	80.9	127	
				<1	1000 mg/L	101	80.9	127	
ED093F: Dissolved Major Cations (QCLot: 3376529)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.0	80.0	114	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
ED093F: Dissolved Major Cations (QCLot: 3376529) - continued									
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.9	90.0	116	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.6	82.0	120	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	85.0	113	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376526)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	85.8	80.0	116	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	85.0	85.0	114	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	85.1	84.0	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	85.0	85.0	111	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	82.9	82.0	112	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	83.2	81.0	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.8	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	83.3	82.0	110	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.3	82.0	112	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	89.8	85.0	115	
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	86.3	77.0	115	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	83.7	81.0	117	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	85.2	82.0	112	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376528)									
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	86.8	85.0	115	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376530)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	85.1	80.0	116	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	87.9	85.0	114	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	87.7	84.0	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.1	85.0	111	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	86.8	82.0	112	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.2	81.0	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.5	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	84.5	82.0	110	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	84.0	82.0	112	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	90.7	85.0	115	
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	88.2	77.0	115	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.8	81.0	117	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	89.8	82.0	112	
EG020T: Total Metals by ICP-MS (QCLot: 3376558)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.1	82.0	120	
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	82.0	114	
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.9	84.0	112	
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.9	86.0	116	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3376558) - continued								
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.7	84.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.7	85.0	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.6	84.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.2	68.0	126
EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	97.2	83.0	123
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.0	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.4	85.0	117
EG020T: Total Metals by ICP-MS (QCLot: 3376559)								
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	98.3	85.0	115
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3375633)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	107	90.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3375632)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3375638)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.2	69.0	101
				<0.1	1 mg/L	101	70.0	118
				<0.1	5 mg/L	92.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3375637)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.7	71.0	101
				<0.01	0.442 mg/L	89.9	72.0	108
				<0.01	1 mg/L	88.8	70.0	130

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.

Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3375806)							
ES2040616-001	DOLLY POT 0m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	99.3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3375807)							
ES2040616-001	DOLLY POT 0m	ED045G: Chloride	16887-00-6	50 mg/L	83.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376526)							
ES2040543-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	83.1	70.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376526) - continued							
ES2040543-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.25 mg/L	87.1	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	86.8	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	84.4	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	85.0	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	89.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	86.5	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	82.9	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	86.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3376530)							
ES2040616-014	BEEF BUCKET 20m	EG020A-F: Arsenic	7440-38-2	1 mg/L	79.3	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	83.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	85.5	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	80.4	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	81.8	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	89.0	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	86.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	79.6	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	82.5	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3376558)							
ES2040445-011	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.5	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	95.4	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.0	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	92.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	92.9	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	93.5	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.4	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.9	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.5	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3375633)							
ES2040616-001	DOLLY POT 0m	EK055G: Ammonia as N	7664-41-7	1 mg/L	91.4	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3375632)							
ES2040616-001	DOLLY POT 0m	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	93.1	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3375638)							
ES2040616-002	DOLLY POT 10m	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	85.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3375637)							
ES2040616-002	DOLLY POT 10m	EK067G: Total Phosphorus as P	----	1 mg/L	86.8	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2040616	Page	: 1 of 10
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Telephone	: +61-2-8784 8555
Project	: EZ20182 Rustler Roost WDL	Date Samples Received	: 20-Nov-2020
Site	: ----	Issue Date	: 24-Nov-2020
Sampler	: AL & JD	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 17

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: **WATER**

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
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, DOLLY POT 60m - Received as DOLLY POT 15m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BACKHOE 30m - Received as BACKHOE 15m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 0m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	18-Nov-2020	----	----	----	20-Nov-2020	25-Nov-2020	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, DOLLY POT 60m - Received as DOLLY POT 15m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BACKHOE 30m - Received as BACKHOE 15m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 0m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	18-Nov-2020	----	----	----	20-Nov-2020	20-Nov-2020	✓



Matrix: **WATER**

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	
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) DOLLY POT 0m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, 25m, SWEAT RIDGE 0m,	DOLLY POT 10m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	18-Nov-2020	----	----	----	21-Nov-2020	16-Dec-2020	✓
Clear Plastic Bottle - Unspecified; Lab-acidified (ED093F) DOLLY POT 20m		18-Nov-2020	----	----	----	21-Nov-2020	25-Nov-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	22-Nov-2020	02-Dec-2020	✓
ED038: Acidity								
Clear Plastic Bottle - Natural (ED038-P) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	22-Nov-2020	02-Dec-2020	✓



Matrix: **WATER**

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	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	20-Nov-2020	16-Dec-2020	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	20-Nov-2020	16-Dec-2020	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) DOLLY POT 0m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, 25m, SWEAT RIDGE 0m,	DOLLY POT 10m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	18-Nov-2020	----	----	----	21-Nov-2020	16-Dec-2020	✓
Clear Plastic Bottle - Unspecified; Lab-acidified (ED093F) DOLLY POT 20m		18-Nov-2020	----	----	----	21-Nov-2020	25-Nov-2020	✓



Matrix: **WATER**

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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020B-F) DOLLY POT 0m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m, DOLLY POT 10m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	18-Nov-2020	----	----	----	21-Nov-2020	17-May-2021	✓
Clear Plastic Bottle - Unspecified; Lab-acidified (EG020B-F) DOLLY POT 20m	18-Nov-2020	----	----	----	21-Nov-2020	17-May-2021	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unspecified; Lab-acidified (EG020B-T) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	21-Nov-2020	17-May-2021	✓	21-Nov-2020	17-May-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	20-Nov-2020	16-Dec-2020	✓



Matrix: **WATER**

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	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	----	----	----	20-Nov-2020	16-Dec-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	20-Nov-2020	16-Dec-2020	✓	20-Nov-2020	16-Dec-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) DOLLY POT 0m, DOLLY POT 20m, DOLLY POT 70m - Received as DOLLY POT 25m, BACKHOE 10m, BACKHOE 30m - Received as BACKHOE 15m, BEEF BUCKET 0m, BEEF BUCKET 20m, BEEF BUCKET 60m - Received as BEEF BUCKET 25m, SWEAT RIDGE 10m - Received as SWEAT RIDGE 12m	DOLLY POT 10m, DOLLY POT 60m - Received as DOLLY POT 15m, BACKHOE 0m, BACKHOE 20m, BACKHOE 40m - Received as BACKHOE 25m, BEEF BUCKET 10m, BEEF BUCKET 30m - Received as BEEF BUCKET 15m, SWEAT RIDGE 0m,	18-Nov-2020	20-Nov-2020	16-Dec-2020	✓	20-Nov-2020	16-Dec-2020	✓



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Acidity as Calcium Carbonate	ED038-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	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
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038-P	WATER	In house: Referenced to APHA 2310 B Acidity is determined by titration automated titration (e.g. by PC Titrate) of a settled supernatant aliquot of the sample with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)



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: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - EG051G Ferrous Iron	WATER - W-01 7 Metals	WATER - W-01T 7 metals (Total)
ES2122736-001	17-Jun-2021 00:00	DOLLY POT 0m	✓	✓	✓	✓	✓	✓	✓
ES2122736-002	17-Jun-2021 00:00	DOLLY POT 5m	✓	✓	✓	✓	✓	✓	✓
ES2122736-003	17-Jun-2021 00:00	DOLLY POT 10m	✓	✓	✓	✓	✓	✓	✓
ES2122736-004	17-Jun-2021 00:00	DOLLY POT 15m	✓	✓	✓	✓	✓	✓	✓
ES2122736-005	17-Jun-2021 00:00	DOLLY POT 20m	✓	✓	✓	✓	✓	✓	✓
ES2122736-006	17-Jun-2021 00:00	DOLLY POT 27m	✓	✓	✓	✓	✓	✓	✓
ES2122736-007	17-Jun-2021 00:00	BACKHOE 0m	✓	✓	✓	✓	✓	✓	✓
ES2122736-008	17-Jun-2021 00:00	BACKHOE 5m	✓	✓	✓	✓	✓	✓	✓
ES2122736-009	17-Jun-2021 00:00	BACKHOE 10m	✓	✓	✓	✓	✓	✓	✓
ES2122736-010	17-Jun-2021 00:00	BACKHOE 15m	✓	✓	✓	✓	✓	✓	✓
ES2122736-011	17-Jun-2021 00:00	BACKHOE 20m	✓	✓	✓	✓	✓	✓	✓
ES2122736-012	17-Jun-2021 00:00	BACKHOE 27m	✓	✓	✓	✓	✓	✓	✓
ES2122736-013	17-Jun-2021 00:00	BEEF BUCKET 0m	✓	✓	✓	✓	✓	✓	✓
ES2122736-014	17-Jun-2021 00:00	BEEF BUCKET 5m	✓	✓	✓	✓	✓	✓	✓
ES2122736-015	17-Jun-2021 00:00	BEEF BUCKET 10m	✓	✓	✓	✓	✓	✓	✓
ES2122736-016	17-Jun-2021 00:00	BEEF BUCKET 15m	✓	✓	✓	✓	✓	✓	✓
ES2122736-017	17-Jun-2021 00:00	BEEF BUCKET 20m	✓	✓	✓	✓	✓	✓	✓
ES2122736-018	17-Jun-2021 00:00	BEEF BUCKET 27m	✓	✓	✓	✓	✓	✓	✓
ES2122736-019	17-Jun-2021 00:00	SWEAT RIDGE 0m	✓	✓	✓	✓	✓	✓	✓
ES2122736-020	17-Jun-2021 00:00	SWEAT RIDGE 5m	✓	✓	✓	✓	✓	✓	✓
ES2122736-021	17-Jun-2021 00:00	SWEAT RIDGE 10m	✓	✓	✓	✓	✓	✓	✓
ES2122736-022	17-Jun-2021 00:00	SWEAT RIDGE 15m	✓	✓	✓	✓	✓	✓	✓



Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - ED038P Acidity (All parameters)	WATER - EK065G Ammonia as N By Discrete Analyser	WATER - NT-01D & 02 Major Cations & Anions (Ca, Mg, Na, K, Cl, SO4,	WATER - NT-11 Total Nitrogen and Total Phosphorus
ES2122736-001	17-Jun-2021 00:00	DOLLY POT 0m	✓	✓	✓	✓
ES2122736-002	17-Jun-2021 00:00	DOLLY POT 5m	✓	✓	✓	✓
ES2122736-003	17-Jun-2021 00:00	DOLLY POT 10m	✓	✓	✓	✓
ES2122736-004	17-Jun-2021 00:00	DOLLY POT 15m	✓	✓	✓	✓
ES2122736-005	17-Jun-2021 00:00	DOLLY POT 20m	✓	✓	✓	✓
ES2122736-006	17-Jun-2021 00:00	DOLLY POT 27m	✓	✓	✓	✓
ES2122736-007	17-Jun-2021 00:00	BACKHOE 0m	✓	✓	✓	✓
ES2122736-008	17-Jun-2021 00:00	BACKHOE 5m	✓	✓	✓	✓
ES2122736-009	17-Jun-2021 00:00	BACKHOE 10m	✓	✓	✓	✓
ES2122736-010	17-Jun-2021 00:00	BACKHOE 15m	✓	✓	✓	✓
ES2122736-011	17-Jun-2021 00:00	BACKHOE 20m	✓	✓	✓	✓
ES2122736-012	17-Jun-2021 00:00	BACKHOE 27m	✓	✓	✓	✓
ES2122736-013	17-Jun-2021 00:00	BEEF BUCKET 0m	✓	✓	✓	✓
ES2122736-014	17-Jun-2021 00:00	BEEF BUCKET 5m	✓	✓	✓	✓
ES2122736-015	17-Jun-2021 00:00	BEEF BUCKET 10m	✓	✓	✓	✓
ES2122736-016	17-Jun-2021 00:00	BEEF BUCKET 15m	✓	✓	✓	✓
ES2122736-017	17-Jun-2021 00:00	BEEF BUCKET 20m	✓	✓	✓	✓
ES2122736-018	17-Jun-2021 00:00	BEEF BUCKET 27m	✓	✓	✓	✓
ES2122736-019	17-Jun-2021 00:00	SWEAT RIDGE 0m	✓	✓	✓	✓
ES2122736-020	17-Jun-2021 00:00	SWEAT RIDGE 5m	✓	✓	✓	✓
ES2122736-021	17-Jun-2021 00:00	SWEAT RIDGE 10m	✓	✓	✓	✓
ES2122736-022	17-Jun-2021 00:00	SWEAT RIDGE 15m	✓	✓	✓	✓

Proactive Holding Time Report

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



Requested Deliverables

ANDREW LEWIS

- *AU Certificate of Analysis - NATA (COA)	Email	andrew.lewis@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	andrew.lewis@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	andrew.lewis@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	andrew.lewis@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	andrew.lewis@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	andrew.lewis@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	andrew.lewis@ecoz.com.au

CORINNE HUTCHINSON

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

INVOICE ADDRESS

- A4 - AU Tax Invoice (INV)	Email	ecoz@ecoz.com.au
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JACK DYMALLA

- *AU Certificate of Analysis - NATA (COA)	Email	jack.dymalla@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jack.dymalla@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jack.dymalla@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jack.dymalla@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	jack.dymalla@ecoz.com.au



CHAIN OF CUSTODY

ALS Laboratory
please tick →

JADELAIDE 21 Emma Road Puerako EA 5095
Ph: 08 859 9890 E: samples@alsjaglobal.com
JURONG 12 Stone Island Road LD 1002
Ph: 07 753 7222 E: samples@alsjaglobal.com
JULIESTONES 46 Calderwood Drive G2/151 QLD 4283
Ph: 07 747 1800 E: g2stones@alsjaglobal.com

JIRACKAY 78 Hawker Road Mackay QLD 4740
Ph: 07 404 9177 E: samples@alsjaglobal.com
MILLSBOURNE 2-4 Watson Road Springvale VIC 3171
Ph: 03 959 9800 E: samples@alsjaglobal.com
MULLOCKE 2-4 Sydney Road Geelong VIC 3220
Ph: 02 6372 6736 E: m.mullocke@alsjaglobal.com

NEWCASTLE 5 Rose Gurn Road Warbrook NSW 2304
Ph: 02 4993 0433 E: samples@alsjaglobal.com
NORCRA 4110 Kenny Place North Sydney NSW 2241
Ph: 02 9447 2022 E: samples@alsjaglobal.com
PERTH 16 Hod Way Midland WA 8100
Ph: 08 9204 7055 E: samples@alsjaglobal.com

OSYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 825 8550 E: samples@alsjaglobal.com
JOHNSVILLE 14-15 Dharma Court BSWA QLD 4818
Ph: 07 475 1002 E: samples@alsjaglobal.com
QUILONG 3690 Kenny Street Waralunga NSW 2300
Ph: 02 425 3125 E: perth@alsjaglobal.com

CLIENT: EcoZ Environmental Consultants	TURNAROUND REQUIREMENTS: <input type="checkbox"/> Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: Darwin	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	Dirty Soil (ppt) Yes No N/A Free Ice / Frozen for better preservation (ppt) Yes No N/A Random Sample Temperature or Location C Other comment:	
PROJECT: Rustler Roost WDL	ALS QUOTE NO.: SY409/20 V2	COC SEQUENCE NUMBER (Circle)	
PROJECT NUMBER: E221105		COC: 1 2 3 4 5 6 7	
PROJECT MANAGER: Corinne Hutchinson	CONTACT PH: 8981 1100	CF: 1 2 3 4 5 6 7	
SAMPLER:	SAMPLER MOBILE:	RECEIVED BY:	RELINQUISHED BY:
COC emailed to ALS? (YES/NO)	EDD FORMAT:	DATE/TIME:	DATE/TIME:
Email Reports to: Corinne.Hutchinson@ecoz.com.au; andrew.lewis@ecoz.com.au; jack.dymallya@ecoz.com.au			
Email Invoice to: ecoz@ecoz.com.au, Corinne.hutchinson@ecoz.com.au			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS				CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (Nil. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottles required).														Additional Information
	MATRIX SOLID (S) WATER (W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)		TOTAL CONTAINERS	NT-01D - Major Cations (Ca, Mg, Na, K) + Hardness	NT-02 - Major Anions (Chloride, Sulphate, Alkalinity)	WT-01 - 7 Metals - As, Cd, Cr, Cu, Fe, Ni, Zn	EC020P - Additional Dissolved Metals by ICP/MS - Al, Co, Fe, Mn, Se, Sn, U	W-01T - 7 metals (total) - As, Ni, Zn	EC020T - Additional Total Metals by ICP/MS (including digestion) - Al, Co, Fe, Mn, Se, Sn, U	EC061G - Ferrous Iron	EA020R - Suspended Solids - standard level	ED008 - Acidity (all parameters)	EA045 - Turbidity	ER050G - Ammonia as N by Discrete Analyser	NT-11 - Total Nitrogen and Total Phosphorus		
13	BEEF BUCKET 0m	17.6.21	W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
14	BEEF BUCKET 5m	↓	W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
15	BEEF BUCKET 10m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
16	BEEF BUCKET 15m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
17	BEEF BUCKET 20m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
18	BEEF BUCKET 27m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	BEEF BUCKET 30m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
19	SWEAT RIDGE 0m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
20	SWEAT RIDGE 5m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
21	SWEAT RIDGE 10m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
22	SWEAT RIDGE 15m		W		4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			

Water Container Codes: P = Unpreserved Plastic; N = Nitro Preserved Plastic; ORC = Nitro Preserved ORC; SH = Sodium Hydroxide/Cl Ethanol; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airtight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisphosphate Preserved; VS = VOA Vial Sulfamic Preserved; AV = Airtight Unpreserved Vial; SG = Sulfamic Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Spectation bottle; SP = Fullsize Preserved Plastic; F = Formaldehyde Preserved Glass;
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag.

CERTIFICATE OF ANALYSIS

Work Order : **ES2122736**
Client : **ECOZ ENVIRONMENTAL SERVICES**
Contact : MS CORINNE HUTCHINSON
Address : PO BOX 381
 DARWIN NT, AUSTRALIA 0801
Telephone : +61 08 89811100
Project : EZ21105 Rustler Roost WDL
Order number : ----
C-O-C number : ----
Sampler : JACK DYMALLA
Site : ----
Quote number : SY/400/20
No. of samples received : 22
No. of samples analysed : 22

Page : 1 of 17
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Jun-2021 09:30
Date Analysis Commenced : 19-Jun-2021
Issue Date : 25-Jun-2021 10:52



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



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 Contact 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.

- EG020: It has been confirmed by re-digestion and re-analysis that dissolved concentration of Manganese is higher than total concentration for sample ES2122736 # 007. For all other elements where filtered results are greater than total results, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 0m	DOLLY POT 5m	DOLLY POT 10m	DOLLY POT 15m	DOLLY POT 20m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-001	ES2122736-002	ES2122736-003	ES2122736-004	ES2122736-005	
				Result	Result	Result	Result	Result	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	5	<5	
EA045: Turbidity									
Turbidity	----	0.1	NTU	0.5	0.5	0.6	0.5	0.5	
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	13	9	8	8	8	
Total Alkalinity as CaCO3	----	1	mg/L	13	9	8	8	8	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	8	4	4	5	3	
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as H2SO4	----	1	mg/L	<1	<1	<1	<1	<1	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2	2	2	2	2	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1	
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1	
Sodium	7440-23-5	1	mg/L	2	2	2	2	2	
Potassium	7440-09-7	1	mg/L	1	1	<1	1	1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 0m	DOLLY POT 5m	DOLLY POT 10m	DOLLY POT 15m	DOLLY POT 20m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-001	ES2122736-002	ES2122736-003	ES2122736-004	ES2122736-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L	0.016	0.012	0.009	0.014	0.016	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.035	0.032	0.037	0.043	0.037	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.01	0.08	0.06	0.04	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.2	0.2	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.2	0.2	0.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.01	<0.01	0.01	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.32	0.24	0.22	0.22	0.22	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 0m	DOLLY POT 5m	DOLLY POT 10m	DOLLY POT 15m	DOLLY POT 20m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-001	ES2122736-002	ES2122736-003	ES2122736-004	ES2122736-005	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
∅ Total Cations	----	0.01	meq/L	0.11	0.11	0.09	0.11	0.11	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 27m	BACKHOE 0m	BACKHOE 5m	BACKHOE 10m	BACKHOE 15m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-006	ES2122736-007	ES2122736-008	ES2122736-009	ES2122736-010	
				Result	Result	Result	Result	Result	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	6	<5	<5	<5	<5	
EA045: Turbidity									
Turbidity	----	0.1	NTU	0.8	0.5	0.6	0.4	0.4	
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11	9	9	9	11	
Total Alkalinity as CaCO3	----	1	mg/L	11	9	9	9	11	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	4	3	3	5	3	
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as H2SO4	----	1	mg/L	<1	<1	<1	<1	<1	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2	2	2	2	2	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1	
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1	
Sodium	7440-23-5	1	mg/L	2	2	2	2	2	
Potassium	7440-09-7	1	mg/L	1	1	1	1	1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	0.001	0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 27m	BACKHOE 0m	BACKHOE 5m	BACKHOE 10m	BACKHOE 15m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-006	ES2122736-007	ES2122736-008	ES2122736-009	ES2122736-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L	0.259	0.043	0.022	0.022	0.033	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.263	0.020	0.052	0.059	0.064	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	0.16	<0.05	<0.05	<0.05	<0.05	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.08	<0.01	<0.01	0.05	0.06	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.04	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.2	0.2	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.2	0.2	0.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.01	0.02	<0.01	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.28	0.24	0.24	0.24	0.28	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DOLLY POT 27m	BACKHOE 0m	BACKHOE 5m	BACKHOE 10m	BACKHOE 15m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-006	ES2122736-007	ES2122736-008	ES2122736-009	ES2122736-010	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
∅ Total Cations	----	0.01	meq/L	0.11	0.11	0.11	0.11	0.11	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BACKHOE 20m	BACKHOE 27m	BEEF BUCKET 0m	BEEF BUCKET 5m	BEEF BUCKET 10m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-011	ES2122736-012	ES2122736-013	ES2122736-014	ES2122736-015	
				Result	Result	Result	Result	Result	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	<5	6	<5	<5	<5	
EA045: Turbidity									
Turbidity	----	0.1	NTU	0.4	2.8	0.5	0.6	0.4	
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8	24	8	9	8	
Total Alkalinity as CaCO3	----	1	mg/L	8	24	8	9	8	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	3	10	4	3	5	
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as H2SO4	----	1	mg/L	<1	<1	<1	<1	<1	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2	2	2	2	2	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1	
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1	
Sodium	7440-23-5	1	mg/L	2	2	2	2	2	
Potassium	7440-09-7	1	mg/L	1	1	<1	1	<1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.009	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BACKHOE 20m	BACKHOE 27m	BEEF BUCKET 0m	BEEF BUCKET 5m	BEEF BUCKET 10m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-011	ES2122736-012	ES2122736-013	ES2122736-014	ES2122736-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L	0.034	0.780	0.018	0.017	0.015	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	2.56	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.012	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.003	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Manganese	7439-96-5	0.001	mg/L	0.068	0.849	0.040	0.047	0.042	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	3.97	<0.05	<0.05	<0.05	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.57	0.01	<0.01	0.02	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.7	0.2	0.2	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.4	0.7	0.2	0.2	0.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.02	0.01	0.01	0.01	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.22	0.54	0.22	0.24	0.22	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BACKHOE 20m	BACKHOE 27m	BEEF BUCKET 0m	BEEF BUCKET 5m	BEEF BUCKET 10m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-011	ES2122736-012	ES2122736-013	ES2122736-014	ES2122736-015	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
∅ Total Cations	----	0.01	meq/L	----	0.25	----	----	----	
∅ Total Cations	----	0.01	meq/L	0.11	----	0.09	0.11	0.09	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BEEF BUCKET 15m	BEEF BUCKET 20m	BEEF BUCKET 27m	SWEAT RIDGE 0m	SWEAT RIDGE 5m
				Sampling date / time	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	ES2122736-016	ES2122736-017	ES2122736-018	ES2122736-019	ES2122736-020	
				Result	Result	Result	Result	Result	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	6	6	
EA045: Turbidity									
Turbidity	----	0.1	NTU	0.4	0.4	0.6	0.5	0.6	
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	9	9	12	9	8	
Total Alkalinity as CaCO3	----	1	mg/L	9	9	12	9	8	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	4	4	4	4	3	
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	<1	<1	<1	
Acidity as H2SO4	----	1	mg/L	<1	<1	<1	<1	<1	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	<1	<1	<1	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2	2	2	2	2	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1	
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	<1	<1	
Sodium	7440-23-5	1	mg/L	2	2	2	2	2	
Potassium	7440-09-7	1	mg/L	1	1	1	<1	1	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	0.006	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BEEF BUCKET 15m	BEEF BUCKET 20m	BEEF BUCKET 27m	SWEAT RIDGE 0m	SWEAT RIDGE 5m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-016	ES2122736-017	ES2122736-018	ES2122736-019	ES2122736-020	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L	0.030	0.024	0.071	0.017	0.014	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	0.007	
Manganese	7439-96-5	0.001	mg/L	0.054	0.059	0.108	0.049	0.048	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.12	<0.05	<0.05	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.05	0.16	<0.01	0.03	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.2	0.2	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.2	0.2	0.2	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.03	0.03	0.02	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.24	0.24	0.30	0.24	0.22	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BEEF BUCKET 15m	BEEF BUCKET 20m	BEEF BUCKET 27m	SWEAT RIDGE 0m	SWEAT RIDGE 5m
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	17-Jun-2021 00:00	
Compound	CAS Number	LOR	Unit	ES2122736-016	ES2122736-017	ES2122736-018	ES2122736-019	ES2122736-020	
				Result	Result	Result	Result	Result	
EN055: Ionic Balance - Continued									
∅ Total Cations	----	0.01	meq/L	0.11	0.11	0.11	0.09	0.11	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWEAT RIDGE 10m	SWEAT RIDGE 15m	----	----	----
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES2122736-021	ES2122736-022	-----	-----	-----	
				Result	Result	----	----	----	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	<5	<5	----	----	----	
EA045: Turbidity									
Turbidity	----	0.1	NTU	0.5	1.2	----	----	----	
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L	<1	<1	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8	9	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	8	9	----	----	----	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	8	4	----	----	----	
Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	----	----	----	
Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	----	----	----	
Acidity as H2SO4	----	1	mg/L	<1	<1	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	2	2	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	<1	<1	----	----	----	
Magnesium	7439-95-4	1	mg/L	<1	<1	----	----	----	
Sodium	7440-23-5	1	mg/L	2	2	----	----	----	
Potassium	7440-09-7	1	mg/L	1	1	----	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	----	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWEAT RIDGE 10m	SWEAT RIDGE 15m	----	----	----
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES2122736-021	ES2122736-022	-----	-----	-----	
				Result	Result	----	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L	0.012	0.014	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	----	----	----	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.048	0.060	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	----	----	----	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	0.05	----	----	----	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.07	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.4	----	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	0.1	0.4	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.01	0.01	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	0.22	0.24	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SWEAT RIDGE 10m	SWEAT RIDGE 15m	----	----	----	
Sampling date / time				17-Jun-2021 00:00	17-Jun-2021 00:00	----	----	----		
Compound	CAS Number	LOR	Unit	ES2122736-021	ES2122736-022	-----	-----	-----		
				Result	Result	----	----	----		
EN055: Ionic Balance - Continued										
∅ Total Cations				----	0.01	meq/L	0.11	0.11	----	----

QUALITY CONTROL REPORT

Work Order	: ES2122736	Page	: 1 of 15
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ21105 Rustler Roost WDL	Date Samples Received	: 18-Jun-2021
Order number	: ----	Date Analysis Commenced	: 19-Jun-2021
C-O-C number	: ----	Issue Date	: 25-Jun-2021
Sampler	: JACK DYMALLA		
Site	: ----		
Quote number	: SY/400/20		
No. of samples received	: 22		
No. of samples analysed	: 22		



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



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

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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3752664)									
ES2122719-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	7	16.4	No Limit
ES2122736-005	DOLLY POT 20m	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3752665)									
ES2122736-015	BEEF BUCKET 10m	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2122967-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	222	270	19.7	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3754195)									
ES2122736-021	SWEAT RIDGE 10m	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2122764-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	727	678	7.0	0% - 20%
EA045: Turbidity (QC Lot: 3745509)									
ES2122582-001	Anonymous	EA045: Turbidity	----	0.1	NTU	781	780	0.1	0% - 20%
ES2122700-003	Anonymous	EA045: Turbidity	----	0.1	NTU	<0.1	<0.1	0.0	No Limit
EA045: Turbidity (QC Lot: 3745510)									
ES2122736-010	BACKHOE 15m	EA045: Turbidity	----	0.1	NTU	0.4	0.4	0.0	No Limit
ES2122736-019	SWEAT RIDGE 0m	EA045: Turbidity	----	0.1	NTU	0.5	0.5	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3745877)									
ES2122718-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8	6	36.9	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	8	6	36.9	No Limit
ES2122718-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	245	230	6.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	245	230	6.2	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3745882)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3745882) - continued									
ES2122736-010	BACKHOE 15m	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11	11	0.0	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	11	11	0.0	0% - 50%
ES2122771-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	171	182	6.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	171	182	6.6	0% - 20%
ED038: Acidity (QC Lot: 3745881)									
ES2122736-001	DOLLY POT 0m	ED038-P: Acidity as CaCO3	----	1	mg/L	8	5	46.2	No Limit
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as H2SO4	----	1	mg/L	<1	<1	0.0	No Limit
ES2122736-011	BACKHOE 20m	ED038-P: Acidity as CaCO3	----	1	mg/L	3	5	50.0	No Limit
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as H2SO4	----	1	mg/L	<1	<1	0.0	No Limit
ED038: Acidity (QC Lot: 3745883)									
ES2122736-021	SWEAT RIDGE 10m	ED038-P: Acidity as CaCO3	----	1	mg/L	8	4	66.7	No Limit
		ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	<1	0.0	No Limit
		ED038-P: Acidity as H2SO4	----	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3748064)									
ES2122736-001	DOLLY POT 0m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ES2122736-010	BACKHOE 15m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3748065)									
ES2122803-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	224	222	1.0	0% - 20%
ES2122803-012	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	147	145	1.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3748063)									
ES2122736-001	DOLLY POT 0m	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.0	No Limit
ES2122736-010	BACKHOE 15m	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3748066)									
ES2122803-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	211	212	0.8	0% - 20%
ES2122803-012	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	537	539	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3748721)									
ES2122736-001	DOLLY POT 0m	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	2	2	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 3748721) - continued									
ES2122736-011	BACKHOE 20m	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	2	2	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3748725)									
ES2122840-008	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	26	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	8	0.0	No Limit
ES2122736-021	SWEAT RIDGE 10m	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	2	2	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3748720)									
ES2122736-001	DOLLY POT 0m	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2122736-011	BACKHOE 20m	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3748722)									
ES2122736-001	DOLLY POT 0m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.016	0.014	10.4	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		ES2122736-011	BACKHOE 20m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001
EG020A-F: Arsenic	7440-38-2			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Chromium	7440-47-3			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Cobalt	7440-48-4			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Copper	7440-50-8			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Lead	7439-92-1			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Manganese	7439-96-5			0.001	mg/L	0.034	0.038	12.6	0% - 20%
EG020A-F: Nickel	7440-02-0			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Tin	7440-31-5			0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020A-F: Zinc	7440-66-6			0.005	mg/L	<0.005	<0.005	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3748722) - continued									
ES2122736-011	BACKHOE 20m	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3748723)									
ES2122840-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.006	0.010	42.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.010	29.4	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.96	0.96	0.0	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit		
ES2122736-021	SWEAT RIDGE 10m	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.010	17.7	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020F: Dissolved Metals by ICP-MS (QC Lot: 3748724)							
ES2122736-021	SWEAT RIDGE 10m	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3748770)									
ES2122736-001	DOLLY POT 0m	EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2122736-011	BACKHOE 20m	EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3748771)									
ES2122736-001	DOLLY POT 0m	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3748771) - continued									
ES2122736-001	DOLLY POT 0m	EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.035	0.040	12.6	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2122736-011	BACKHOE 20m	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.068	0.068	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020T: Total Metals by ICP-MS (QC Lot: 3748772)							
ES2122736-021	SWEAT RIDGE 10m	EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EW2102691-019	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.020	0.017	13.1	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.07	0.04	44.4	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.48	0.47	3.0	No Limit
		ES2122736-021	SWEAT RIDGE 10m	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001
EG020A-T: Arsenic	7440-38-2			0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3748772) - continued									
ES2122736-021	SWEAT RIDGE 10m	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.048	0.054	9.9	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.025	131	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.09	59.2	No Limit		
EG020T: Total Metals by ICP-MS (QC Lot: 3748773)									
ES2122736-021	SWEAT RIDGE 10m	EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3746697)									
ES2122736-001	DOLLY POT 0m	EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	0.0	No Limit
ES2122736-010	BACKHOE 15m	EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3746698)									
ES2122736-021	SWEAT RIDGE 10m	EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3749033)									
ES2122539-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.18	0.19	0.0	0% - 50%
ES2122673-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3749034)									
ES2122736-009	BACKHOE 10m	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.03	53.4	No Limit
ES2122736-018	BEEF BUCKET 27m	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.16	0.17	0.0	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3749032)									
ES2122539-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.82	2.84	0.8	0% - 20%
ES2122673-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.20	0.20	0.0	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3749035)									
ES2122736-009	BACKHOE 10m	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2122736-018	BEEF BUCKET 27m	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3749036)									
ES2122539-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	1.0	34.1	No Limit
ES2122736-007	BACKHOE 0m	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3749039)									
ES2122736-009	BACKHOE 10m	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
ES2122736-019	SWEAT RIDGE 0m	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3749037)									
ES2122693-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.34	0.33	3.1	0% - 20%
ES2122539-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.0	No Limit

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 Work Order : ES2122736
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ21105 Rustler Roost WDL



Sub-Matrix: **WATER**

				<i>Laboratory Duplicate (DUP) Report</i>					
<i>Laboratory sample ID</i>	<i>Sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Acceptable RPD (%)</i>
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3749038)									
ES2122736-007	BACKHOE 0m	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES2122736-019	SWEAT RIDGE 0m	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.02	55.6	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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3752664)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	83.0	129	
				<5	1000 mg/L	101	82.0	110	
				<5	463 mg/L	86.5	83.0	118	
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3752665)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	100	83.0	129	
				<5	1000 mg/L	102	82.0	110	
				<5	463 mg/L	98.8	83.0	118	
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3754195)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	95.7	83.0	129	
				<5	1000 mg/L	101	82.0	110	
				<5	463 mg/L	103	83.0	118	
EA045: Turbidity (QCLot: 3745509)									
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	99.5	91.0	105	
EA045: Turbidity (QCLot: 3745510)									
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	99.5	91.0	105	
ED037P: Alkalinity by PC Titrator (QCLot: 3745877)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	105	81.0	111	
				----	50 mg/L	100	80.0	120	
ED037P: Alkalinity by PC Titrator (QCLot: 3745882)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	107	81.0	111	
				----	50 mg/L	108	80.0	120	
ED038: Acidity (QCLot: 3745881)									
ED038-P: Acidity as CaCO3	----	1	mg/L	<1	100 mg/L	88.0	70.0	130	
ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as H2SO4	----	1	mg/L	<1	----	----	----	----	
ED038: Acidity (QCLot: 3745883)									
ED038-P: Acidity as CaCO3	----	1	mg/L	<1	100 mg/L	93.0	70.0	130	
ED038-P: Acidity as CaCO3 (pH 3.7)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as CaCO3 (pH 8.3)	----	1	mg/L	<1	----	----	----	----	
ED038-P: Acidity as H2SO4	----	1	mg/L	<1	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3748064)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	82.0	122	
				<1	500 mg/L	105	82.0	122	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3748065)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	82.0	122
				<1	500 mg/L	106	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3748063)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	100	80.9	127
				<1	1000 mg/L	93.0	80.9	127
ED045G: Chloride by Discrete Analyser (QCLot: 3748066)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	100	80.9	127
				<1	1000 mg/L	94.3	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3748721)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.1	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	109	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	106	85.0	113
ED093F: Dissolved Major Cations (QCLot: 3748725)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.6	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	106	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748720)								
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	85.3	85.0	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748722)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	90.2	80.0	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.8	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.6	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.7	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	88.5	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.6	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.7	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.9	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.4	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.1	85.0	115
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	112	77.0	115
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	84.7	81.0	117
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.6	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748723)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	90.5	80.0	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.7	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.3	84.0	110



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748723) - continued									
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.1	85.0	111	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	85.1	82.0	112	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.6	81.0	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.0	83.0	111	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.7	82.0	110	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.6	82.0	112	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	89.5	85.0	115	
EG020A-F: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	104	77.0	115	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.2	81.0	117	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.9	82.0	112	
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748724)									
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	85.9	85.0	115	
EG020T: Total Metals by ICP-MS (QCLot: 3748770)									
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	115	
EG020T: Total Metals by ICP-MS (QCLot: 3748771)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.2	82.0	120	
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.5	82.0	114	
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.2	84.0	112	
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.3	86.0	116	
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.4	84.0	116	
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.9	83.0	118	
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.8	85.0	115	
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.2	85.0	113	
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.0	84.0	116	
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.1	68.0	126	
EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	95.4	83.0	123	
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.5	79.0	117	
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	85.0	117	
EG020T: Total Metals by ICP-MS (QCLot: 3748772)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	89.8	82.0	120	
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.0	82.0	114	
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.6	84.0	112	
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.1	86.0	116	
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.0	84.0	116	
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.8	83.0	118	
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.3	85.0	115	
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	113	
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.7	84.0	116	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3748772) - continued								
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	89.6	68.0	126
EG020A-T: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	92.3	83.0	123
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.3	79.0	117
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.2	85.0	117
EG020T: Total Metals by ICP-MS (QCLot: 3748773)								
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	92.1	85.0	115
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3746697)								
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	102	89.0	117
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3746698)								
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	104	89.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3749033)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90.0	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3749034)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	108	90.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3749032)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	91.0	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3749035)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3749036)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	93.3	69.0	101
				<0.1	1 mg/L	110	70.0	118
				<0.1	5 mg/L	103	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3749039)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	90.5	69.0	101
				<0.1	1 mg/L	106	70.0	118
				<0.1	5 mg/L	105	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3749037)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.9	71.0	101
				<0.01	0.442 mg/L	# 112	72.0	108
				<0.01	1 mg/L	115	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3749038)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	96.4	71.0	101
				<0.01	0.442 mg/L	# 109	72.0	108
				<0.01	1 mg/L	111	70.0	130

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.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3748064)							
ES2122736-001	DOLLY POT 0m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	104	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3748065)							
ES2122736-021	SWEAT RIDGE 10m	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	104	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3748063)							
ES2122736-001	DOLLY POT 0m	ED045G: Chloride	16887-00-6	50 mg/L	96.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3748066)							
ES2122736-021	SWEAT RIDGE 10m	ED045G: Chloride	16887-00-6	50 mg/L	102	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748722)							
ES2122736-002	DOLLY POT 5m	EG020A-F: Arsenic	7440-38-2	1 mg/L	106	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	121	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	114	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	112	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	120	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	112	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	117	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	105	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	113	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3748723)							
ES2122736-022	SWEAT RIDGE 15m	EG020A-F: Arsenic	7440-38-2	1 mg/L	86.1	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.4	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	87.4	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	81.4	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	84.9	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	102	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	87.9	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	89.0	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3748771)							
ES2122736-002	DOLLY POT 5m	EG020A-T: Arsenic	7440-38-2	1 mg/L	101	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	90.0	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	89.1	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	93.2	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	88.7	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70.0	130



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3748771) - continued							
ES2122736-002	DOLLY POT 5m	EG020A-T: Nickel	7440-02-0	1 mg/L	101	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	106	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3748772)							
ES2122736-022	SWEAT RIDGE 15m	EG020A-T: Arsenic	7440-38-2	1 mg/L	86.7	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	88.0	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	93.9	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	77.2	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	79.3	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	77.2	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	88.6	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	87.1	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.8	70.0	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3746697)							
ES2122736-001	DOLLY POT 0m	EG051G: Ferrous Iron	----	1 mg/L	103	70.0	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3746698)							
ES2122736-021	SWEAT RIDGE 10m	EG051G: Ferrous Iron	----	1 mg/L	97.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3749033)							
ES2122539-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	117	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3749034)							
ES2122736-009	BACKHOE 10m	EK055G: Ammonia as N	7664-41-7	1 mg/L	113	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3749032)							
ES2122539-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3749035)							
ES2122736-009	BACKHOE 10m	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	110	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3749036)							
ES2122539-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3749039)							
ES2122736-010	BACKHOE 15m	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3749037)							
ES2122539-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3749038)							
ES2122736-010	BACKHOE 15m	EK067G: Total Phosphorus as P	----	1 mg/L	109	70.0	130

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Work Order : ES2122736
Client : ECOZ ENVIRONMENTAL SERVICES
Project : EZ21105 Rustler Roost WDL



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2122736	Page	: 1 of 11
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Telephone	: +61-2-8784 8555
Project	: EZ21105 Rustler Roost WDL	Date Samples Received	: 18-Jun-2021
Site	: ----	Issue Date	: 25-Jun-2021
Sampler	: JACK DYMALLA	No. of samples received	: 22
Order number	: ----	No. of samples analysed	: 22

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.
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- 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.



Matrix: **WATER**

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		
EA025: Total Suspended Solids dried at 104 ± 2°C - Continued									
SWEAT RIDGE 10m,	SWEAT RIDGE 15m	17-Jun-2021	----	----	----	24-Jun-2021	24-Jun-2021	✓	
EA045: Turbidity									
Clear Plastic Bottle - Natural (EA045)									
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	19-Jun-2021	19-Jun-2021	✓	
EA065: Total Hardness as CaCO3									
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F)									
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	22-Jun-2021	15-Jul-2021	✓	
ED037P: Alkalinity by PC Titrator									
Clear Plastic Bottle - Natural (ED037-P)									
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	19-Jun-2021	01-Jul-2021	✓	



Matrix: **WATER** 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	
ED038: Acidity								
Clear Plastic Bottle - Natural (ED038-P) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	19-Jun-2021	01-Jul-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	21-Jun-2021	15-Jul-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	21-Jun-2021	15-Jul-2021	✓



Matrix: **WATER** 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	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	22-Jun-2021	15-Jul-2021	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020B-F) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	22-Jun-2021	14-Dec-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020B-T) DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	22-Jun-2021	14-Dec-2021	✓	22-Jun-2021	14-Dec-2021	✓



Matrix: **WATER**

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	
EG051G: Ferrous Iron by Discrete Analyser								
Clear Plastic Bottle - HCl - Filtered (EG051G)								
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	21-Jun-2021	24-Jun-2021	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	22-Jun-2021	15-Jul-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	----	----	----	22-Jun-2021	15-Jul-2021	✓



Matrix: **WATER** 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	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G)								
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	22-Jun-2021	15-Jul-2021	✓	22-Jun-2021	15-Jul-2021	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
DOLLY POT 0m, DOLLY POT 10m, DOLLY POT 20m, BACKHOE 0m, BACKHOE 10m, BACKHOE 20m, BEEF BUCKET 0m, BEEF BUCKET 10m, BEEF BUCKET 20m, SWEAT RIDGE 0m, SWEAT RIDGE 10m,	DOLLY POT 5m, DOLLY POT 15m, DOLLY POT 27m, BACKHOE 5m, BACKHOE 15m, BACKHOE 27m, BEEF BUCKET 5m, BEEF BUCKET 15m, BEEF BUCKET 27m, SWEAT RIDGE 5m, SWEAT RIDGE 15m	17-Jun-2021	22-Jun-2021	15-Jul-2021	✓	22-Jun-2021	15-Jul-2021	✓



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acidity as Calcium Carbonate	ED038-P	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	5	40	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acidity as Calcium Carbonate	ED038-P	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	9	60	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	34	17.65	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	36	16.67	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Acidity as Calcium Carbonate	ED038-P	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	60	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite B	EG020B-T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	36	5.56	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
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Acidity as Calcium Carbonate	ED038-P	WATER	In house: Referenced to APHA 2310 B Acidity is determined by titration automated titration (e.g. by PC Titrate) of a settled supernatant aliquot of the sample with a standardised alkali to an end-point pH of 8.3. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

APPENDIX C FIELD SHEETS

Water Quality Data Sheet

Date	18.11.20					
Project	EZ 20182 - Henking RR Pit sampling.					
Sampler	JD & AL					
Site ID	Dollys Pot Surface	Dolly Pot 10	Dolly Pot 20	Beef Bucket 0	Beef Bucket 10	Beef Bucket 20
Parameters	Time: 1140	Time: 1155	Time: 1205	Time: 1220	Time: 1228	Time: 1235
Temp °C	32.6	32.0	27.5	32.6	31.9	27.4
DO %	56.9	63.1	18.8	58.1	57.1	22.1
EC µS/cm	30.9	35.7	32.4	27.9	28.2	29.6
TDS mg/L	20.15	23.40	20.8	18.2	18.2	19.5
SAL ppt	0.01	0.01	0.01	0.01	0.01	0.01
pH	8.47	8.05	6.63	7.76	7.72	6.49
ORP mV	33.4	51.7	76.9	56.4	51.0	76.7
Turbidity NTU	3.07	3.82	4.00	2.98	3.30	3.17
Free Cl mg/L						
Total Cl mg/L	25.8					

Water Quality Data Sheet

Date	18.11.20					
Project	EZ 20182 - Hanking RR Pit sampling					
Sampler	JD & AL					
Site ID	Beef Bucket 25	Backhoe 0	Backhoe 10	Backhoe 20	Backhoe 25	Dolly Pot 25
Parameters	Time: 1245	Time: 1315	Time: 1322	Time: 1335	Time: 1350	Time: 1425
Temp °C	27.2	33.0	30.9	27.0	26.2	27.1
DO %	22.4	62.4	56.2	21.7	19.7	22.0
EC µS/cm	37.2	28.4	27.2	30.7	44.0	43.2
TDS mg/L	24.05	18.20	17.55	20.15	28.60	27.95
SAL ppt	0.02	0.01	0.01	0.01	0.02	0.02
pH	6.47	7.46	7.74	6.47	6.45	6.52
ORP mV	-41.7	13.6	12.3	76.4	-49.2	-8.3
Turbidity NTU	2.75	3.13	3.34	3.99	2.50	2.75
Free Cl mg/L						
Total Chloride depth	25.7	25.5				



Water Quality Data Sheet

Date	18.11.20					
Project	EZ 20182 - Hanking RR Pit sampling					
Sampler	JD & AL					
Site ID	Bachhoe 15	Beef Bucket 15	Dolly Pot 15	Sweat Ridge 0	Sweat Ridge 12	
Parameters	Time: 1341	Time: 1400	Time: 1416	Time: 1435	Time: 1445	Time:
Temp °C	27.7	28.9	29.1	32.9	30.0	
DO %	41.3 41.3	59.9	63.8 63.8	73.8 73.8	57.7	
EC µS/cm	28.1	27.6	27.0	27.9	27.9	
TDS mg/L	18.20	18.20	17.55	18.20	18.20	
SAL ppt	0.01	0.01	0.01	0.01	0.01	
pH	6.45	6.77	6.97	7.34	6.72	
ORP mV	80.4	32.6	4 5.5	-1 0.1	51.1	
Turbidity NTU	2.77	3.12	2.63	3.65	3.36	
Free Cl mg/L						
Total Cl mg/L depth			25.7	13.1		

Water Quality Data Sheet

Date	17.6.21					
Project	E2 20115					
Sampler	JD & BD					
Site ID	Sweat Ridge 0m	SR 5m	SR 10m	SR 15m	DP 0m	DP 5m
Parameters	Time: 1000	Time:	Time:	Time:	Time: 1030	Time:
Temp °C	28.0	27.9	27.8	27.6	27.9	27.7
DO %	94.3	93.9	91.7	88.7	96.5	94.5
EC µS/cm	30.4	28.3	26.2	29.5	24.8	24.7
TDS mg/L	20	18	17	19	16	16
SAL ppt	0.01	0.01	0.01	0.01	0.01	0.01
pH	7.55	7.17	6.96	6.75	6.78	6.74
ORP mV	184.7	206.0	219.4	228.1	221.3	228.6
Turbidity NTU	0.41	1.25	0.95	2.75	0.67	0.49
Free Cl mg/L						
Total Cl mg/L						

- Sunny with light/mod W breeze.

Water Quality Data Sheet

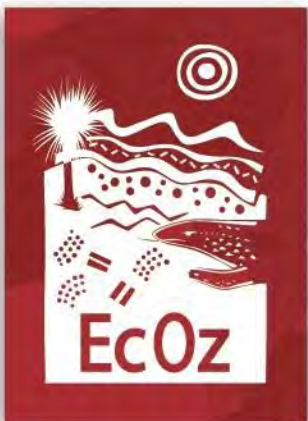
Date	17.6.21					
Project	EZ 20115					
Sampler	JD & BD					
Site ID	DP 10m	DP 15m	DP 20m	DP 27m	BB 0m	BB 5m
Parameters	Time:	Time:	Time:	Time:	Time: 1110	Time:
Temp °C	27.5	27.6	27.5	27.4	28.0	27.8
DO %	90.6	88.5	85.3	67.3	94.2	93.7
EC µS/cm	24.9	25.0	25.1	27.3	24.9	24.6
TDS mg/L	16	16	16	18	16	16
SAL ppt	0.01	0.01	0.01	0.01	0.01	0.01
pH	6.72	6.63	6.56	6.35	6.55	6.54
ORP mV	232.3	238.0	246.1	258.1	241.8	254.9
Turbidity NTU	1.17	0.79	1.53	2.34	0.35	0.15
Free Cl mg/L						
Total Cl mg/L						

Water Quality Data Sheet

Date	17.6.21					
Project	EZ 20115					
Sampler	JD & BD					
Site ID	BB 10 _m	BB 15 _m	BB 20 _m	BB 27 _m	B 0 _m	B 5 _m
Parameters	Time:	Time:	Time:	Time:	Time: 1150	Time:
Temp °C	27.9	27.7	27.8	27.7	28.4	28.2
DO %	87.7	85.7	87.1	78.8	96.9	97.0
EC µS/cm	24.9	24.9	24.7	25.7	24.5	24.7
TDS mg/L	16	16	16	17	16	16
SAL ppt	0.01	0.01	0.01	0.01	0.01	0.01
pH	6.46	6.37	6.38	6.31	6.51	6.51
ORP mV	251.1	257.1	257.2	261.5	244.2	245.2
Turbidity NTU	0.83	0.68	0.77	1.06	0.08	0.15
Free Cl mg/L						
Total Cl mg/L						

Water Quality Data Sheet

Date	17.6.21					
Project	E2 20115					
Sampler	JD & BD					
Site ID	B 10m	B 15m	B 20m	B 27m		
Parameters	Time:	Time:	Time:	Time:	Time:	Time:
Temp °C	28.0	27.8	27.7	26.8		
DO %	91.6	87.5	88.6	39.7		
EC µS/cm	248	25.3	24.8	52.4		
TDS mg/L	16	16	16	34		
SAL ppt	0.01	0.01	0.01	0.02		
pH	6.48	6.43	6.39	5.99		
ORP mV	249.4	254.0	259.2	115.2		
Turbidity NTU	1.11	4.11	4.08	1.16		
Free Cl mg/L				sulphur smell		
Total Cl mg/L				depth 28.5m		



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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