

Lake Mackay SOP Project

Preliminary Acid Sulfate Soils Investigation

Prepared for: Agrimin Limited

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### Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by Agrimin Limited (Agrimin) to undertake a Preliminary Acid Sulfate Soil Investigation for the Lake Mackay Sulfate of Potash (SOP) Project site. This investigation provides an evaluation of the potential for acid generation due to the disturbance of near surface sediments at the Lake Mackay SOP Project site.

The Mackay SOP Project comprises twelve tenements covering the majority of Lake Mackay for a combined area of approximately 3,013 km<sup>2</sup> (Figure 1). The nearest township is Kiwirrkurra, WA, located approximately 65 km south-west of the lake.

The Project covers the majority of the Western Australia portion of Lake Mackay, which is a hypersaline lake. While typically associated with coastal environments, acid sulfate soils (ASS) can also develop in hypersaline lakes where the degradation of organic material and abundant sulfate in groundwater becomes reduced in anoxic environments to form sulfide minerals, ranging from acidic monosulfide muds (black oozes) to pyrite.

In recognition that there is a potential for AASS and PASS to occur at the site, the following preliminary ASS investigation has been guided by the Department of Water and Environmental Regulation's (DWER) guideline *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* originally published in 2015 by the former Department of Environment Regulation (DER, 2015a). Given the Project area is considerably larger than 50 ha, strict adherence to the soil sampling requirements of the Acid Sulfate Soil Guideline Series (2015) has not been undertaken at this preliminary stage of the Project development. This preliminary investigation has been designed to opportunistically collect samples in association with other field programmes, however, the scope of work is considered to provide sufficient data to enable a preliminary evaluation of the potential for acid generation due to the disturbance of near surface sediments at the site.

Sediment samples were collected in conjunction with the installation of fourteen (14) x 100 m test trenches and 1 pilot pond [to depths up to 10 m below ground surface (mbgs)] that were installed by Agrimin between 13 August 2017 and 30 October 2017.

#### Objectives and Scope

The objectives of this preliminary acid sulfate soil investigation are as follows:

- To opportunistically collect samples as part of the lake trenching programme to characterise the acid generating and neutralising capacity of the near surface sediments that may be disturbed during development activities;
- To determine (to the extent possible) the areas where ASS exists in the proposed areas of intrusive ground disturbance;
- To obtain sufficient information so that an initial analysis of the risks and consequences associated with the disturbance and exposure of acid generating materials, including potential impacts on benthic habitats, water quality and local vegetation, and



• To enable a general understanding of the requirements for suitable management practices to be adopted during site development and operations and identify requirements for further investigations as part of the mining approvals process.

The following scope of work has been undertaken:

- Project management and organisation of logistics with Agrimin;
- Review of existing geologic, drilling, and hydrogeologic data from the project area;
- Preparation of a field work plan to be coordinated with the existing trenching programme for onsite use by Agrimin that defines the number of samples to be collected at each trench location including sample collection methods;
- Training of Agrimin personnel on the collection methods and field testing procedures;
- Collection of samples at 0.5 m intervals (where possible) for analysis of pH<sub>F</sub> and pH<sub>FOX</sub> through the profile of each trench (a total of 119 primary samples and 14 QA/QC have been collected) to a total depth of 10 mbgs;
- Submission of up to 10 samples from each encountered lithology for laboratory analysis by a NATA accredited laboratory (ALS) for chromium reducible sulfur (CRS) (67 primary samples and 4 QA/QC), for metals (aluminium, arsenic, chromium, cadmium, copper, iron, lead, mercury, nickel and zinc) (23 primary samples and 3 QA/QC) and for total uranium (17 primary samples and 1 QA/QC), and
- Data interpretation, review of existing hydrogeological data (including groundwater quality) and other support documents and preparation of a preliminary technical report including and assessment of potential ASS risks and recommendations for future site investigation and management requirements.

#### **Results - ASS Occurrence**

Based on soil field pH results (obtained from 119 samples), there were no  $pH_F$  values indicative of actual acid sulfate soil (AASS) and there were no  $pH_{FOX}$  values indicative of potential acid sulfate soil (PASS) from any of the soil samples tested. Based on the laboratory results, no occurrences of AASS were identified within the Project area. Within the majority of the project area there were no occurrences of PASS, with the exception of only two black ooze samples collected from sample locations along the southern edge of lake. The findings are summarised in the table below:



### **ASS** Distribution

Soil Type	Number of samples	Description	Depth (mbgs)	CRS (%S)	Net Acidity (%S)	ASS Classification
Black Ooze	11	Dark brown to black thin layer approximately 5 mm thick.	0 – 0.05	<0.005 to 0.12	<0.02	Majority NASS, with only two samples in the very southern end of lake slightly exceeds assessment criteria for CRS (PASS)
SAND, light brown, brown or grey	20	Light brown, brown, cream or grey evaporitic sand. The sands contain variable gypsum and fine silt content. Typically a thin layer (approximately 8 mm thick) was observed. Sand was typically observed either above (on the ground surface) or below the black ooze layer and typically extended to depths of up to 1 mbgs. However, in three trenches (T11, T12 and T20) cream or grey evaporative sand was also encountered between 2.0 and 6 m, interbedded with orange/ red / brown clays and sandy clays.	0 – 6	<0.05 to 0.005	<0.02	NASS
SILTY to SANDY CLAY Red/ brown or light brown OR SILTY to CLAYEY SANDS, red/brown	17	Red brown or light brown clay with varying sand and silt content or red / brown silty to clayey sands was observed within the majority of trenches, typically underlying the black ooze and extending up to 5 m bgs.	0.05 – 5	<0.005 to 0.006	<0.02	NASS
CLAY, Red ⁄ brown	65	Thick layer of red/brown firm to hard clay. The clay extends to the maximum depth of 10 mbgs across the site. The clay may be interbedded at isolated locations with thin sand layers.	~ 0.3 - 10	<0.005 to 0.016	<0.02	NASS
CLAY, green and SILTY CLAY, green/brown	6	In one trench (T22) a green firm to hard clay was encountered at 4 mbgs and was underlain by a green/brown silty clay. A red/brown/ green firm to hard clay was also observed in Trench 9, PP and 12 (between 2 and 6 m bgl). A green clay (soft to firm) and plastic was also observed at 2 to 2.5 mbgs at trench (T20).	2.0 to 6	<0.005 to 0.006	<0.02	NASS



#### Conclusions and Recommendations

Based on the results presented in this report, 360 Environmental makes the following conclusions:

- Based on soil field pH results, there were no pH<sub>F</sub> values indicative of actual acid sulfate soil (AASS) and there were no pH<sub>FOX</sub> values indicative of potential acid sulfate soil (PASS) from any of the soil samples tested;
- For three black ooze samples, a laboratory pH decrease greater than 3 units (3.1 to 3.4) between pH<sub>F</sub> and pH<sub>Fox</sub> was reported. This indicates that some black ooze samples have acid generating potential (PASS). Sixty percent (60%) of black ooze samples reported a CRS %S above laboratory limits of reporting (LOR). Two of the black ooze samples (T20\_0.03 and PP\_0.02), located on the very southern edge of the lake, indicate that these two samples are PASS with CRS concentrations of 0.062%S and 0.12%S. Given that the majority of the remaining black ooze samples collected from the central sections of the lake recorded pH changes below the criteria, and no other criteria were exceeded, overall the black ooze lithology in the central sections of the lake is determined to be NASS. The western edge of the lake was not sampled during the investigation and it is possible that black ooze may also be PASS along the western fringe of the lake;
- All other soil types reported no laboratory pH changes greater than 3 units, indicative of NASS. The remainder of the samples from all other soil types had a concentration of CRS below the 0.03 %S action criteria, indicating the majority of the soil types were NASS. Further, most other lithologies had a CRS concentration less than LOR with only 23% of red/brown clays reporting a CRS above LOR;
- Net Acidity [minus acid neutralising capacity (ANC)] was <0.02 %S in the majority of analysed soil samples, confirming the majority of soils are non-acid sulfate soils (NASS). Only two black ooze samples in the very southern end of lake reported net acidity minus ANC above assessment criteria, ranging from 0.06 to 0.12 S%;
- In addition, acid neutralising capacity (ANC) across all soil types ranged from 0.04 %S to 3.9 S%. Based on these results, the majority of lithologies encountered are considered to have a low risk of acid generation due to the absence of sulphides and the inherently elevated ANC;
- All heavy metal concentrations for all lithologies were below their relevant Ecological Investigation Levels (EILs), indicating they pose a low risk to the receiving ecological environment;
- The majority of soils samples reported total uranium at less than the laboratory limit of reporting, the only exception was one soil sample from the pilot pond location. All soil samples reported concentrations below the soil standards for the protection of human health from Canada (Nova Scotia). In the absence for EILs for uranium, the soil



standards for the protection of human health from Canada (Nova Scotia) have been adopted;

- Aluminium and iron were detected within all samples with the highest concentrations observed within the SANDY CLAY red/brown, CLAY red brown and CLAY, green lithologies suggesting that there is a potential for aluminium and iron mobilisation into the groundwater from these units under acidic conditions;
- Site specific groundwater information was collected as part of a separate hydrogeological study undertaken as part of the baseline assessment for the Project. High concentrations of chloride, sodium and TDS were observed in all of the groundwater samples which are indicative of a hypersaline lake, and
- The CI:SO<sub>4</sub><sup>2-</sup> ratio of the groundwater was greater than 2 (ranged from 6.4 to 11.6) in all groundwater analysed indicating that there is not likely to be an extra source of sulfate from current or historic sulfate oxidation and leaching into the groundwater system. The concentrations within the groundwater are representative of natural background concentrations within an undisturbed environment.

The following recommendations are made based on the outcome of this preliminary ASS investigation:

- Further sampling and analysis should be undertaken of the black ooze material in the southern and western fridges of the lake where development is potentially going to occur;
- Based on the results of this preliminary investigation, a limited Acid Sulfate Soils Management Plan (ASSMP) may be required only to manage the black ooze material in the southern and western fringes of the lake. However, this will be determined following further sampling and analysis in these areas;
- To establish more detailed baseline conditions of the underlying groundwater, it is recommended that groundwater monitoring for pH, redox, dissolved oxygen, electrical conductivity (EC) is undertaken and future groundwater samples are analysed for:
  - o Total acidity, total alkalinity, pH;
  - Dissolved metals (aluminium, arsenic, chromium, iron, manganese, nickel, selenium, zinc);
  - o Total metals (aluminium, iron);
  - Ammonia, total nitrogen, total phosphorus, filterable reactive phosphorus (FRP), and
  - o TDS (mg/L).



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### 1 Introduction

360 Environmental Pty Ltd (360 Environmental) was commissioned by the Agrimin Limited (Agrimin) to undertake a Preliminary Acid Sulfate Soil Investigation for the Lake Mackay Sulfate of Potash (SOP) Project site. This investigation provides an evaluation of the potential for acid generation due to the disturbance of near surface sediments at the Lake Mackay SOP Project site (Figure 1).

The Mackay SOP Project comprises twelve tenements covering the majority of Lake Mackay for a combined area of approximately 3,013 km<sup>2</sup>. Lake Mackay (the lake, locally known as Wilkinkara) is a seasonally inundated salt lake located in the Great Sandy Desert on the Western Australian (WA) and Northern Territory (NT) border, with most of the lake located in WA. The nearest township is Kiwirrkurra, WA, located approximately 65 km south-west of the lake. The Project covers the majority of Lake Mackay which is hypersaline.

### 1.1 Background

The Project currently has an Indicated Mineral Resource of 4.4 million tonnes and an Inferred Mineral Resource of 18.9 million tonnes of SOP at a potassium concentration of 3,603mg/L of brine. These Mineral Resources have been defined to an average depth of 24.7 m, however, the initial study incorporates brine extraction from only the top 5.5 m of the deposit. This preliminary ASS investigation has examined lake sediments to a depth of 6 m below ground surface (mbgs).

Sediment samples were collected in conjunction with the proposed installation of fourteen (14) x 100 m test trenches and 1 pilot pond [to depths up to 10 m below ground surface (mbgs)] that were installed by Agrimin between 13 August 2017 and 30 October 2017.

#### 1.1.1 Acid sulfate soils in hypersaline environments

Acid sulfate soils (ASS) are the common name given to soils containing iron sulfides or their oxidation products. Upon exposure to air, the iron sulfides (commonly pyrite) oxidise to produce sulfuric acid, iron precipitates and potentially elevated concentrations of elements such as aluminium, iron and arsenic that have the potential to adversely impact upon the environment.

While typically associated with coastal environments, ASS can also develop in hypersaline lakes where the degradation of organic material and abundant sulfate in groundwater becomes reduced in anoxic environments to form sulfide minerals, ranging from acidic monosulfide muds (black oozes) to pyrite. Although the hypersaline environment typically contains a considerable surplus of acid neutralising capacity, because the rates of acid generation and acid neutralisation may differ, development activities such as trenching, excavation and dredging, as well as loading that result in the compaction of saturated soils or sediments, may result in temporary or long-term acid generation. Fluxes in the natural balance between acid generation and neutralisation, may pose a risk to biota associated



with the hypersaline lake system. Intermittent black oozes have previously been encountered within the lake sediments during the exploration activities.

### 1.2 Objectives

This ASS investigation has been undertaken in order to characterise ASS within the onlake environment site in recognition that there is a potential for actual ASS (AASS), potential ASS (PASS) and non-ASS (NASS) to occur at the site.

The objectives of this preliminary acid sulfate soil investigation were as follows:

- Opportunistically collect samples as part of the lake trenching programme to characterise the acid generating and neutralising capacity of the near surface sediments that may be disturbed during development activities;
- To determine (to the extent possible) the areas where ASS exists in the proposed areas of intrusive ground disturbance;
- To obtain sufficient information so that an initial analysis of the risks and consequences associated with the disturbance and exposure of acid generating materials including potential impacts on benthic habitats, water quality and local vegetation, and
- To enable a general understanding of the requirements for suitable management practices to be adopted during site development and operations and identify requirements for further investigations as part of the mining approvals process.

### 1.3 Scope of Works

The following preliminary ASS investigation will be guided by the DWER guideline *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* originally published in 2015 by the former DER (DER, 2015a). Given the Project area is considerably larger than 50 ha, strict adherence to the soil sampling requirements of the Acid Sulfate Soil Guideline Series (2015) has not been undertaken at this preliminary stage of the Project development. This preliminary investigation has been designed to opportunistically collect samples in association with other field programmes, however, the scope of work is considered to provide sufficient data to enable a preliminary evaluation of the potential for acid generation due to the disturbance of near surface sediments at the site.

The following scope of work has been undertaken:

- Project management and organisation of logistics with Agrimin;
- Review of existing geologic, drilling, and hydrogeologic data from the project area;
- Preparation of a field work plan to be coordinated with the existing trenching programme for onsite use by Agrimin that defines the number of samples to be collected at each trench location including sample collection methods;
- Training of Agrimin personnel on the collection methods and field testing procedures;



- Collection of samples at 0.5 m intervals (where possible) for analysis of pH<sub>F</sub> and pH<sub>FOX</sub> through the profile of each trench (a total of 119 samples and 14 QA/QC have been collected to date) to a total depth of 10 mbgs;
- Submission of up to 10 samples from each encountered lithology for laboratory analysis by a NATA accredited laboratory (ALS) for chromium reducible sulfur (CRS) (67 primary samples and 4 QA/QC), for metals (aluminium, arsenic, chromium, cadmium, copper, iron, lead, mercury, nickel and zinc) (23 primary samples and 3 QA/QC) and for total uranium (17 primary samples and 1 QA/QC), and
- Data interpretation, review of existing hydrogeological data (including groundwater quality) and other support documents and preparation of a preliminary technical report (this report) including and assessment of potential ASS risks and recommendations for future site investigation and management requirements.

### 1.4 Regulatory Guidance

Guidance on the assessment and management of ASS is provided in the following documents:

- DWER (former DER), 2015a. Acid Sulfate Soils Guideline Series Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes.
- DWER (former DER), 2015b. Acid Sulfate Soils Guideline Series Treatment and Management of Soil and Water in Acid Sulfate Soils Landscapes.

The Acid Sulfate Soil Guideline Series (2015) provides action criteria based on levels of oxidisable sulfur measured for broad categories of sediment types. Works undertaken in sediments or soils that exceed these action criteria may require the preparation of an acid sulfate soil management plan (ASSMP).



### 2 Proposed Activities

The information in this section has been obtained from the Agrimin Mackay SOP Project Scoping Study (Lycopodium, 2016) and represents a preliminary concept model of the Project that is subject to change based on the results of future findings during the prefeasibility and feasibility stages of the Project. SOP production will involve the pumping of brine from extraction trenches into a series of solar evaporation ponds. Crystallised potassium salts will then be dry harvested and trucked to the process plant for processing into SOP. The SOP products will be transported in bulk by road trains to a rail load-out located in Alice Springs and then railed to a selected port for shipment. The proposed site layout is presented in Figure 2.

### 2.1 Sediment Disturbing Activities

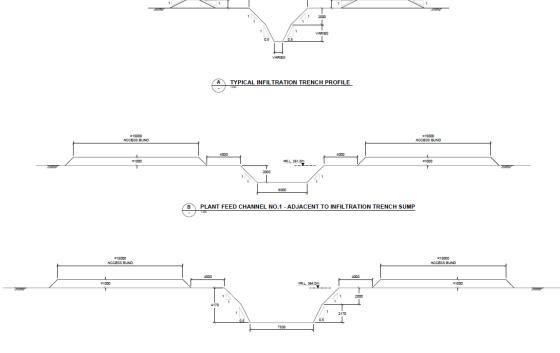
The SOP Project covers the majority of Lake Mackay for a combined area of approximately  $3,013 \text{ km}^2$ .

Based on current information (Knight Piesold 2018), the brine (66.5 GL per year) will be extracted via an approximately 550 km long trench network. The lake sediment will be excavated to construct the trench network and placed alongside the trenches. The trench design based on a depth of 5.5 m is shown in Plate 1. Some excavated sediment will be used for the road bases. The trenches will have an average width of 7 m on surface. However, the total trench disturbance will be between 40 m and 60 m on surface after allowing for the extracted material to be placed along the sides of each trench. This extracted material be formed and compacted to create a 1 m high bund along the sides of each trench.

The trench network will feed into a pond feed channel that will drain to the evaporation ponds. The lake sediments will also need to be excavated to construct the pond feed channels. It is expected that the sediment excavated will be placed alongside the pond feed channels.

The potassium concentration has been estimated at 3,600 mg/L of brine.



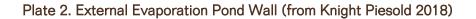


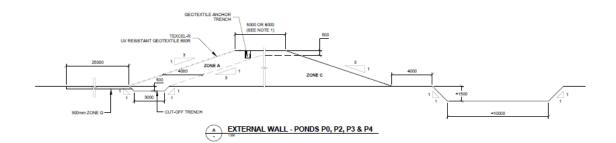
#### Plate 1: Proposed excavation trench (from Knight Piesold 2018)

C PLANT FEED CHANNEL NO.2 - ADJACENT TO POND P0

The brine will be evaporated within a series of evaporation ponds to facilitate the crystallisation of targeted potassium salts. Solar evaporation ponds will be constructed on the western side of Lake Mackay (Figure 2). This will involve the cut-to-fill construction of pond walls on the surface of the lake using the lakebed clay sediments. Therefore, the lake sediments will be excavated to form the ponds. Due to the lake's favourable geotechnical characteristics these ponds can be unlined (Plate 2). The evaporation ponds will cover an initial area of 3,400 ha and will expand to 6,000 ha over a 20-year period (Knight Piesold 2018). This is easily accommodated by Lake Mackay which has a total area of approximately 350,000 ha.

A geotextile liner will used on the external pond walls to protect against erosion.







The process plant will not be constructed on the lakebed. At this stage it is expected that lake sediments will not be disturbed during the construction of the plant. The process plant components are planned to be prefabricated, pre-assembled, standard types of mechanical and electrical equipment, either mobile or fixed (Lycopodium, 2016).

Stockpiled potassium salts from the ponds will be coarsely crushed, screened and fed into a flotation process to separate the bulk of the potassium salts from halite and other minor materials (Lycopodium, 2016). Concentrated potassium salts will then be sent to the SOP crystallisers where process water is added to dissolve excess magnesium sulfate to produce SOP (Lycopodium, 2016). The SOP crystals will be dried, compacted and glazed to meet desired product specifications (Lycopodium, 2016).

In addition, proposed activities that result in the compaction of saturated soils or sediments are also a process that may result in the disturbance of acid sulfate sediments. These may include loading and stockpiling of potassium salts and granular SOP and disposal of process waste to a tailings stack.

Sediment disturbance may also be required for the construction of site infrastructure including a tailings stack and a site access road from the process plant to the evaporation ponds.

### 2.2 Groundwater Extraction

The brine (hypersaline groundwater) will be extracted via an approximately 540 km long trench network. It is expected that 66.5 GL of hypersaline groundwater will be extracted per year. The radius of drawdown from the proposed extraction has not yet been determined. However, possible acid sulfate sediments within the cone of depression from the proposed extraction could be disturbed from the lowering of the water table.

It is estimated that 2.3 GL of fresh water per year will be required to operate the process plant and other uses for the Project. This groundwater is proposed to be extracted from a borefield located approximately 15 km south of the proposed plant site (Lycopodium, 2016). The proposed borefield is approximately 14 km south of the lakebed. Based on this distance, the likely radius of drawn down of the groundwater table from the extraction of water will not impact on Lake Mackay sediments.



### 3 Environmental Setting

### 3.1 Geology

Based on the Regolith of Western Australia (500 m grid) (GeoView online map), regionally the surface geology of the site is described as Lacustrine deposits, including lake, playa (temporary lake) and fringing dunes. Lacustrine deposits typically comprise mud, silt, evaporate, limestone and minor sand (Quaternary in age). Based on the 1:250,000 Geological Series Sheet (1976) Sheet SF 52-10, other geological units that occur in association with Lake Mackay include:

- Halite, gypsum, sand, silt, clay evaporitic and lacustrine, and
- Sand, halite, gypsum, calcrete aeolian and minor evaporitic.

In the area adjacent to Lake Mackay, aeolian deposits, comprising sand and clayey sand are present as longitudinal dunes. Sand plain deposits (quaternary in age) also occur within the extent of Lake Mackay (Lycopodium, 2016). Extensive tracts of calcrete comprising massive, nodular and cavernous sandy limestone of tertiary age occur adjacent to Lake Mackay where they formed as paleodrainage valley infill deposits. Quaternary aeolian deposits often overlie the calcrete deposits (Lycopodium 2016).

The stratigraphy of Lake Mackay sediments comprises a coarse grained upper gypsum sand unit, predominately present in the eastern areas of the Lake to depths up to 1 mbgs. This unit has interbedded silt layers and grades downwards into sandy clay. Beneath this unit, red clay extends to underlying bedrock. The lake depth is approximately 16 m in the west of the lake and deepening to over 30 m on the northern territory border (Lycopodium, 2016).

### 3.2 Site specific lithology

A search of the DWER Water Information Reporting database in September 2017 identified 3 groundwater bores within the site that were drilled by Agrimin. Based on the drill logs that were available for these 3 groundwater bores, the site specific lithology can be summarised as follows:

- Brown clay or coarse gypsum sand 0 mbgs to 0.6 mbgs;
- Red brown to brown clay to sandy clay 0.6 mbgs to up to 2.7 mbgs;
- Fine cemented gypsum sand 1.8 mbgs to up to 3 mbgs;
- Red brown to brown clay with traces of gypsum 2.2 mbgs to 16 mbgs;
- Coarse crystalline gypsum 15 mbgs to 16.7 mbgs, and
- Red brown clay with traces of gypsum 16.5 mbgs to 30 mbgs.

Similar lithology was encountered during this ASS trench sampling investigation, namely:



- A surficial salt crust (in trenches T2, T6, T8, T14, T15, T16 and T21) and/or brown evaporative/gypsum sand (in trenches T6, T7, T8, T11 and PP), overlying a black ooze lithology in the majority of the trenches (T2, T5, T7, T12, T20, T21, T22 T14, T15, T16, T2, T22 and PP) to a depth of up to 0.05 mbgs, underlain by light brown, brown or grey evaporative sand (T11, T12, T15, T16, T20 and T22) at some locations, up to a depth of 1 mbgs;
- This is further underlain by red brown or light brown silty to sandy clay with varying sand and silt content OR red / brown silty to clayey sands. In the majority of trenches this lithology was immediately below the black ooze lithology and extended up to 5 mbgs;
- This is further underlain by brown or red clays to a depth up to 10 mbgs. In some locations (T6, T9, PP), the brown, red clays were encountered directly beneath the surface sands or black ooze;
- In three trenches (T11, T12 and T20) cream or grey evaporative sand was also encountered between 2.0 mbgs and 6 mbgs, interbedded with orange/ red / brown clays and sandy clays, and
- In one trench (T22) a green firm to hard clay was encountered between 3.5 mbgs and 4.5 mbgs and was underlain by a green/brown silty clay to 6 mbgs. A red/brown/ green clay was also observed in Trench 9, PP and trench 12 (between 2 and 6 m bgl). A green clay (soft to firm) and plastic was also observed at 2 mbgs to 2.5 mbgs at trench (T20).

### 3.3 ASS Risk Mapping

The Australian National Acid Sulfate Soil Risk Map (ASRIS online map) indicates that Lake Mackay sediments have a high probability/low confidence of the presence of potential acid sulfate soils.

### 3.4 Topography and Hydrology

The site is located within the Mackay basin, specifically within Lake Mackay. Lake Mackay is an ephemeral hypersaline lake. The Lake Mackay lakebed covers an area of approximately 3,325 km<sup>2</sup> and measures approximately 100 km east to west and 100 km north to south. Lake McKay is the low point of the enormous groundwater and surface water catchment area that is approximately 87,000 km<sup>2</sup>. The elevation of Lake Mackay ranges between 355 m and 370 m Australian Height Datum (AHD).

The catchment area extends mainly to the east of the lake through the valley between McDonnel Range and the range to the south (Lycopodium, 2016). This is the contributing catchment for the groundwater paleochannel system and for surface water runoff in times of abnormally heavy flows that generate significant surface flow. The catchment area excluding such abnormal rainfall periods is probably closer to approximately half this size (Lycopodium, 2016).



There is also an extensive system of paleovalleys and paleochannels. These originate in the Northern Territory and extend west to the valley between the ranges to Lake Mackay, which is the discharge point for water in the paleochannels (Lycopodium, 2016).

Lake Mackay undergoes some inundation during the wet season (December to March), with water entering the lake along a series of channels (Lycopodium, 2016).

### 3.5 Hydrogeology

A search of the DWER Water Information Reporting database in September 2017 identified 3 groundwater bores within the site (Appendix A) consisting of three groundwater bores drilled by Agrimin. The status and use of the bores were not specified.

There were no groundwater bores within a 1 km radius, surrounding the site. Based on this review, no current use of groundwater within a 1 km radius of the site can be identified.

The site is within the lakebed of Lake Mackay. Lake Mackay is the low point of the enormous groundwater and surface water catchment area. The water table underlying the lakebed is typically encountered at around 0.4 mbgs at most points around the lake. However, Lake Mackay undergoes some inundation during the wet season (December to March) (Lycopodium, 2016).

Regional groundwater flows predominantly from an easterly direction towards Lake McKay. Groundwater flows through the extensive system of palaeovalleys and palaeochannels originating in the Northern Territory and intersecting the lake in the east and along the southern boundary. Lake Mackay is the discharge point for groundwater and surface water in the paleochannels (Lycopodium, 2016). There is also possible upward groundwater migration from the basement beneath the salt lake (Lycopodium, 2016).

An investigation was undertaken by Geosciences Australia of the Wilkinkarra palaeovalley system, which is located east of Lake Mackay (Lycopodium, 2016). They concluded that the palaeovalley system ends in Lake Mackay. The investigation identified that the palaeovalley comprised an upper layer of calcrete and underlying units of sandy sediments with internal clay units all overlying weathered basement of the Arunta Region and Ngalia Basin. The groundwater flow within the channel is towards Lake Mackay (Lycopodium, 2016).

The groundwater underlying the site is considered to be hypersaline. No information is available on the quality (total dissolved solids) of the underlying groundwater.

### 3.6 Surrounding Land uses

The site is very remote. The closest town is Kiwirrkurra community located approximately 65 km south west of the Project.

### 3.7 Environmentally Sensitive Receptors

The nearest sensitive receptor is Lake Mackay and adjacent swamps and pans. The site is within the lakebed of Lake Mackay. Lake Mackay is an ephemeral hypersaline lake which



can support significant populations of water birds and other salt lake fauna such as crustaceans during periods of inundation.

360 Environmental conducted a waterbird survey across the lake and local environs (flooded claypans and freshwater lakes) in April 2017 and a single phase Level 2 fauna survey (largely off-lake as well as targeting selected on-lake islands) in May 2017 for the Lake Mackay SOP Project for Agrimin. A total of 21 conservation significant species (including Priority species) were identified during the desktop review of database searches. These comprised one reptile species, 16 bird species from 11 families, and three mammal species from two families (360 Environmental (a), 2017).

Five conservation significant species in total were recorded during the 10-day field survey – the Fork-tailed Swift (*Apus pacificus*), Australian Painted Snipe (*Rostratula australis*), Sharp-tailed Sandpiper (*Calidris acuminata*), Common Greenshank (*Tringa nebularia*) and Red-necked Stint (*Calidris ruficollis*). All species, except for the Fork-tailed Swift, were recorded during the waterbird survey (360 Environmental (b), 2017).

These migratory shorebirds (and other waterbirds) will likely utilise the Survey Area sporadically and are unlikely to depend exclusively on the foraging habitat present. This habitat is also widespread and common in the overall vicinity of the Survey Area and, importantly, is also more broadly represented around the lake and across the region. It should also be noted that these migratory birds are likely to only visit the lake and its claypans when episodically significant rainfall events occur and fill these waterbodies (360 Environmental (a), 2017).

360 Environmental also conducted a Detailed Flora and Vegetation Assessment for the Lake Mackay SOP Project for Agrimin in April 2017. No Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or gazetted as Threatened pursuant to the *Wildlife Conservation Act 1950* were recorded during the recent flora and vegetation survey (360 Environmental (c), 2017).

A review of the Department of Department of Biodiversity Conservation and Attractions (DBCA), formerly Department of Parks and Wildlife (DPaW), threatened flora database and EPBC Protected Matters Search Tool (PMST) did not identify any Threatened/EPBC listed species, however, ten taxa listed as Priority flora were identified as potentially occurring in the survey area (360 Environmental, 2017). Of these ten conservation significant flora, four are considered Likely to occur – Goodenia virgata (P2) (recorded during the survey), *Thysanotus sp.* Desert East of Newman (P2), *Dampiera atriplicina* (P3) and Goodenia modesta (P3) (recorded during the survey).

Three Priority listed flora were recorded during the survey comprising one Priority 1 taxon (*Tecticornia globulifera*), one Priority 2 taxon (*Goodenia virgata*) and one Priority 3 taxon (*Goodenia modesta*) (360 environmental (c), 2017).



### 3.8 Potential Environmental Impacts

Disturbance of potential acid sulfate sediments (PASS) may potentially result in the oxidisation of sulfides and the generation of acidity. The major environmental impacts commonly associated with the acidification of acid sulfate sediments, either through dredging, excavation, dewatering or surcharging, include the release of acidity into water that in turn mobilises heavy metals such as aluminium, arsenic, manganese, iron, and zinc from within the sediment into the groundwater.



### 4 Sampling and Analysis Plan

### 4.1 Sediment Sampling Locations

Sediment samples were opportunistically collected as part of the lake trenching programme. Sediment samples have been collected during the excavation of 14 trenches of 100 m in length and 1 pilot pond (PP) to a depth of up to 10 m depth by Agrimin in August, September and October 2017.

In accordance with the *Acid Sulfate Soil Guideline Series* (2015) and given the Project area is considerably larger than 50 ha, the final sampling regime (if required) will need to be considered by the DWER on a project specific basis. The proposed methodology aims to provide a preliminary characterisation of the acid generating potential and neutralising capacity of near surface sediments that will be disturbed during development works.

The trench sample locations are shown in Figure 3 and further details are provided in Table A.

The general sampling requirement was the collection of field samples at 0.5 m intervals down the soil profile to a depth of 6 mbgs for the majority of trenches. In one trench (T12), samples were collected to a depth of 10 mbgs. In some trenches, water filled the trench at 0.33 mbgs to 1 mbgs and samples were unable to be collected from deeper depths.

Trench	Trench Coordinates <sup>1</sup>	GDA94 Z 52	Max D Sample Method	Max Depth of Sampling
Number	Easting	Northing		mbgs
2	460022	7512116	Trench sampling	0.5
5	479981	7508068	Trench sampling	0.33
6	482030	7494097	Trench sampling	4
7	484981	7511898	Trench sampling	5
8	490922	7507101	Trench sampling	4.5
9	491044	7519229	Trench sampling	6
11	495975	7518101	Trench sampling	6
12	499728	7513973	Trench sampling	10
14	452555	7515036	Trench sampling	1
15	485924	7491739	Trench sampling	0.5
16	452706	7505167	Trench sampling	1

Table A. Trench Location and Sediment Sample Details



Trench	GDA94 Z 52	Comple Method	Max Depth of Sampling	
Number	Easting	Northing	Sample Method	mbgs
20	485923	7491845	Trench sampling	6
21	474098	7504090	Trench sampling	5.5
22	495997	7513449	Trench sampling	6
PP	464400	7495221	Trench sampling	6

1. Coordinate estimated based on field GPS unless otherwise noted

### 4.2 Sediment Sampling Methodology

ASS sediment field investigations were undertaken over four sampling periods by Agrimin's Sustainability Manager and/or Hydrogeologist, namely:

- 13 August 2017 to 17 August 2017:
- 13 September to 14 September 2017;
- 27 September 2017, and
- 26 October to 30 October 2017.

A field work plan was provided by 360 Environmental to the Agrimin Sustainability Manager that defined the number of samples to be collected at each trench location including sample collection methods. Training of Agrimin personnel on the collection methods and field testing procedures was also undertaken by 360 Environmental.

Trenches were excavated at 15 locations (including the pilot pond) using an excavator. The general sampling requirement was the collection of 12 primary field samples and 1 duplicate sample per trench investigation down the soil profile to a depth of 6 mbgs (or as deep as the trench could be excavated). Sediment samples were collected at 0.5 m intervals, or at smaller intervals where variation in lithology or specific lithologies (such as black ooze, gypsum, yellow/ green clay) were observed.

Sediment sampling was undertaken partially in accordance with the Soil Characterisation Sampling and Analysis Plan (SAP) - Lake Mackay SOP (Appendix B). Any deviation from the SAP are described in the methodology outlined below:

- An excavator was used to dig the trenches and remove the sediment;
- Sediment was removed at regular 0.5 m intervals for sediment sample analysis (where possible);
- At each 0.5 m interval, a full bucket load of material was recovered from the trench (where possible);
- Each bucket load was placed on the lake surface alongside the trench in as compact a heap as possible;



- A compact heap was required to preserve the integrity of the material for sediment sampling. In some cases a sediment sample was unable to be taken straight away and it was a few days before the sample could be retrieved. By maintaining a compact heap of material for sampling it was expected that the material towards the centre of the heap would be less compromised by oxygen ingress over a period of time and, therefore, still provided material of reasonable integrity for sampling when the opportunity arose;
- The material recovered for sampling was placed alongside the trench in order of depth, starting with the 0.5 m interval closest to the trench and placing subsequent material next to, but progressively further away from, the trench (i.e. 6.0 m sample was located furthest from the trench);
- Samples were collected using fresh, unused disposable gloves directly from alongside the trench, and
- Where a trench did not obtain its full (6.0 m) depth, or was abandoned, sample material was still recovered at 0.5 m intervals to the maximum trench depth that could be achieved.

Field samples were collected as per Table B. Laboratory sampling methods are detailed in Table C. Soil field testing (soil pH<sub>F</sub> and pH<sub>FOX</sub> testing) was undertaken in accordance with 360 Environmental Technical Standard Operating Procedures (TSOP) *AS2 - Acid Sulfate Soil Sampling* (Appendix B). Decontamination and Instrument Calibration was undertaken in accordance with 360 Environmental TSOP E2 –Decontamination and TSOP E-1 Instrument Calibration (Appendix B).

SAMPLING COMPONENT	REQUIREMENT
Sample Logging	The lithology of the trenches was logged as per Agrimin's standards
Sample Volume	1x 400 ml bag (in laboratory supplied soil bags)
Sample Labelling	All samples bags were labelled with the following information: Sample ID : Sample Location_depth (e.g. T21_0.5) Sample Date and Time: DD/MM/YYY HH:MM Sampler Name 360 Project Number: 2225
Sample Location	The geographic location of the sample was be recorded using handheld GPS or equivalent
Sample Storage	Samples were collected and stored in plastic bags and excess air removed prior to sealing.
Sample Preservation	Samples were preserved on ice in the field and in transit back to the site camp adjacent to Lake Mackay where they were then either analysed immediately or stored frozen for later analysis. If possible, all pH <sub>F</sub> and pH <sub>Fox</sub> field testing was carried out on samples stored at the camp within 24 hours of acquiring the samples. Frozen samples were transferred from the site camp to Alice Springs by plane in a sealed esky. In Alice Springs, the samples were immediately transferred to a freezer for storage. Frozen samples were then transported by plane from Alice Springs to Perth in a sealed esky where they were then transferred to a freezer prior to delivery to the laboratory. While every attempt was made to maintain the integrity of the samples, the remote location of the lake meant that transferring the samples over

#### Table B: Field Sampling Requirements



SAMPLING COMPONENT	REQUIREMENT
	considerable distances prior to field and, particularly, laboratory analysis was unavoidable which, in turn, may have impacted sample results. The implications of the incorrect preservation are discussed in Section 5.
Field Documentation	F1 Project Field Log AS1 Soil pH <sub>F</sub> and pH <sub>FOX</sub> Testing
QA/QC	1:20 blind duplicate samples were collected Samples were sent to laboratory using the provided Chain of Custody (COC) form provided by 360 Environmental

#### Table C: Laboratory Sampling Requirements

SAMPLING COMPONENT	REQUIREMENT
Sample Volume	1x 400ml bag
Sample Preservation	Samples were chilled with ice in the field and then frozen on site back at camp. Samples were transferred frozen in a sealed esky to Alice Springs where they were once again stored in a freezer prior to transfer to Perth. Samples were transferred to Perth frozen in a sealed esky and stored in a freezer for delivery to the laboratory.
Laboratory	Samples were sent to the following Laboratory under appropriate COC. <b>Eurofins/MGT</b> Unit 2, 91 Leach Hwy, WA 6105, Kewdale

Agrimin personnel collected primary sediment samples at least every 0.5 m intervals through the profile of each trench and logged the sediment lithology noting any observations indicative of ASS, such as black organic matter, water level, moisture content any other diagnostic features. Trench completion reports describing the lithology at each trench locations are presented in Appendix C.

Photographs showing the typical sediment profile at the site are provided in Appendix D.

Samples were chilled and sent under chain of custody to Nation Association of Testing Authorities (NATA) accredited laboratory Eurofins MGT for analysis.

### 4.3 Sediment pH<sub>F</sub> and pH<sub>FOX</sub>

Sediment field testing (soil pH<sub>F</sub> and pH<sub>FOX</sub> testing) was undertaken in accordance with 360 Environmental Technical Standard Operating Procedures (TSOP) AS2 - Acid Sulfate Soil Sampling (Appendix B) for trenches T2, T5, T7, T8, T14, T15, T16, T21 and T22. All primary and duplicate samples (total of 59 primary and 9 duplicates) were tested in the field for soil pH<sub>F</sub> and pH<sub>FOX</sub>. Samples were typically collected from at least 0.5 m intervals down the soil profile to a depth of up to 6 mbgs (or as deep as the trench could be excavated).

For these trenches (T2, T5, T7, T8, T14, T15, T16, T21 and T22), 36 select samples (also selected for Chromium Reducible Sulfur) were retested by the laboratory for  $pH_F$  and  $pH_{FOX}$  to assess the integrity of the handling and transport method.

For all remaining trenches and pilot pond, the sediment samples were analysed at NATA accredited laboratory (Eurofins MGT) for  $pH_F$  and  $pH_{FOX}$ . Samples were typically collected from at least 0.5 m intervals down the soil profile to a depth of up to 6 mbgs (or as deep as the trench could be excavated). A total of 95 primary and 5 duplicates (QA/QC) were analysed at NATA accredited laboratory (Eurofins MGT) for  $pH_F$  and  $pH_{FOX}$ .



In total, (both in the field and the lab), 119 primary samples and 14 QA/QC have been tested for sediment  $pH_{\rm F}$  and  $pH_{\rm FOX}.$ 

### 4.4 Sediment Laboratory Analysis

A total of 67 primary and 4 duplicates (QA/QC) were analysed at NATA accredited laboratory (Eurofins MGT) for Chromium Reducible Sulfur (CRS). CRS analysis was undertaken from each lithology encountered to determine total sulfur concentration, net acidity, and acid neutralising capacity (ANC). This was undertaken by Eurofins MGT. Samples were chosen for analysis in accordance with the DWER protocol based on field assessment criteria as detailed in Table E along with field observations. The laboratory soil samples were selected based on the highest risk sample (based on the field  $pH_F$  and  $pH_{FOX}$  tests) from each lithological unit in each sediment profile.

In addition, analysis for metals (aluminium, arsenic, chromium, cadmium, copper, iron, lead, mercury, nickel and zinc) was undertaken on 23 primary samples and 3 duplicate QA/QC from a range of identified lithologies encountered from the trenches. Analysis for total uranium was also undertaken on 17 primary samples and 1 duplicate QA/QC.

### 4.5 Temporary Groundwater Monitoring Wells

Thirty seven temporary groundwater monitoring wells were installed within the site between August and November 2017 under the supervision of Agrimin's Hydrogeologist as part of an associated hydrogeological study.

Monitoring piezometers were installed using a 150 mm wide auger attachment on the arm of the excavator. The resulting hole was filled with 50 mm OD PVC, slotted (1mm slot size) and blank 50 mm casing. The annulus is then filled with a 1,8 - 2.4 mm graded silica gravel pack to surface. All piezometers have bottom and top end caps.

Temporary monitoring well locations are presented in Figure 4 and summarised in Table D.



#### Coordinates GDA94 Z 52 Bore Hole Base Screened Interval Top of Casing below top of Easting Northing mbgs m (above ground) casing (TOC) T2 20mN 460022 7512136 4.08 Not provided 0.45 T2 50mN 460022 7512167 4.17 Not provided 0.35 T2 20mW 459997 7512072 4.31 Not provided 0.38 7512073 T2 50mW 4.07 Not provided 0.28 459966 T5 20mN 479984 7508098 Not provided 4.5 0.5 T5 50mN 479984 7508123 4.63 Not provided 0.57 T5 20mE 480009 7508031 4.8 Not provided 0.47 T5 50mE 480034 7508034 4.82 Not provided 0.44 T5 100mE 480084 7508035 4.67 0.46 Not provided Not provided 0.5 5.02 T6 20mN 482030 7494117 5.08 Not provided 0.5 T6 50mN 482033 7494146 5.02 T6 20mE 482052 7494052 Not provided 0.5 0.5 5.02 Not provided T6 50mE 482086 7494053 5.05 Not provided 0.5 T6 100mE 482134 7494049 4.82 Not provided 0.5 T6 20mW 7494051 482005 T8 20mN 490924 7507408 4.89 Not provided 0.5 T8 50mN 490925 7507438 4.89 Not provided 0.5 7507340 T8 20mE 4.77 Not provided 490955 0.5 4.58 T8 50mE 490986 7507346 Not provided 0.5 T8 100mE 491029 7507352 4.96 Not provided 0.5 T9 20mN 491048 Not provided 7519251 \_ -Not provided \_ \_ T9 50mN 7519280 491058 Not provided T9 20mE 491058 7519181 --Not provided T9 50mE 491087 7519177 \_ \_ T9 100mE Not provided 491134 7519167 \_ -T11 20mN \_ Not provided \_ 495972 7518121 Not provided T11 50mN 495967 7518149 \_ -Not provided \_ \_ T11 20mE 496007 7518057 Not provided T11 50mE 496036 7518062 --Not provided T11 100mE 496083 7518074 --T11 20mS 495995 7517978 Not provided -Not provided T11 50mS 495999 7517951 --Not provided T11 20mW 495962 7518042 \_ -Not provided T11 50mW 495936 7518038 --T11 100mW \_ Not provided 495896 7518027 T12 20mW 499696 7514011 1.5 0.5-1.5 0.5 T12 30mW 499689 7514010 1.5 0.5-1.5 0.5 T14 20mN 452557 7515052 4.5 0.5-4.5 0.5 452553 3.32 0.5-3.3 T14 50mN 7515081 0.58 T14 20mE 452590 7514995 3.68 0.5-3.6 0.52 T14 50mE 452619 7515001 4.24 0.5-4.2 0.6 T14 100mE 452670 7515012 3.6 0.5-3.6 0.52 T14 20mS 452580 7514905 3.7 0.5-3.7 0.4 T14 50mS 0.42 452586 7514876 3.74 0.5-3.7 0.43 T14 20mW 452545 7514968 3.7 0.4-3.7 T14 50mW 452513 7514964 3.03 0.5-3 0.41 T 16 20mN 452707 7505182 2.68 Not provided 0.4

#### Table D. Temporary Monitoring Wells



	Coordinates	GDA94 Z 52	Bore Hole Base	Screened Interval	Top of Casing
ID	Easting	Northing	mbgs	m below top of casing (TOC)	m (above ground )
T16 50mN	452706	7505215	2.4	Not provided	0.4
T16 20mE	452733	7505116	2.7	Not provided	0.39
T16 50mE	452762	7505115	3.18	Not provided	0.35
T16 100mE	452813	7505117	2.08	Not provided	0.55
T16 20mS	452709	7505043	3.5	Not provided	0.5
T16 50mS	452711	7505013	2.26	Not provided	0.45
T16 20mW	452682	7505118	2.39	Not provided	0.45
T16 50mW	452653	7505118	2.49	Not provided	0.37
T16 100mW	452604	7505119	2.66	Not provided	0.43
T20 20mN	485925	7491866	5.04	Not provided	0.5
T20 50mN	485922	7491898	5.05	Not provided	0.5
T20 20mE	485945	7491801	5.04	Not provided	0.5
T20 50mE	485974	7491800	4.96	Not provided	0.5
T20 100mE	486028	7491809	4.86	Not provided	0.5
T20 20mW	485898	7491813	4.96	Not provided	0.5
T20 50mW	485873	7491813	4.83	Not provided	0.5
T21 20mE	474048	7505047	-	Not provided	-
T21 50mE	474147	7505043	-	Not provided	-
T21 20mS	474098	7504965	-	Not provided	-
T21 50mS	474098	7504937	-	Not provided	-
T21 20mW	474071	7504965	-	Not provided	-
T21 50mW	474043	7504937	-	Not provided	-
T22 20mN	495958	7513457	1.5	0.5-1.5	0.5
T22 50mN	495952	7513489	1.5	0.5-1.5	0.5
T22 20mE	496018	7513455	4.3	0.5-4.3	0.5
T22 50mE	496048	7513455	3.8	0.5-3.8	0.5
T22 100mE	496098	7513455	4	0.5-4	0.5
PP1	464400	7495221	-	Not provided	-
PP2	464470	7495402	-	Not provided	-
PP3	464544	7495588	-	Not provided	-

### 4.6 Groundwater Laboratory Analysis

Groundwater analytical data was provided by Agrimin from associated hydrogeological studies undertaken by Agrimin. Groundwater samples were analysed at Intertek Genalysis for:

- Calcium (Ca), chlorine (Cl), potassium (K), magnesium (Mg), sodium (Na), sulfur (S), sulfate (SO<sub>4</sub>);
- Specific gravity, and
- Total Dissolved Solids (TDS).



### 4.7 Quality Assurance and Quality Control (Sediment)

Field and laboratory quality assurance/quality control (QA/QC) measures are presented in Section 4.2 and evaluation of QA/QC data is presented in Section 5.

### 4.8 Assessment Criteria

ASS Assessment criteria are detailed in Table E.

Table E.	ASS As	sessment	Criteria
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Criteria	Source	Description, Use and Application
Field Assessment Criteria	DER (2015a)	<ul> <li>The presence of AASS or PASS are generally indicated as follows:</li> <li>pH<sub>F</sub> &lt; 4 is indicative of AASS;</li> <li>pH<sub>F</sub> of 4 to 5.5 is an acid soil and may be indicative of an AASS presence;</li> <li>pH<sub>FOX</sub> &lt; 3 combined with a significant reaction is indicative of PASS, and</li> <li>A large pH<sub>F</sub> to pH<sub>FOX</sub> drop (i.e. &gt; 3) is indicative of PASS.</li> <li>Other indicators such as presence/absence of organic matter, fill, jarosite, etc., are used to aid in the interpretation of field results.</li> </ul>
Action Criteria	DER (2015a)	For disturbances of >1000 tonnes a net acidity action criterion of 0.03 %S is applicable.

Samples analysed for heavy metals are assessed against Ecological Investigation Levels (EILs) for Urban residential / Public Open Space (Table F). Under the NEPM land classification system, EILs for Public Open Spaces are the most relevant to an undisturbed remote location such as Lake MacKay. It is noted that these criteria were derived under neutral soil conditions and metals present in concentrations less than the EIL may pose a greater risk to the environment under highly acidic conditions.

Table F.	Heavy	Metals	Assessment	Criteria
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Beneficial Use/ Environmental Value	Criteria	Description, Use, Application
Ecological (Urban residential/public open space) (NEPM 2013)		Values developed for a broad range of metals and organic substances. EILs depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil.



### 5 Data Useability and Validity Assessment (Sediment Sampling)

Prior to data interpretation, the field and analytical results and QC data were evaluated for accuracy, precision and representativeness of the data and compiled into a QA/QC report (Table 3) to evaluate the suitability of the data for assessment purposes and identify any bias that may exist within the data set. Laboratory certificates are included in Appendix E.

### 5.1 Field QA/QC

Table G summarises the compliance with the field QA/QC procedures.

Field QA/QC	Component	Compliant	Reference
Calibration	Field equipment requiring calibration was calibrated prior to sampling and complied with calibration checks.	Yes	Appendix F
	Soil samples were collected in accordance with required sampling procedures	Υ	Appendix B
Sample Collection	Standardised field documentation (trench completion reports) used to record field activities. Trench completion reports were completed for each trench location.	Y	Appendix C
Collection	Laboratory prepared sample bags and bottles used for sample collection	Y	Appendix E
	Decontamination of sample equipment undertaken between samples	Y	Appendix B
Sample Handling and Transit	Samples were chilled with ice in the field and then frozen on site back at camp. Samples were transferred frozen in a sealed esky to Alice Springs where they were once again stored in a freezer prior to transfer to Perth. Samples were transferred to Perth frozen in a sealed esky and stored in a freezer for delivery to the laboratory. While every attempt was made to maintain the integrity of the samples, the remote location of the lake meant that transferring the samples over considerable distances prior to field and, particularly, laboratory analysis was unavoidable which, in turn, may have impacted sample results.	Y	Appendix E
	Samples appropriately handled between field and laboratory	Y	Appendix E
	Samples transported under chain of custody	Y	Appendix E
	Samples received in good condition at the laboratory	Y	Appendix E

Table G. Soil Field QA/QC Compliance

Table H summarises the number and frequency of field QC samples and compliance with QC sample frequency and typical data quality indicator (DQI) assessment criteria. Where LORs differ between the primary and secondary laboratories, the RPD was only calculated where both results exceed the largest LOR.



	QC Sample Type	Primary Sample	% of Primary Samples	No. of QC Samples Acceptable?	QC DQI	DQI Non-Compliances	
	Duplicate	T2_0 (lab test)	6%	Yes	RPD >30%	Aluminium 46%, Chromium 32%, Copper 32%, Iron 64%.	
	Duplicate	T5_0.05 (lab test)	6%	Yes	RPD >30%	Aluminium 76%, Iron 47%, 33% CRS and ANC 67%	
	Duplicate	T8_0.03 (lab test)	6%	Yes	RPD >30%	ANC 33%	
[	Duplicate	T12_0.5 (lab test)	6%	Yes	RPD >30%	ANC 113%	

#### Table H. Soil Field QA/QC Sample Compliance

### 5.2 Laboratory QA/QC

Outcomes of the laboratory QA/QC data validation assessment are summarised below in Table I. DQIs for the laboratory QA/QC components are defined within the laboratory certificate of analysis provided in Appendix E.

#### Table I. Laboratory QA/QC Summary

QA/QC	Compliant ? (Y/N)	QC Non-Compliances	
Analytes Holding Times / Sample Preservation	Ν	All the metals analyses were performed within holding times. However, pHF and pHFOX testing could not occur within 24 hours of collection. Samples were chilled with ice in the field and then frozen on site back at camp. Samples were transferred frozen in a sealed esky to Alice Springs where they were once again stored in a freezer prior to transfer to Perth. Samples were transferred to Perth frozen in a sealed esky and stored in a freezer for delivery to the laboratory. While every attempt was made to maintain the integrity of the samples, the remote location of the lake meant that transferring the samples over considerable distances prior to field and, particularly, laboratory analysis was unavoidable which, in turn, may have impacted sample results. Prior to analysis (for sediment samples from the final sampling round, 26 to 30 October 17), the previously dried samples used for CRS suite analysis still contained moisture and were not frozen. This meant the samples were inappropriately preserved for the Chromium Reducible Sulfur Suite analysis. Due to the inappropriate preservation of the samples, the Chromium Reducible Sulfur Suite results for report number 573748 are not NATA accredited.	
Limits of Reporting (LORs) acceptable	Y	LORs were acceptable.	
Laboratory Duplicates	Ν	Sufficient laboratory duplicate samples were analysed for all COPCs. All laboratory duplicate samples were within the specified range.	
Laboratory Surrogates	Y	All surrogate samples for soil were within the acceptable range as specified by the laboratory.	
Laboratory Matrix Spikes	Ν	All matrix spike samples for soil were within the acceptable range as specified by the laboratory with the exception of one sample. Soil sample Q08 on report number 560004-S,	
Laboratory Method Blanks	Υ	All samples for soil and water were below acceptance limits (set at LOR).	
Laboratory Control Samples	Υ	All laboratory control samples for soil and water were within the acceptable range as specified by the laboratory.	



### 5.3 Data Usability

In evaluating the data quality, it was identified that there were field and laboratory QA/QC DQI non-compliances associated with the analytical results for soils and groundwater as noted in Tables G, H and I. All soil vapour QC data were compliant with the nominated DQIs.

In consideration of the outcomes of the QA/QC evaluation for the non-compliances presented below, the reported non-compliances are not considered to materially impact on the interpretation and use of the data at this stage of the investigation. Where potential bias has been introduced as a result of the QA/QC evaluation, the higher concentration data has conservatively been adopted for use at this stage of the investigation.

#### 5.3.1 Field QA/QC

#### 5.3.1.1 RPDs

It was identified that there were three primary samples where the field QA/QC had noncompliances with the RPD of field duplicate:

- T2-0 and the duplicate (QC1) reported RPDs above the DQI for aluminium (46%), chromium (32%), copper (32%) and iron (64%). For chromium and copper the RPDs were only slightly above the acceptable criterion of 30%. Both the primary and duplicate samples had low level concentrations (less than 10 times the LOR), whereby small variations in concentration results in large RPD values, and are therefore considered to be insignificant. The exceedances for aluminium and iron are most likely due to the heterogeneous nature of sediments. The highest concentration (the primary sample) has been used in this investigation as a conservative approach;
- T5-0.05 and the duplicate (QC2) reported RPDs above the DQI for aluminium (76%), iron (47%), CRS (33%) and ANC (67%). For CRS and ANC both the primary and duplicate samples had low level concentrations (less than 10 times the LOR), whereby small variations in concentration results in large RPD values, and are therefore considered to be insignificant. The exceedances for aluminium and iron are most likely due to the heterogeneous nature of soil. The highest concentration (the duplicate sample) has been considered in this investigation as a conservative approach;
- T8-0.05 and the duplicate (QC1) reported RPD above the DQI for ANC (33%). For ANC the RPD was only slightly above the acceptable criterion of 30%. Both the primary and duplicate samples had low level concentrations (less than 10 times the LOR), whereby small variations in concentration results in large RPD values, and are therefore considered to be insignificant, and
- T12-0.5 and the duplicate (QC1) reported RPDs above the DQI for ANC (110%). The exceedances for ANC are most likely due to the heterogeneous nature of soil. The lowest concentration (the duplicate sample) has been considered in this investigation as a conservative approach.



#### 5.3.1.2 Sample Preservation

Samples were chilled with ice in the field and then frozen on site back at camp. Samples were transferred frozen in a sealed esky to Alice Springs where they were once again stored in a freezer prior to transfer to Perth. Samples were transferred to Perth frozen in a sealed esky and stored in a freezer for delivery to the laboratory. While every attempt was made to maintain the integrity of the samples, the remote location of the lake meant that transferring the samples over considerable distances prior to field and, particularly, laboratory analysis was unavoidable which, in turn, may have impacted sample results.

Based on a review of the  $pH_F$  and  $pH_{FOX}$  testing and CRS suite analytical data, no actual acidity was reported in any of the samples (total actual acidity was <0.02 %S in all samples). In addition, net acidity (S%) concentrations were all less than the laboratory limit of reporting (LOR) in all samples analysed, indicating that there are minimal sulfides available to react. Although, the sample preservation was not ideal, as there was no actual acidity reported in any of the samples analysed, it is considered unlikely that the analytical data has been affected by the preservation technique. Therefore, the analytical results are considered useable for assessment purposes.

#### 5.3.2 Laboratory QA/QC

#### 5.3.2.1 Matrix Spikes

In evaluating the data quality, it was identified that there was one laboratory QA/QC noncompliance with the matrix spike for zinc in lab sample Q08 being below the acceptance limits. The laboratory control sample for zinc was, however, within the acceptable range, as were all other matrix spikes for metals and, therefore, the non-compliant matrix spike is not considered to introduce bias to the data set.

#### 5.3.2.2 Sample Preservation

Prior to analysis (for sediment samples from the final sampling round, 26 to 30 October 2017), the previously dried samples used for CRS suite analysis still contained moisture and were not frozen. This meant the samples were inappropriately preserved for the Chromium Reducible Sulfur Suite analysis. Due to the inappropriate preservation of the samples, the Chromium Reducible Sulfur Suite results for this report are not NATA accredited.

Based on a review of the  $pH_F$  and  $pH_{FOX}$  testing and CRS suite analytical data, no actual acidity was reported in any of the samples (total actual acidity was <0.02 %S in all samples). In addition, net acidity (S%) concentrations were all less than the laboratory limit of reporting (LOR) in all samples analysed, indicating that there are minimal sulfides available to react. Although the sample preservation was not ideal, as there were no actual acidity reported in any of the samples analysed, it is considered unlikely that the analytical data has been affected by the preservation technique. Therefore, the analytical results are considered useable for assessment purposes.



### 6 Results

### 6.1 Sediments and soils

#### 6.1.1 Lithology

Lithological descriptions from the August to October 2017 field investigation are provided in the trench completion reports in Appendix C and photographs are provided in Appendix D. Encountered lithologies are summarised in Table J.

Tab	le	J.	Litho	logies
Tub		υ.	LIUIO	iogico.

Soil Type	Description	Depth (mbgs)
Black Ooze	Dark brown to black thin layer approximately 5 mm thick.	0 – 0.05
SAND, light brown, brown or grey	Light brown, brown, cream or grey evaporitic sand. The sands contain variable gypsum and fine silt content. Typically a thin layer (approximately 8 mm thick) was observed. Sand was typically observed either above (on the ground surface) or below the black ooze layer and typically extended to depths of up to 1 mbgs. However, in three trenches (T11, T12 and T20) cream or grey evaporative sand was also encountered between 2.0 and 6 m, interbedded with orange/ red / brown clays and sandy clays.	0 – 6
SILTY to SANDY CLAY Red/ brown or light brown OR SILTY to CLAYEY SANDS, red/brown	Red brown or light brown clay with varying sand and silt content or red / brown silty to clayey sands was observed within the majority of trenches, typically underlying the black ooze and extending up to 5 m bgs.	0.05 – 5
CLAY, Red / brown	Thick layer of red/brown firm to hard clay. The clay extends to the maximum depth of 10 mbgs across the site. The clay may be interbedded at isolated locations with thin sand layers.	~ 0.3 - 10
CLAY, green and SILTY CLAY, green/brown	In one trench (T22) a green firm to hard clay was encountered at 4 mbgs and was underlain by a green/brown silty clay. A red/brown/ green firm to hard clay was also observed in Trench 9, PP and 12 (between 2 and 6 m bgl). A green clay (soft to firm) and plastic was also observed at 2 to 2.5 mbgs at trench (T20).	2.0 to 6

#### 6.1.2 Field and Analytical ASS Results

Field and laboratory results are presented in Table 1 with reference to assessment criteria as outlined in Section 4.8. Laboratory analysis for CRS was carried out on the highest risk samples within each lithology from each trench to provide confirmation of the field results. The samples were also chosen to ensure that sediment types encountered across the site were sufficiently represented. Laboratory reports are provided in Appendix E.

Field and laboratory results for each soil type are summarised as follows:

#### Black Ooze (11 samples)

A thin layer of black ooze was observed in the majority of trenches (T2, T5, T7, T12, T14, T15 T16, T20, T21, T22 and PP) to a depth of up to 0.05 mbgs. It was often overlain by either a surficial salt crust or a thin layer of light brown sand. The following results of the black ooze were identified:



- Field analysis pH<sub>F</sub> ranges from 7.4 to 8.3 and laboratory analysis pH<sub>F</sub> ranges from 7.6 to 8.4, with no values indicative of AASS;
- Field analysis pH<sub>FOX</sub> ranges from 5.6 to 6.3 and laboratory analysis pH<sub>FOX</sub> ranges from 5.0 to 7.6, with no values indicative of PASS;
- Laboratory pH changes ranged from 0.5 to 3.4 in nine samples, with only 3 sample (T7\_0.01, T20\_0.03 and PP\_0.02) values decreasing by more than 3. This indicates that the majority of samples are not PASS with only 3 potential PASS samples;
- Total actual acidity (TAA) was < 0.02 %S in the ten analysed samples;
- CRS ranged from < 0.005 %S to 0.12 %S in the ten analysed samples. Only two samples exceeded the 0.03 %S action criteria (T20\_0.03, 0.12 S% and PP\_0.02, 0.062 S%). These samples were collected from location along the southern edge of the lake. No samples exceeded the 0.03 %S action criteria. This indicates that the majority of samples are not PASS with only 2 potential PASS samples;</li>
- Six samples (T2\_0.05, T14\_0.01, T14\_0, T20\_0.03, PP\_0.02 and T21\_0) out of a total of ten samples reported CRS %S above LOR;
- Net Acidity was < 0.02 %S in the all ten analysed samples, indicating that the majority
  of the soils are non-acid sulfate soils (NASS), and</li>
- ANC was 0.04 to 0.47 S% in the 10 analysed samples.

Based on the results as summarised above, the majority of black ooze is determined to be NASS. The only exceptions were two samples, T20\_0.03 and PP\_0.02. These samples are considered PASS and were collected from locations along the southern edge of the lake suggesting that higher potential for PASS in the black ooze may be associated with the accumulation of sediments along the edges of Lake Mackay. Excess ANC was present in all samples, indicating a natural potential buffering capacity. On average, the concentration of ANC S % was a factor of 40 times the concentration of CRS S%.

#### SAND, light brown, cream, brown or grey (20 samples)

A light brown to brown sand was observed either above (on the ground surface) or below the black ooze layer and extended to depths of up to 0.5 mbgs. A grey sand was observed up to 1 mbgs. The sands contain variable gypsum and fine silt content. However, in three trenches (T11, T12 and T20) cream or grey evaporative sand was also encountered between 2.0 and 6 m, interbedded with orange/ red / brown clays and sandy clays. The following results for this material were identified:

- Field analysis pH<sub>F</sub> ranges from 7.2 to 8.2 and laboratory analysis pH<sub>F</sub> ranges from 7.3 to 8.3, with no values indicative of AASS;
- Field analysis pH<sub>FOX</sub> ranges from 5.5 to 6.4 and laboratory analysis pH<sub>F</sub> ranges from 6.1 to 8.7, with no values indicative of PASS;
- Laboratory pH changes range from 0.2 to 2.2. This indicates that the samples are not PASS;



- TAA was < 0.02 %S for all fifteen samples analysed;</li>
- CRS ranges from < 0.005 to 0.005 %S. Only one sample (T22\_0.5) reported a CRS S% above LOR. No samples exceeded the 0.03 %S action criteria;
- Net Acidity was < 0.02 %S for all fifteen samples, confirming the soils are non-acid sulfate soils (NASS), and
- ANC was 0.07 to 3.9 S% in the 15 analysed samples.

Based on the results as summarised above, the SAND is determined to be NASS. Excess ANC was present in all samples, indicating a natural potential buffering capacity. On average, the concentration of ANC S % was a factor of 105 times the concentration of CRS S%.

# SILTY to SANDY CLAY Red/ brown or light brown or SILTY to CLAYEY SANDS, red/brown (17 samples)

Red brown or light brown clay with varying sand and silt content or red/brown silty to clayey sands was observed within the majority of trenches, typically underlying the black ooze and extending up to 5 mbgs. The following results for this material were identified:

- Field analysis pH<sub>F</sub> ranges from 7.4 to 8.2 and laboratory analysis pH<sub>F</sub> ranges from 7.2 to 8.1, with no values indicative of AASS;
- Field analysis pH<sub>FOX</sub> ranges from 5.8 to 6.5 and laboratory analysis pH<sub>FOX</sub> ranges from 6.5 to 8, with no values indicative of PASS;
- Laboratory pH changes range from 0 to 1.6. This indicates that the samples are not PASS;
- TAA was < 0.02 %S for all eleven samples analysed;
- CRS ranges from < 0.005 to 0.006 %S. Only one sample (T8\_1.5) reported a CRS S% above LOR. No samples exceeded the 0.03 %S action criteria;
- Net Acidity was < 0.02 %S for all eleven samples, confirming the soils are non-acid sulfate soils (NASS), and
- ANC was 0.04 to 0.8 S% in the 11 analysed samples.

Based on the results as summarised above, the SILTY to SANDY CLAY Red/ brown or light brown or SILTY to CLAYEY SANDS, red/brown is determined to be NASS. Excess ANC was present in all samples, indicating a natural potential buffering capacity. On average, the concentration of ANC S % was a factor of 74 times the concentration of CRS S%.

#### CLAY, red/brown (65 samples)

A thick layer of red/brown firm to hard clay was observed in the majority of trenches. The clay typically extends from approximately 0.3 mbgs to the maximum depth of 10 mbgs across the site. The following results for this material were identified:



- Field analysis pH<sub>F</sub> ranges from 7.6 to 8.1 and laboratory analysis pH<sub>F</sub> ranges from 5.7 to 8 with no values indicative of AASS;
- Field analysis pH<sub>FOX</sub> ranges from 5.7 to 6.2 and laboratory analysis pH<sub>FOX</sub> ranges from 6.3 to 8.4 with no values indicative of PASS;
- Laboratory pH changes range from 0 to 1.8. This indicates that the samples are not PASS.
- TAA was < 0.02 %S for all twenty six samples analysed;
- CRS ranges from < 0.005 to 0.016 %S. Six samples (T7\_0.3, T7\_5, T8\_3, T8\_4.5, T9\_1.0 and T22\_2.5) out of a total of twenty six samples reported CRS %S above LOR. No samples exceeded the 0.03 %S action criteria;</li>
- Net Acidity was < 0.02 %S for all twenty six samples, confirming the soils are nonacid sulfate soils (NASS), and
- ANC was 0.16 to 1.2 S% in the 26 analysed samples.

Based on the results as summarised above, the red/brown CLAY is determined to be NASS. Excess ANC was present in all samples, indicating a natural potential buffering capacity. On average, the concentration of ANC S % was a factor of 96 times the concentration of CRS S%.

## CLAY, green / SILTY CLAY, green/brown (6 samples)

In one trench (T22), a green firm to hard clay was encountered at 4 mbgs and was underlain by a green/brown silty clay. A red/brown/green firm to hard clay was also observed in Trench 9, Piot Pond (PP) and Trench 12 (between 2 and 6 m bgl). A green clay (soft to firm) and plastic was also observed at 2 mbgs to 2.5 mbgs at trench (T20). The following results for this material were identified:

- Field analysis pH<sub>F</sub> was 8.0 for both samples and laboratory analysis pH<sub>F</sub> was 6.7 to 8.0, with no values indicative of AASS;
- Field analysis pH<sub>FOX</sub> ranges from 5.8 to 6.0 and laboratory analysis pH<sub>FOX</sub> was 7.6 to 8.0, with no values indicative of PASS;
- TAA was < 0.02 %S for all the five samples analysed;
- CRS was < 0.005 %S to 0.006 % S for all the five samples analysed. The samples did not exceed the 0.03 %S action criteria. Only one sample out of five analysed was reported above LOR;
- Net Acidity was < 0.02 %S for all the five samples analysed, confirming the soil type is non-acid sulfate soils (NASS), and
- ANC was 0.36 to 0.74 S% for the five samples analysed.

Based on the results as summarised above, the green CLAY to SIILTY CLAY is determine to be NASS. Excess ANC was present in all samples, indicating a natural potential



buffering capacity. On average, the concentration of ANC S % was a factor of 112 times the concentration of CRS S%.

### 6.1.3 Review of integrity of the handling and transport method.

Thirty six selective samples from trenches (T2, T5, T7, T8, T14, T15, T16, T21 and T22),  $pH_F$  and  $pH_{FOX}$  were tested in the field and then retested by the laboratory to assess the integrity of the handling and transport method. A comparison of the field to laboratory data are summarised as follows:

- The average field analysis pH<sub>F</sub> was 7.8, with a range of 7.4 to 8.3;
- The average laboratory analysis  $pH_F$  was 7.4, with a range of 6.3 to 8.3;
- The average field analysis pH<sub>Fox</sub> was 6.0, with a range of 5.4 to 6.4, and
- The average laboratory analysis pH<sub>Fox</sub> was 7.3, with a range of 5 to 8.6.

A comparison of the field and laboratory pH<sub>f</sub> value, demonstrates that pH values are similar between the field and laboratory. However, the laboratory value is typically slightly more acidic than the value tested in the field. For the pH<sub>fox</sub> value, the field tested value is more acidic than the laboratory tested value. Based on a review of the pH<sub>F</sub> and pH<sub>FoX</sub> testing and CRS suite analytical data, no actual acidity was reported in any of the samples (total actual acidity was < 0.02 %S in all samples). In addition, net acidity (S%) concentrations were all less than the laboratory limit of reporting (LOR) in all samples analysed, indicating that there are minimal sulphides available to react. Although, there was slight variation between field and laboratory tested pH, as there were no actual acidity reported in any of the samples in any of the samples analysed, it is considered unlikely that the analytical data has been significantly affected by the handling and storage method.

#### 6.1.1 Heavy Metals

Heavy metal laboratory results from the analysis of 23 primary samples are presented in Table 2 with reference to assessment criteria as outlined in Section 4.8 and summarised in Table K. Analysis for total uranium was also undertaken on 17 primary samples and presented in Table 2.



-		
Analyte	Concentration Range (mg/kg)	Samples exceeding EILs (Urban Residential/ Open Public Space)
Aluminium	760 – 46,000	None
Arsenic	<2 - 5.1	None
Cadmium	< 0.4 - 0.5	None
Chromium	<5 - 54	None
Copper	<5– 23	None
Iron	1,300 – 47,000	None
Lead	<5 – 19	None
Mercury	<0.1	None
Nickel	<5 - 23	None
Uranium	<10 - 16	None
Zinc	<5 – 56	None

# Table K. Metals Summary

Based on the laboratory analysis, the following conclusions were drawn:

- All heavy metal concentrations for all lithologies were below their relevant EILs indicating they pose a low risk to the receiving ecological environment;
- Aluminium and iron were detected within all samples with the highest concentrations observed within the SANDY CLAY red/brown, CLAY red brown and CLAY, green lithologies suggesting that there is a potential for aluminium and iron mobilisation into the groundwater from these units under acidic conditions, and
- In the absence for EILs for uranium, the soil standards for the protection of human health from Canada (Nova Scotia) have been adopted. The majority of soils samples reported total uranium at less than the laboratory limit of reporting, the only exception was one sample from the pilot pond location (PP\_2.0, 16 mg/kg). All samples reported concentration below the soil standards for the protection of human health from Canada (Nova Scotia).

# 6.2 Groundwater

The following section summarises the results of site specific groundwater information collected as part of a separate hydrogeological study undertaken as part of the baseline assessment for the project. Data discussed in this section were collected by Agrimin and are provided to support an understanding of the site-specific receiving environment.

## 6.2.1 Field Results

Static water levels (SWL) were measured in temporary piezometers between August and October 2017 and are presented in Table L. In addition, SWL were also measured in some of the trenches during this period. This is presented in Table M. The SWL data is summarised as follows:

- During the monitoring period, SWLs in the piezometers ranged from 0.15 mbgs (T20 100mE) to 0.97 mbgs (T14 20mS), and
- During the monitoring period, water levels in the trenches ranged from 0. 5 mbgs (Trench 9) to 1.3 mbgs (Trench 22). The water levels measured in the trenches may not be static because the water levels were still recovering after excavation. The



Agrimin hydrologist advised that the SWL across the lake is typically between 0.5-0.6 mbgs.

Site specific groundwater flow direction cannot be determined at this stage. However, regional groundwater flows predominantly from an easterly direction towards Lake Mackay. Groundwater flows through the extensive system of palaeovalleys and palaeochannels originating in the Northern Territory and intersecting the lake in the east and along the southern boundary. Lake Mackay is the discharge point for groundwater and surface water in the paleochannels (Lycopodium, 2016).

ID	Coordinates	GDA94 Z 52	SV	VL
	Easting	Northing	m (*TOC)	m (bgs)
T2 20mN	460022	7512136	1.25	0.8
T2 50mN	460022	7512167	1.04	0.69
T2 20mW	459997	7512072	1.22	0.84
T2 50mW	459966	7512073	1.04	0.76
T5 20mN	479984	7508098	0.965	0.465
T5 50mN	479984	7508123	0.98	0.41
T5 20mE	480009	7508031	0.99	0.52
T5 50mE	480034	7508034	0.915	0.475
T5 100mE	480084	7508035	0.88	0.42
T6 20mN	482030	7494117	0.97	0.47
T6 50mN	482033	7494146	0.95	0.45
T6 20mE	482052	7494052	1.05	0.55
T6 50mE	482086	7494053	0.97	0.47
T6 100mE	482134	7494049	0.92	0.42
T6 20mW	482005	7494051	1.07	0.57
T8 20mN	490924	7507408	1.07	0.57
T8 50mN	490925	7507438	0.955	0.455
T8 20mE	490955	7507340	1.045	0.545
T8 50mE	490986	7507346	1.01	0.51
T8 100mE	491029	7507352	0.87	0.37
T9 20mN	491048	7519251	-	-
T9 50mN	491058	7519280	-	-
T9 20mE	491058	7519181	-	-
T9 50mE	491087	7519177	-	-
T9 100mE	491134	7519167	-	-
T11 20mN	495972	7518121	-	-
T11 50mN	495967	7518149	-	-
T11 20mE	496007	7518057	-	-
T11 50mE	496036	7518062	-	-
T11 100mE	496083	7518074	-	-
T11 20mS	495995	7517978	-	-
T11 50mS	495999	7517951	-	-
T11 20mW	495962	7518042	-	-
T11 50mW	495936	7518038	-	-
T11 100mW	495896	7518027	-	-
T12 20mW	499696	7514011	0.80	0.30
T12 30mW	499689	7514010	0.80	0.30
T14 20mN	452557	7515052	1.15	0.65
T14 50mN	452553	7515081	1.16	0.58

Table L Static Water Levels (SWL) in Temporary Monitoring wells



ID	Coordinates	GDA94 Z 52	SV	٧L
	Easting	Northing	m (*TOC)	m (bgs)
T14 20mE	452590	7514995	1.39	0.87
T14 50mE	452619	7515001	1.32	0.72
T14 100mE	452670	7515012	1.14	0.62
T14 20mS	452580	7514905	1.37	0.97
T14 50mS	452586	7514876	1.17	0.75
T14 20mW	452545	7514968	1.38	0.95
T14 50mW	452513	7514964	1.18	0.77
T 16 20mN	452707	7505182	1.07	0.67
T16 50mN	452706	7505215	1.07	0.67
T16 20mE	452733	7505116	1.15	0.76
T16 50mE	452762	7505115	1.09	0.74
T16 100mE	452813	7505117	1.2	0.65
T16 20mS	452709	7505043	1.09	0.59
T16 50mS	452711	7505013	1.13	0.68
T16 20mW	452682	7505118	1.19	0.74
T16 50mW	452653	7505118	1.02	0.65
T16 100mW	452604	7505119	1.08	0.65
T20 20mN	485925	7491866	0.945	0.445
T20 50mN	485922	7491898	0.825	0.325
T20 20mE	485945	7491801	1.22	0.72
T20 50mE	485974	7491800	0.965	0.465
T20 100mE	486028	7491809	0.65	0.15
T20 20mW	485898	7491813	1.14	0.64
T20 50mW	485873	7491813	0.915	0.415
T21 20mE	474048	7505047	-	-
T21 50mE	474147	7505043	-	-
T21 20mS	474098	7504965	-	-
T21 50mS	474098	7504937	-	-
T21 20mW	474071	7504965	-	-
T21 50mW	474043	7504937	-	-
T22 20mN	495958	7513457	-	-
T22 50mN	495952	7513489	-	-
T22 20mE	496018	7513455	-	-
T22 50mE	496048	7513455	-	-
T22 100mE	496098	7513455	-	-
PP1	464400	7495221	-	-
PP2	464470	7495402	-	-
PP3 *TOC – Top of	464544	7495588	-	-

\*TOC – Top of Casing



# Table M Static Water Levels (SWL) in Trenches

Trench Number	SWL m(bgl)
Trench 2	0.76
Trench 5	0.75
Trench 6	No information
Trench 7	No information
Trench 8	No information
Trench 9	0.5
Trench 11	1.0
Trench 12	1
Trench 14	0.6
Trench 15	No information
Trench 16	No information
Trench 20	No information
Trench 21	No information
Trench 22	1.3

## 6.2.2 Analytical Results

Groundwater analytical reports are provided in Appendix E. Results of the baseline sampling are presented in Table 4 and summarised as follows:

- Calcium (Ca) concentrations range from 271 mg/L (Pilot Pond 2) to 693 mg/L (Trench 22);
- Chloride (Cl) concentrations were consistently high and ranged from ranged from 116,100 mg/L (Trench 22) to 174,800 mg/L (Trench 2);
- Potassium (K) concentrations ranged from 2,725 mg/L (Pilot Pond 2) to 3,998 mg/L (Trench 5);
- Magnesium (Mg) concentrations ranged from 1,884 mg/L (Trench 22) to 9,045 mg/L (Pilot Pond 2);
- Sodium (Na) concentrations were high and ranged from 76,592 mg/L (Trench 22) to 120,048 mg/L (Trench 2);
- Sulfur (S) concentrations ranged from 4,806 mg/L (Trench 16) to 8,028 mg/L (Trench 2);
- Sulfate concentrations ranged from 14,399 mg/L (Trench 16) to 23,772 mg/L (Trench 5), and
- Total dissolved Solids (TDS) (evaporation) ranged from 198 g/kg (Trench 22) to 266 g/kg (Trench 5) and were indicative of a hypersaline lake.



# 7 Discussion

# 7.1 ASS Occurrence

The findings of the investigation are summarised in Table N. The presence of AASS, PASS or NASS is identified based on soil type as presented in Table N.

Based on soil field pH results (obtained from 119 samples), there were no  $pH_F$  values indicative of AASS and there were no  $pH_{FOX}$  values indicative of (PASS from any of the soil samples tested.

Based on the laboratory results, there were no occurrences of AASS were identified within the Project area. Within the majority of the Project area, there were no occurrences of PASS, with the exception of only two black ooze samples collected from sample locations in the very southern edge of lake.

Soil Type	Number of samples	Description	Depth (mbgs)	CRS (%S)	Net Acidity (%S)	ASS Classification
Black Ooze	11	Dark brown to black thin layer approximately 5 mm thick.	0 – 0.05	<0.005 to 0.12	<0.02	Majority NASS, with only two samples in the very southern end of lake slightly exceeds assessment criteria for CRS (PASS)
SAND, light brown, brown or grey	20	Light brown, brown, cream or grey evaporitic sand. The sands contain variable gypsum and fine silt content. Typically a thin layer (approximately 8 mm thick) was observed. Sand was typically observed either above (on the ground surface) or below the black ooze layer and typically extended to depths of up to 1 mbgs. However, in three trenches (T11, T12 and T20) cream or grey evaporative sand was also encountered between 2.0 mbgs and 6 mbgs, interbedded with orange/ red / brown clays and sandy clays.	0 – 6	<0.05 to 0.005	<0.02	NASS
SILTY to SANDY CLAY Red/ brown or light brown OR SILTY to CLAYEY	17	Red brown or light brown clay with varying sand and silt content or red/brown silty to clayey sands was observed within the majority of trenches, typically underlying the black ooze and extending up to 5 mbgs.	0.05 – 5	<0.005 to 0.006	<0.02	NASS

# Table N. ASS Distribution



Soil Type	Number of samples	Description	Depth (mbgs)	CRS (%S)	Net Acidity (%S)	ASS Classification
SANDS, red/brown						
CLAY, Red / brown	65	Thick layer of red/brown firm to hard clay. The clay extends to the maximum depth of 10 mbgs across the site. The clay may be interbedded at isolated locations with thin sand layers.	~ 0.3 - 10	<0.005 to 0.016	<0.02	NASS
CLAY, green and SILTY CLAY, green/brown	6	In one trench (T22) a green firm to hard clay was encountered at 4 mbgs and was underlain by a green/brown silty clay. A red/brown/ green firm to hard clay was also observed in Trench 9, PP and 12 (between 2 and 6 m bgl). A green clay (soft to firm) and plastic was also observed at 2 to 2.5 mbgs at trench (T20).	2.0 to 6	<0.005 to 0.006	<0.02	NASS

Based on the laboratory analysis, CRS ranged from <0.005 %S to 0.12 %S in the 67 analysed samples from all soil types.

The majority of the samples from all soil types had a concentration of CRS below the 0.03 %S action criteria, indicating the majority of the soil types were NASS. Only two samples of black ooze in the very southern end of lake slightly exceeded assessment criteria for CRS, indicating that the black ooze is possibly PASS along the southern edge of the lake.

Net Acidity was <0.02 %S in the all 67 analysed samples, confirming the soils are nonacid sulfate soils (NASS). Based on the results as summarised above, the majority of the encountered lithologies were determined to be NASS, with the exception of black ooze in the very southern end of the lake (possibly PASS).

# 7.2 Baseline Groundwater Conditions

The shallowest depth of 0.15 mbsl was recorded, with generally shallow groundwater levels recorded across the site.

High concentrations of chloride, sodium and TDS were observed in all of the groundwater samples which are indicative of a hypersaline lake. Groundwater concentrations of Ca and K were lowest in Pilot Pond 2 located in the southern end of the lake. Groundwater concentrations of Cl, Mg, TDS and Na were lowest in Trench 22 (31/10/17) located in the eastern end of the lake. Highest concentrations of chloride, sodium, potassium, sulfate, TDS and were reported in either Trench 2 or Trench 5, both located within the centre of the lake.

Groundwater flows through the extensive system of palaeovalleys and paleochannels originating in the Northern Territory and intersecting the lake in the east and along the southern boundary. Therefore, less saline groundwater (lower concentrations of Na, Cl,



TDS) are likely to occur within the southern and eastern edges of the lake as they receive groundwater discharge.

The  $CI:SO_4^{2}$  ratio was greater than 2 (ranged from 6.4 to 11.6) in all groundwater analysed indicating that there is not likely to be an extra source of sulfate from current or historic sulfate oxidation and leaching into the groundwater system. The concentrations within the groundwater are representative of natural background concentrations within an undisturbed environment.



# 8 Conclusions and Recommendations

Based on the results presented in this report, 360 Environmental makes the following conclusions:

- Based on soil field pH results, there were no pH<sub>F</sub> values indicative of actual acid sulfate soil (AASS) and there were no pH<sub>FOX</sub> values indicative of potential acid sulfate soil (PASS) from any of the soil samples tested;
- ٢ For three black ooze samples, a laboratory pH decrease greater than 3 units (3.1 to 3.4) between pH<sub>F</sub> and pH<sub>Fox</sub> was reported. This indicates that some black ooze samples have acid generating potential (PASS). Sixty percent (60%) of black ooze samples reported a CRS %S above laboratory limits of reporting (LOR). Two of the black ooze samples (T20 0.03 and PP 0.02), located on the very southern edge of the lake, indicate that these two samples are PASS with CRS concentrations of 0.062%S and 0.12%S. Given that the majority of the remaining black ooze samples collected from the central sections of the lake recorded pH changes below the criteria, and no other criteria was exceeded, overall the black ooze lithology in the central sections of the lake is determined to be NASS. The western edge of the lake was not sampled during the investigation and it is possible that black ooze may also be PASS along the western fringe of the lake It should be noted that the black ooze lithology did not always appear form a continuous layer over the lake surface, instead forming a patchy distribution which could lead to some bias when considering its overall potential for acid generation;
- All other soil types reported no laboratory pH changes greater than 3 units, indicative of NASS. The remainder of the samples from all other soil types had a concentration of CRS below the 0.03 %S action criteria, indicating the majority of the soil types were NASS. Further, most other lithologies had a CRS concentration less than LOR with only 23% of red/brown clays reporting a CRS above LOR;
- Net Acidity [minus acid neutralising capacity (ANC)] was <0.02 %S in the majority of analysed soil samples, confirming the majority of soils are non-acid sulfate soils (NASS). Only two black ooze samples in the very southern end of lake reported net acidity minus ANC above assessment criteria, ranging from 0.06 to 0.12 S%;
- In addition, acid neutralising capacity (ANC) across all soil types ranged from 0.04 %S to 3.9 S%. Based on these results, the majority of lithologies encountered are considered to have a low risk of acid generation due to the absence of sulphides and the inherently elevated ANC;



- All heavy metal concentrations for all lithologies were below their relevant Ecological Investigation Levels (EILs), indicating they pose a low risk to the receiving ecological environment;
- The majority of soils samples reported total uranium at less than the laboratory limit of reporting, the only exception was one soil sample from the pilot pond location. All soil samples reported concentrations below the soil standards for the protection of human health from Canada (Nova Scotia). In the absence for EILs for uranium, the soil standards for the protection of human health from Canada (Nova Scotia) have been adopted;
- Aluminium and iron were detected within all samples with the highest concentrations observed within the SANDY CLAY red/brown, CLAY red brown and CLAY, green lithologies suggesting that there is a potential for aluminium and iron mobilisation into the groundwater from these units under acidic conditions;
- Site specific groundwater information was collected as part of a separate hydrogeological study undertaken as part of the baseline assessment for the Project. High concentrations of chloride, sodium and TDS were observed in all of the groundwater samples which are indicative of a hypersaline lake, and
- The Cl<sup>-</sup>:SO<sub>4</sub><sup>2-</sup> ratio of the groundwater was greater than 2 (ranged from 6.4 to 11.6) in all groundwater analysed indicating that there is not likely to be an extra source of sulfate from current or historic sulfate oxidation and leaching into the groundwater system. The concentrations within the groundwater are representative of natural background concentrations within an undisturbed environment.

The following recommendations are made based on the outcome of this preliminary ASS investigation:

- Further sampling and analysis should be undertaken of the black ooze material in the southern and western fridges of the lake where development is potentially going to occur:
- Based on the results of this preliminary investigation, a limited Acid Sulfate Soils Management Plan (ASSMP) may be required only to manage the black ooze material in the southern and western fringes of the lake. However, this will be determined following further sampling and analysis in these areas;
- To establish more detailed baseline conditions of the underlying groundwater, it is recommended that groundwater monitoring for pH, redox, dissolved oxygen, electrical conductivity (EC) is undertaken and future groundwater samples are analysed for:
  - o Total acidity, total alkalinity, pH;
  - Dissolved metals (aluminium, arsenic, chromium, iron, manganese, nickel, selenium, zinc);
  - o Total metals (aluminium, iron);



- Ammonia, total nitrogen, total phosphorus, filterable reactive phosphorus (FRP), and
- o TDS (mg/L).



# 9 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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# 10 References

Blake D.H, Tower R.L., Crowe RWA. 1:250,000 Geological Series Sheet SF 52-10 (1976) Published 01 January 1976.

360 Environmental (2017 a) Lake Mackay Sulfate of Potash Project. Single Phase Level 2 Fauna Survey at Lake Mackay. Prepared for Agrimin Ltd.

360 Environmental (2017 b) Lake Mackay Sulfate of Potash Project. Waterbird Survey at Lake Mackay. Prepared for Agrimin Ltd.

360 Environmental (2017 c) Lake Mackay Sulfate of Potash Project. Detailed Flora and Vegegation Assessment at Lake Mackay. Prepared for Agrimin Ltd.

Department of Environment Regulation, 2015a. *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*. Western Australia.

Department of Environment Regulation, 2015b. *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes*. Western Australia.

http://www.asris.csiro.au/themes/AcidSulfateSoils.html#ass\_Downloads (online accessed 17 October 17)

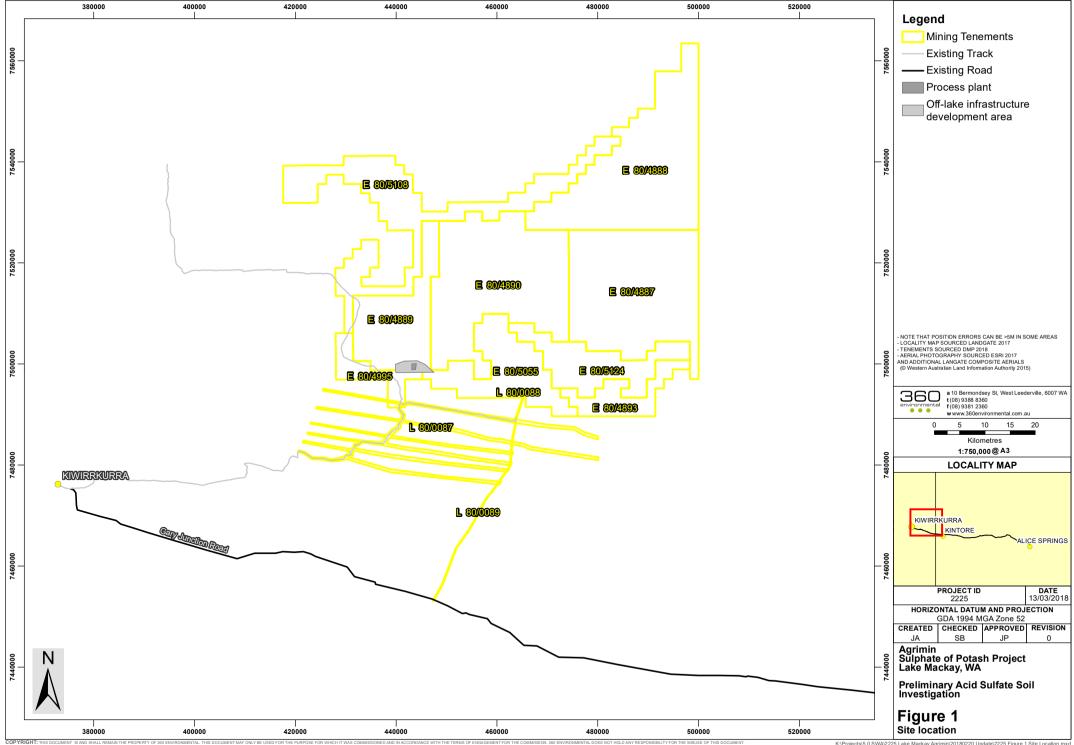
<u>https://geoview.dmp.wa.gov.au/GeoViews/?Viewer=GeoVIEW</u> (online accessed 3 October 17)

Knight Piesold Consulting, 2018 Brine Collection Prefeasibility Study Rev D. Report prepared for Agrimin, 2018.

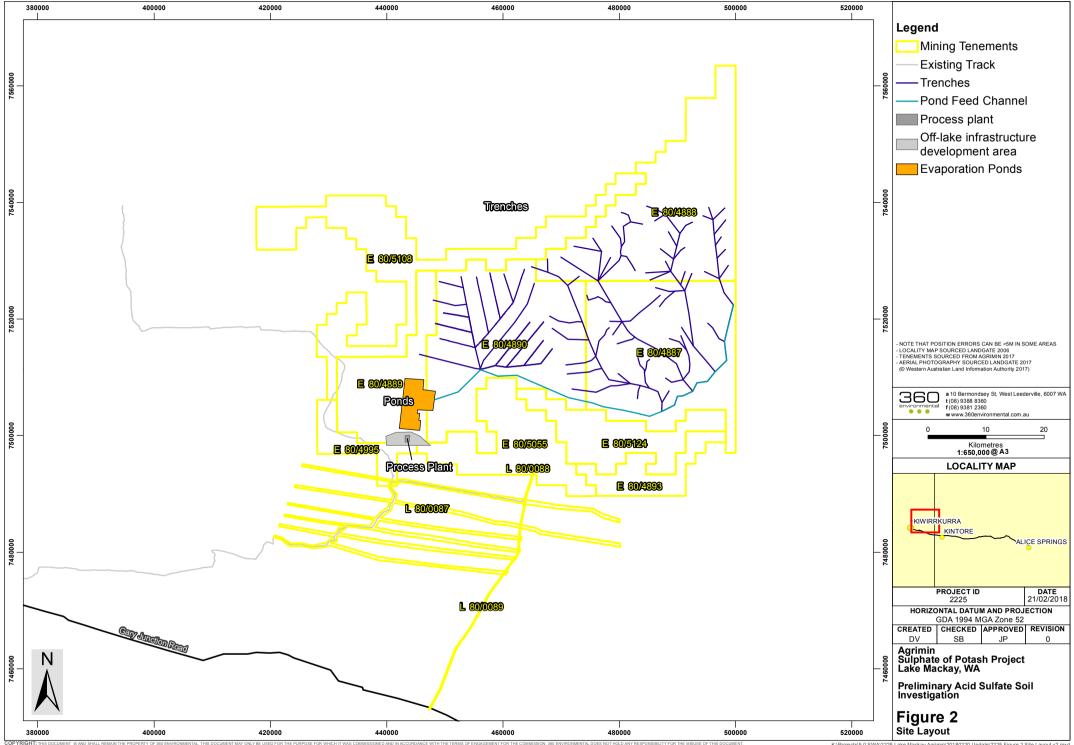
Lycopodium, 2016, Mackay SOP Project Scoping Study. Prepared for Agrimin, 2016



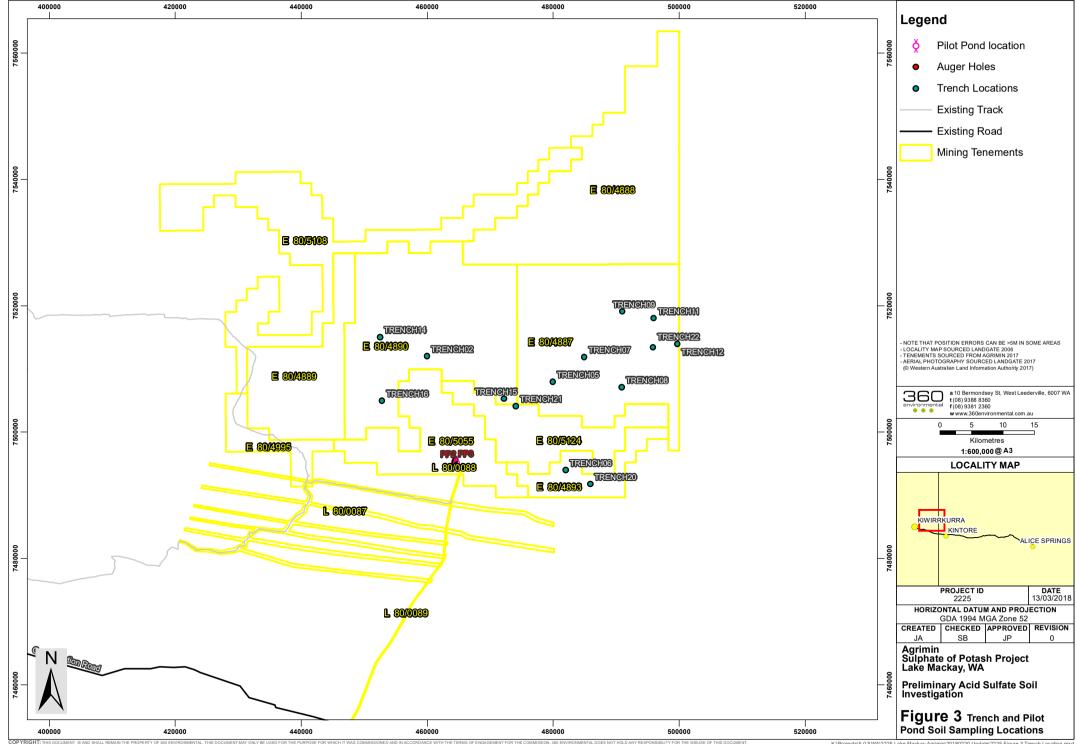
# FIGURES



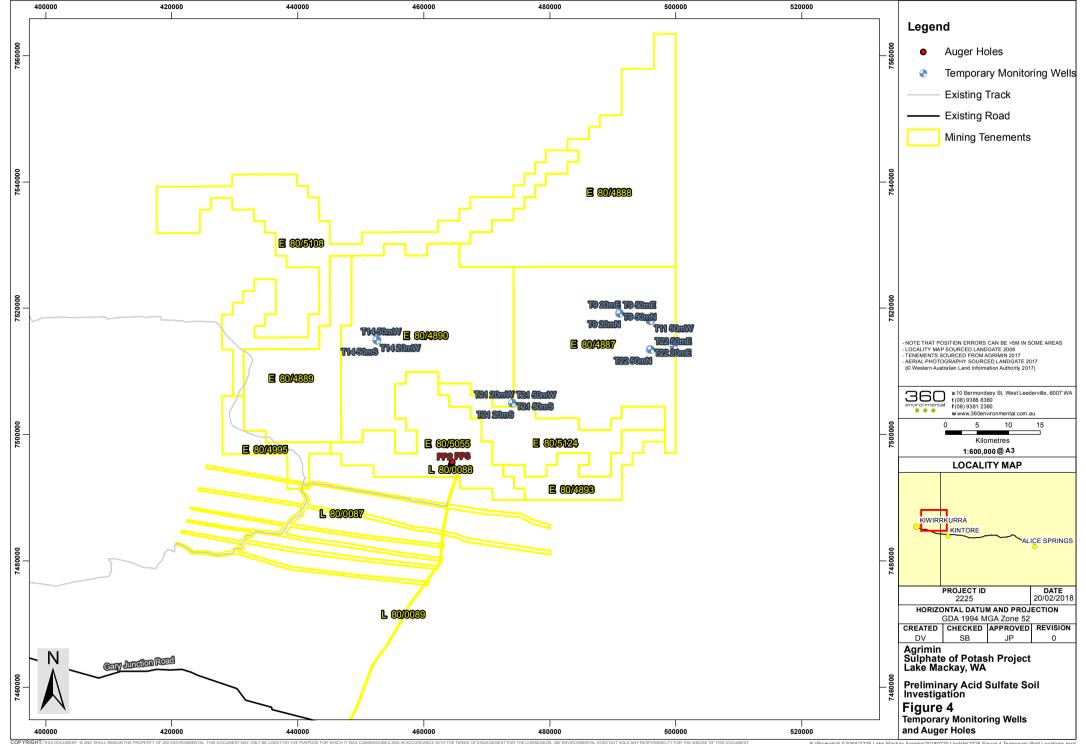
K:\Projects\5.0 SWA\2225 Lake Mackay Agrimin\20180220 Update\2225 Figure 1 Site Location.mxd



K:\Projects\5.0 SWA\2225 Lake Mackay Agrimin\20180220 Update\2225 Figure 2 Site Layout v2.mxd



K:\Projects\5.0 SWA\2225 Lake Mackay Agrimin\20180220 Update\2225 Figure 3 Trench Location.mxd



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# TABLES



				Fiel	d Analysis			Laborat	ory Analy	sis							
													Chromium	Reducible Sulfur Suit	e		
Bore Hole ID	Sample Depth	Simplified Lithology	рН <sub>Е</sub>	pH <sub>FOX</sub>	pH <sub>change</sub>	Reaction	рН <sub>Е</sub>	pH <sub>FOX</sub>		Reaction	pH-KCl	TAA equiv. S% pyrite	CRS (%S)	Net Acidity (%S)	Net Acidity (%S) - ANC (%S)	ANC (%S)	ASS Interpretation
HOLE ID	mbgl	Assessment Criteria:	< 5.5	< 3.0	>-3	> 2	< 5.5	< 3.0	> 3	> 2	< 5.5	0.03	0.03	0.03	0.03	-	
	0	Black Ooze	7.4	6.3	1.1	2	7.6	7.1	0.5	4	8.2	< 0.02	< 0.005	< 0.02	< 0.02	0.42	
T2	0.5	sandy CLAY, red/brown	7.4	6.1	1.3	2	7.5	7.5	0	4	7.7	< 0.02	< 0.005	< 0.02	< 0.02	0.18	NASS
	0	SAND, light brown	7.2	5.5	1.7	1											
	0.05	Black Ooze silty CLAY, dark brown	8.3 7.8	5.5 6.5	2.8 1.3	1 2	7.8	6.5	1.3	2	7	< 0.02	0.01	< 0.02	<0.02	0.04	
T5	0.2	CLAY, red	7.8	6.3	1.5	2	6.5	8.4	1.9	4	7.9	< 0.02	< 0.005	< 0.02	<0.02	0.21	NASS
	0.3	silty SAND, light brown Clay, red/brown	8.2 7.8	6.5 6.4	1.7	2	6.8	8.6	1.8	4	8	< 0.02	< 0.005	< 0.02	<0.02	0.28	
	0.02	Evaporite SAND, grey/black					8.3	6.1	2.2	2	7.9	< 0.02	< 0.005	< 0.02	< 0.02	0.12	
	0.5	CLAY, red CLAY, red					8 7.9	8.3 8.2	0.3	4	8.1 8.3	< 0.02	< 0.005	< 0.02	< 0.02	0.43	
	1.5	CLAY, red					7.7	7.2	0.5	2							
Т6	2	CLAY, red					7.7	7.1	0.6	2							NASS
	2.5 3	CLAY, red CLAY, red					7.6 7.7	7 7.1	0.6	2	8.4	< 0.02	< 0.005	< 0.02	< 0.02	1.2	
	3.5	CLAY, red					7.8	7.1	0.7	2							
	4	CLAY, red SAND, light brown	7.2	5.522	1.7	1	7.8	7.2	0.6	2							
	0.01*	Black Ooze	8	5.4	2.6	2	8.3	5.0	3.3	3	7.5	< 0.02	0.014	< 0.02	<0.02	0.07	
	0.05	Clay, brown Clay, red/brown	7.7 7.8	6.1 6.1	1.6	2	6.9	8.2	1.3	4	8.1	< 0.02	< 0.005	< 0.02	<0.02	0.38	
т7	0.29	silty Clay, light brown	7.9	6.1	1.8	2											NASS
	0.3	silty CLAY, red	7.9	6	1.9 1.9	2	8.1	6.5	1.6	3	7.7	< 0.02	0.006	< 0.02	<0.02	0.04	
	2	CLAY, brown CLAY, red/brown	7.9 7.8	6	1.9	2	6.3	6.9	0.6	1	8.3	< 0.02	< 0.005	< 0.02	<0.02	0.44	
	5	CLAY, red/brown	8.1	6.2	1.9	1	7.9	7.3	0.6	2	8.5	< 0.02	0.006	< 0.02	<0.02	0.71	
	0.03	SAND, light brown sandy CLAY, red/brown	8.2 7.8	5.8 5.8	2.4	1	8.2 7.4	6.8 7.1	1.4 0.3	2	7.5 8.1	< 0.02	< 0.005	< 0.02	<0.02	0.07	
	1	CLAY, red/brown	7.9	5.9	2.0	1											
	1.5	CLAY, red/brown	7.9	5.8	2.1	1	6.6	6.9	0.3	2	8.3	< 0.02	0.005	< 0.02	<0.02	0.47	
Т8	2	CLAY, red/brown CLAY, red/brown	8	5.9 5.9	2.1 2.1	1											NASS
	3	CLAY, red/brown	7.7	5.9	1.8	1	7	7.4	0.4	2	8.4	< 0.02	0.008	< 0.02	<0.02	0.54	
	3.5 4	CLAY, red/brown CLAY, red/brown	8 7.6	5.9 5.9	2.1	1											
	4.5	CLAY, red/brown	7.9	5.9	2.0	1	6.9	7.1	0.2	2	8.4	< 0.02	0.006	< 0.02	<0.02	0.64	
	0.5	sandy CLAY, dark brown/red					7.7	6.9	0.8	4	8.1	< 0.02	< 0.005	< 0.02	< 0.02	0.83	
	1	CLAY, red CLAY, red/grey					7.6 7.7	6.6 7.0	1	2	8.4	< 0.02	0.016	< 0.02	0.02	0.91	
	2	CLAY, red					7.9	7.4	0.5	4							
Т9	2.5 3	CLAY, red CLAY, red					7.8 7.9	7.4 7.6	0.4	4							NASS
15	3.5	CLAY, red					7.8	7.2	0.6	2							NA33
	4	CLAY, red					7.9	7.7	0.2	4							
	4.5 5	CLAY, red CLAY, red					7.9 7.8	7.9 7.4	0	4							
	6	CLAY, red/brown/green					8.0	7.5	0.5	4	8.4	< 0.02	0.006	< 0.02	< 0.02	0.66	
	0.5	evaporite SAND, brown evaporite SAND, dark grey/black					8 7.8	7	1	2	8.3	< 0.02	< 0.005	< 0.02	< 0.02	0.6	
	1.5	clayey SAND, brown/orange					7.5	6.6	0.8	3	7.2	< 0.02	< 0.005	< 0.02	< 0.02	0.12	
	2	evaporite CLAY, tan					7.3	6.9	0.4	4							
T11	3.5 4	evaporite SAND, mottled CLAY, olive brown					7.3 7.5	6.5 7.6	0.8	4	7.4	< 0.02	< 0.005	< 0.02	< 0.02	0.16	NASS
	4.5	evaporite sandy CLAY, mottled brown					7.5	7.1	0.4	4	7.4	< 0.02	< 0.005	< 0.02	< 0.02	0.21	
	5	sandy CLAY, orange/brown evaporite SAND, cream/orange					7.4 7.6	7.6 7.2	0.2	4							
	0.01	evaporite SAND, cream/orange Black Ooze					7.6	6.8	0.4	4	8.2	< 0.02	< 0.005	< 0.02	< 0.02	0.4	
	0.45	gypsum SAND, brown					8.0	7.1	0.9	3	8.4	< 0.02	< 0.005	< 0.02	< 0.02	0.71	
	0.5	SAND, brown SAND, brown					7.9 7.9	6.9 6.9	1	3	8.3	< 0.02	< 0.005	< 0.02	< 0.02	0.53	
	1	CLAY, red					7.3	7.3	0	3							
	1.5	CLAY, red					7	6.5	0.5	3							
T12	2	CLAY, brown gypsum SAND, cream					7 7.4	6.3 6.6	0.7	4	6.9 7.3	< 0.02	< 0.005	< 0.02	< 0.02	0.16	NASS
	3	sandy CLAY, brown					7.2	6.6	0.6	4							
	3.5 4	CLAY, brown gypsum SAND, cream					7.2 7.3	7.2 6.4	0	4	7.5	< 0.02	< 0.005	< 0.02	< 0.02	0.19	
	4.5	CLAY, red/grey					7.5	7.9	0.4	4							
	5	CLAY, red/brown/green					7.6	7.4	0.2	3	7.7	< 0.02	< 0.005	< 0.02	< 0.02	0.36	
	6 10	CLAY, brown CLAY, red					7.6 7.1	7.0 6.5	0.6	3	6.9	< 0.02	< 0.005	< 0.02	< 0.02	0.16	
	0	Black Ooze	7.4	5.9	1.5	2	7.8	6.6	1.2	4	8.3	< 0.02	0.016	< 0.02	0.02	0.5	
T14	0.5	silty SAND, red/brown CLAY, red/brown	7.8 7.7	6.2 6.2	1.6 1.5	2	7.4	7.9 7.8	0.5	4	7.9 8.2	< 0.02	< 0.005	< 0.02	< 0.02	0.46	NASS
$\vdash$	0	Black Ooze	8	5.6	2.4	2						~ 0.02					
T15	0.05	SAND, brown	7.9	6.4	1.5	2	7.6	8.3	0.7	4	8	< 0.02	< 0.005	< 0.02	< 0.02	0.44	NASS
	0.5	sandy CLAY, red/brown Black Ooze	7.8 7.4	6.1 5.7	1.7 1.7	1	7.5 7.6	8.1 6.6	0.6	4	8	< 0.02	< 0.005	< 0.02	< 0.02	0.22	
	-	··· ··· =		L	. <u> </u>	-	· ···		-	ı –							



		1			d Analysis			Labora	tory Analy	315							
													Chromium	Reducible Sulfur Suit	e		
ore le ID		Simplified Lithology	рН <sub>Е</sub>	рН <sub>ғох</sub>	pH <sub>change</sub>	Reaction	рН <sub>Е</sub>	pH <sub>FOX</sub>	pH <sub>change</sub>	Reaction	рН-КСІ	TAA equiv. S% pyrite	CRS (%S)	Net Acidity (%S)	Net Acidity (%S) - ANC (%S)	ANC (%S)	ASS Interpreta
		Assessment Criteria:	< 5.5	< 3.0	> -3	> 2	< 5.5	< 3.0	> 3	> 2	< 5.5	0.03	0.03	0.03	0.03	1	
16	0.03	silty SAND, red/brown	7.6	6.5	1.1	2											NAS
10	1	clayey SAND, red/brown	7.7	6	1.7	2	7.5	7.9	0.4	4	8	< 0.02	< 0.005	< 0.02	< 0.02	0.36	NA3
	1.0A	SAND, grey	7.5	5.8	1.7	1	7.6	8.2	0.6	4	7.5	< 0.02	< 0.005	< 0.02	< 0.02	0.12	
	0.03	Black ooze					8.2	5.1	3.1	4	7.7	< 0.02	0.12	< 0.02	0.12	0.47	PA
	0.06	evaporite SAND, grey					7.6	7.4	0.2	4	7.7	< 0.02	< 0.005	< 0.02	< 0.02	0.09	
	0.5	evaporite CLAY, brown					7.8	8.7	0.9	4	7.6	< 0.02	< 0.005	< 0.02	< 0.02	0.21	
	1	CLAY, brown					7.5	8	0.5	4	8.1	< 0.02	< 0.005	< 0.02	< 0.02	0.6	
0	1.5	CLAY, brown					7.6	6.9	0.7	4	7.9	< 0.02	< 0.005	< 0.02	< 0.02	0.47	
	2	evaporite SAND, grey					7.9	8.3	0.4	4	8.6	< 0.02	< 0.005	< 0.02	< 0.02	3.9	NA
	2.5	CLAY, olive					7.8	7.3	0.5	2	8.5	< 0.02	< 0.005	< 0.02	< 0.02	0.74	
	3	CLAY, brown					7.7	6.9	0.8	2							
	3.5	CLAY, brown					7.8	6.9	0.9	2							
	6	CLAY, brown					7.6	6.8	0.8	2	8.2	< 0.02	< 0.005	< 0.02	< 0.02	0.81	
	0	Black Ooze	8.1	6.2	1.9	1	8.1	7.6	0.5	4	8.3	< 0.02	0.005	< 0.02	< 0.02	0.41	
	0.05	sandy CLAY, brown	7.7	6.2	1.5	2	7.6	6.9	0.7	2	8.2	< 0.02	< 0.005	< 0.02	< 0.02	0.46	
	0.5	CLAY, red	7.6	5.8	1.8	1	7.5	7.8	0.3	4	8.1	< 0.02	< 0.005	< 0.02	< 0.02	0.33	
	1	CLAY, brown	7.5	6.1	1.4	2	7.5	8.1	0.6	4	8.1	< 0.02	< 0.005	< 0.02	< 0.02	0.62	
	1.5	CLAY, red	7.6	6	1.6	1											
	2	sandy CLAY, red	7.5	5.9	1.6	1	7.6	7	0.6	2	8.3	< 0.02	< 0.005	< 0.02	< 0.02	0.63	
1	2.5	CLAY, red	7.7	5.8	1.9	1											N
	3	CLAY, red	7.7	5.8	1.9	1	7.9	7.2	0.7	2	8.4	< 0.02	< 0.005	< 0.02	< 0.02	0.79	
	3.5	CLAY, red	7.8	6	1.8	1											
	4	CLAY, red	7.7	5.8	1.9	1	7.7	7.1	0.6	3	8.4	< 0.02	< 0.005	< 0.02	< 0.02	0.92	
	4.5	CLAY, red	7.7	5.9	1.8	1											
	5	CLAY, red	7.8	5.8	2.0	1	7.8	7.3	0.5	3	8.5	< 0.02	< 0.005	< 0.02	< 0.02	0.87	1
	5.5	CLAY, red	7.7	5.7	2.0	1											
	0.03	Black Ooze	7.4	5.6	1.8	1	7.6	6.8		2	8.1	< 0.02	< 0.005	< 0.02	<0.02	0.19	
	0.5	SAND, light brown	7.6	5.8	1.8	1	7.8	6.9		2	8	< 0.02	0.005	< 0.02	<0.02	0.18	
	1	CLAY, red/brown	7.8	5.9	1.9	1	6.8	7.2		3	7.7	< 0.02	< 0.005	< 0.02	<0.02	0.14	
	1.5	CLAY, red/brown	7.8	5.9	1.9	1											1
22	2	CLAY, red/brown	7.7	6	1.7	1											N/
~	2.5	CLAY, red/brown	7.9	6.1	1.8	2	6.3	7.5		3	8.8	< 0.02	0.014	< 0.02	<0.02	0.99	N/
	3	CLAY, red/brown	7.9	5.9	2.0	1											
	3.5	CLAY, red/brown	7.9	5.8	2.1	1											
	4	CLAY, green	8	6	2.0	2	6.7	7.7		3	8.7	< 0.02	< 0.005	< 0.02	<0.02	0.58	
	6	silty CLAY, green/brown	8	5.8	2.2	1											
	0.02	evaporatite SAND, grey/black organic material					7.5	6.5	1	2	7.8	< 0.02	< 0.005	< 0.02	< 0.02	0.45	NA
	0.02b	Black ooze					8.4	5	3.4	2	8.2	< 0.02	0.062	< 0.02	0.06	0.41	PA
Р	0.3	CLAY, red/brown					7.4	7.5	0.1	4	7.6	< 0.02	< 0.005	< 0.02	< 0.02	0.32	
	2	CLAY, mottled red/ brown/ tan/olive					7.9	7.9	0	4	8.1	< 0.02	< 0.005	< 0.02	< 0.02	0.58	NA
	6	CLAY, red/brown					7.8	7.6	0.2	4							1

PASS: Potential Acid Sulfate Soil

AASS: Actual Acid Sulfate Soil

ANC: Acid Neutralising Capacity

\*Mislabeled as T7\_0.1 in lab report

#### Agrimin Lake Mackay Table 2: Soil Metal Results

360	
environmental	

Sample ID			Assessment Criteria	T2 0	T6 0.02	T11_1.0	T11 4.5	T12_0.01	T12 0.5	T12 2.5	T14 0.5	T15_0.5	T20_1.0
			A33033inchi Chicha						_				
Laboratory ID				P17-Au28569	P17-No25779	P17-No02825	P17-No02823	P17-No02826	P17-No02832	P17-No02829	P17-Au28572	P17-Au28576	P17-No25785
Sample Date			EIL	13/08/2017	26/10/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	27/09/2017	13/08/2017	15/08/2017	30/10/2017
Laboratory	Unit	LOR		Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Simplified Lithology				Black Ooze	Evaporite SAND, grey/black	Evaporite SAND, dark grey/black	Evaporite sandy CLAY, mottled brown	Black Ooze	SAND, brown	Gypsum SAND, cream	SILTY SAND, red/brown	SANDY CLAY red/brown	CLAY, brown
Heavy Metals													
Aluminium	mg/kg	10		9600	1100	4300	15000	2700	2600	7500	12000	9300	44000
Arsenic	mg/kg	2	100	< 2	< 2	< 2	2.1	< 2	< 2	< 2	2	< 2	3.9
Cadmium	mg/kg	0.4		< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	mg/kg	5	190**	18	< 5	7.7	18	< 5	< 5	8.5	20	16	44
Copper	mg/kg	5	60**	7.8	< 5	< 5	11	< 5	< 5	8.9	9.6	7.7	25
Iron	mg/kg	20		16000	1500	6400	17000	3500	3300	8900	17000	14000	52000
Lead	mg/kg	5	1100	< 5	< 5	< 5	9.3	6.1	< 5	< 5	< 5	< 5	22
Mercury	mg/kg	0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	30**	5.7	< 5	< 5	7.8	< 5	< 5	< 5	6.1	5.1	19
Uranium	mg/kg	10	23***		<10	<10	<10	<10	<10	<10			<10
Zinc	mg/kg	5	70**	28	< 5	14	21	10	5.2	10	25	15	48

Acronyms:

LOR = limits of reporting

mg/kg = milligrams per kilogram

"---" = criteria have not been derived for these chemical constituents/compounds.

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

\*\*\*In the absence of EIL values for Uranium, the soil standards for the protection of human health from Canada (Nova Scotia) have been adopted.

Font and Cell :

- Coloured cells indicate exceedence of relevant assessment criteria

- Bolded analytical data indicates detection above LOR Ecological Investigation Level - Urban Residential/ Open Public Space

#### Agrimin Lake Mackay Table 2: Soil Metal Results

360	
environmental	

									_				
Sample ID	)		Assessment Criteria	T20_2.5	T21_0	T21_1.0	T21_2.0	T5_0.05	T7_0.05	T8_0.5	T22_0.03	T22_2.5	T22_4.0
Laboratory ID	)			P17-No25788	P17-Au28581	P17-Au28584	P17-Au28586	P17-Se27802	P17-Se27807	P17-Se27813	P17-Se27817	P17-Se27820	P17-Se27821
Sample Date	9		EIL	30/10/2017	15/08/2017	17/08/2017	17/08/2017	14/09/2017	14/09/2017	13/09/2017	13/09/2017	13/09/2017	13/09/2017
Laboratory	/ Unit	LOR		Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT	Eurofins MGT
Simplified Lithology	1			CLAY, olive	Black Ooze	Clay, brown	SANDY CLAY, red	Black Ooze	CLAY, brown	SANDY CLAY, red/brown	Black Ooze	CLAY, red/brown	CLAY, green
Heavy Metals													
Aluminium	mg/kg	10		32000	5600	9500	38000	760	14000	46000	1800	38000	43000
Arsenic	mg/kg	2	100	4.2	< 2	< 2	4	< 2	2.6	5.1	< 2	4.2	4.6
Cadmium	mg/kg	0.4		< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.5
Chromium	mg/kg	5	190**	35	12	16	47	< 5	22	54	< 5	33	48
Copper	mg/kg	5	60**	35	7.5	11	19	< 5	11	20	< 5	23	22
Iron	mg/kg	20		43000	7900	12000	39000	1300	18000	47000	2100	34000	45000
Lead	mg/kg	5	1100	11	< 5	< 5	12	< 5	5.4	15	< 5	19	12
Mercury	mg/kg	0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	30**	13	< 5	5.4	17	< 5	6.7	20	< 5	23	21
Uranium	mg/kg	10	23***	<10				<10	<10	<10	<10	<10	<10
Zinc	mg/kg	5	70**	45	17	30	44	< 5	26	54	< 5	54	56

Acronyms:

LOR = limits of reporting

mg/kg = milligrams per kilogram

"---" = criteria have not been derived for these chemical constituents/compounds.

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

\*\*\*In the absence of EIL values for Uranium, the soil standards for the protection of human health from Canada (Nova Scotia) have been adopted.

Font and Cell :

- Coloured cells indicate exceedence of relevant assessment criteria

- Bolded analytical data indicates detection above LOR Ecological Investigation Level - Urban Residential/ Open Public Space



			1			
Sample ID			Assessment Criteria	PP_0.02	PP_0.02B	PP_2.0
Laboratory ID				P17-No25775	P17-No25776	P17-No25778
Sample Date			EIL	Not Provided	Not Provided	Not Provided
Laboratory	Unit	LOR		Eurofins MGT	Eurofins MGT	Eurofins MGT
Simplified Lithology				evaporatite SAND, grey/black organic material	Black Ooze	CLAY, mottled red/ brown/ tan/olive
Heavy Metals						
Aluminium	mg/kg	10		7500	6400	38000
Arsenic	mg/kg	2	100	< 2	< 2	5.7
Cadmium	mg/kg	0.4		< 0.4	< 0.4	< 0.4
Chromium	mg/kg	5	190**	15	13	66
Copper	mg/kg	5	60**	5.9	5.4	24
Iron	mg/kg	20		11000	10000	49000
Lead	mg/kg	5	1100	< 5	< 5	21
Mercury	mg/kg	0.1		< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	30**	< 5	< 5	19
Uranium	mg/kg	10	23***	<10	<10	16
Zinc	mg/kg	5	70**	22	19	67

Acronyms:

LOR = limits of reporting

mg/kg = milligrams per kilogram

"---" = criteria have not been derived for these chemical constituents/compounds.

\*\*In the absence of site specific soil parameters, the most conservative EILs have been adopted

\*\*\*In the absence of EIL values for Uranium, the soil standards for the protection of human health from Canada (Nova Scotia) have been adopted.

Font and Cell :

- Coloured cells indicate exceedence of relevant assessment criteria

- Bolded analytical data indicates detection above LOR Ecological Investigation Level - Urban Residential/ Open Public Space

#### Agrimin Limited Table 3: Field and Laboratory QA/QC



Sample Type			Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Duplicate	
Sample ID			T2 0	QC1		T2 0	QC1		T2 0.05	QC2		T14 0	QC3		T15 0	QC4	
Laboratory Sample ID	Unit	LOR			RPD		_ :	RPD	-		RPD	-		RPD		-	RPD
Sample Date	onit	2011	13/08/2017	17/08/2017	14 5	13/08/2017	17/08/2017	10.0	13/08/2017	13/08/2017	11.5	13/08/2017	13/08/2017	14 5	15/08/2017	15/08/2017	10.5
Laboratory			Field Result	Field Result		Eurofins MGT			Field Result	Field Result		Field Result	Field Result		Field Result	Field Result	
Laboratory pHf and pHox	<u> </u>		r loid rtoodit	Tiola Hoodil		Editorino ino i	Editorino filo f		T Iold Hobdit	r ioid ricodair		r Ioid Hobdit	riola resourc		r loid r lobait	Tiola Hobalt	
pHfield	pH Units	0.1	7.4	7.4	0%	7.6	7.4	3%	7.4	7.5	1%	7.4	7.4	0%	8.0	8.0	0%
pHfox	pH Units	0.1	6.3	6	5%	7.1	6.7	6%	6.1	5.8	5%	5.9	6.0	2%	5.6	5.5	2%
Heavy Metals			•														
Aluminium	mg/kg	10				9600	6000	46%									
Arsenic	mg/kg	2				< 2	< 2	NA									
Cadmium	mg/kg	0.4				< 0.4	< 0.4	NA									
Chromium	mg/kg	5				18	13	32%									
Copper	mg/kg	5				7.8	5.6	33%									
Iron	mg/kg	20				16000	8200	64%									
Lead	mg/kg	5				< 5	< 5	NA									
Uranium	mg/kg	10															
Mercury	mg/kg	0.1				< 0.1	< 0.1	NA									
Nickel	mg/kg	5				5.7	< 5	NA									
Zinc	mg/kg	5				28	21	29%									
									-								
pH-KCL	pH Units	0.1				8.2	8.3	1%									
TAA equiv. S% pyrite	% pyrite S	0.02				< 0.02	< 0.02	NA									
CRS	%S	0.005				< 0.005	0.005	NA									
Net Acidity	%S	0.02				< 0.02	< 0.02	NA									
Net Acidity (%S) - ANC (%S)	% S	0.02				< 0.02	< 0.02	NA									
ANC	%S	0.02				0.42	0.36	15%									

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs is 30%)

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

#### Agrimin Limited Table 3: Field and Laboratory QA/QC



											1			
	Duplicate	Primary		Duplicate	Primary		Duplicate	Primary		Duplicate	Primary			Sample Type
	QC1	T5_0.05		QC6	T16_0.03		QC7	T21_0		QC5	T16_0			Sample ID
RPD	-	-	RPD	-	-	RPD	-	-	RPD	-	-	LOR	Unit	Laboratory Sample ID
	14/09/2017	14/09/2017		13/08/2017	13/08/2017		15/08/2017	15/08/2017		17/08/2017	13/08/2017			Sample Date
	Field Result	Field Result		Field Result	Field Result		Field Result	Field Result		Field Result	Field Result			Laboratory
														Laboratory pHf and pHox
6%	8.3	7.9	1%	7.5	7.6	6%	8.4	8.1	8%	8.0	7.4	0.1	pH Units	pHfield
4%	5.5	5.7	2%	6.4	6.5	0%	6.2	6.2	19%	6.9	5.7	0.1	pH Units	pHfox
														Heavy Metals
												10	mg/kg	Aluminium
												2	mg/kg	Arsenic
												0.4	mg/kg	Cadmium
												5	mg/kg	Chromium
												5	mg/kg	Copper
												20	mg/kg	Iron
												5	mg/kg	Lead
												10	mg/kg	Uranium
												0.1	mg/kg	Mercury
												5	mg/kg	Nickel
												5	mg/kg	Zinc
												0.1	pH Units	pH-KCL
												0.02	% pyrite S	TAA equiv. S% pyrite
												0.005	%S	CRS
												0.02	%S	Net Acidity
												0.02	% S	Net Acidity (%S) - ANC (%S)
												0.02	%S	ANC
						   					  	0.1 0.02 0.005 0.02 0.02	pH Units % pyrite S %S %S % S	pH-KCL TAA equiv. S% pyrite CRS Net Acidity Net Acidity (%S) - ANC (%S)

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs is 30%)

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

#### Agrimin Limited Table 3: Field and Laboratory QA/QC



Sample Type			Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Duplicate	
Sample ID			T5_0.05	QC1		T8_0.03	QC2		T8_0.03	QC2		T12_0.5	QC1		T12_2.5	QC2	
Laboratory Sample ID	Unit	LOR	P17-Se27802	P17-Se27805	RPD	-	-	RPD	P17-Se27811	P17-Se27812	RPD	P17-Oc21182	P17-Oc21188	RPD	P17-Oc21178	P17-Oc21189	RPD
Sample Date			14/09/2017	14/09/2017		13/09/2017	13/09/2017		13/09/2017	13/09/2017		27/09/2017	27/09/2017		27/09/2017	27/09/2017	
Laboratory			Eurofins MGT	Eurofins MGT		Field Result	Field Result		Eurofins MGT	Eurofins MGT		Eurofins MGT	Eurofins MGT		Eurofins MGT	Eurofins MGT	
Laboratory pHf and pHox																	
pHfield	pH Units	0.1	7.8	8.2	5%	8.2	7.9	6%	8.2	7.9	4%	7.9	7.9	0%	7.4	7.4	0%
pHfox	pH Units	0.1	6.5	5.2	22%	5.8	5.6	4%	6.8	6.7	1%	6.9	6.6	4%	6.6	6	10%
Heavy Metals																	
Aluminium	mg/kg	10	760	1700	76%							2600	3000	14%	7500		
Arsenic	mg/kg	2	< 2	< 2	NA							< 2	< 2	NA	< 2		
Cadmium	mg/kg	0.4	< 0.4	< 0.4	NA							< 0.4	< 0.4	NA	< 0.4		
Chromium	mg/kg	5	< 5	5.3	NA							< 5	5.1	NA	8.5		
Copper	mg/kg	5	< 5	< 5	NA							< 5	< 5	NA	8.9		
Iron	mg/kg	20	1300	2100	47%							3300	3700	11%	8900		
Lead	mg/kg	5	< 5	< 5	NA							< 5	< 5	NA	< 5		
Uranium	mg/kg	10	<10	<10	NA												
Mercury	mg/kg	0.1	< 0.1	< 0.1	NA							< 0.1	< 0.1	NA	< 0.1		
Nickel	mg/kg	5	< 5	< 5	NA							< 5	< 5	NA	< 5		
Zinc	mg/kg	5	< 5	5.9	NA							5.2	5.8	11%	10		
pH-KCL	pH Units	0.1	7	7.4	6%				7.5	7.4	1%	8.3	9	8%			
TAA equiv. S% pyrite	% pyrite S	0.02	< 0.02	< 0.02	NA				< 0.02	< 0.02	NA	< 0.02	< 0.02	NA			
CRS	%S	0.005	0.01	0.014	33%				< 0.005	0.007	NA	< 0.005	0.008	NA			
Net Acidity	%S	0.02	<0.02	< 0.02	NA				< 0.02	< 0.02	NA	< 0.02	< 0.02	NA			
Net Acidity (%S) - ANC (%S)	% S	0.02	< 0.02	< 0.02	NA				< 0.02	< 0.02	NA	< 0.02	< 0.02	NA			
ANC	%S	0.02	0.04	0.08	67%				0.07	0.05	33%	0.53	1.9	113%			

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs is 30%)

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory



		C																				
		Sample ID	TRENCH 16					PILOT POND PP#2			TRENCH16	TRENCH2	TRENCH5	TRENCH14	TRENCH14	TRENCH16				TRENCH 22		
		Date	5/9/17	30/9/17	30/9/17	7/10/17	2/10/17	2/10/17	2/10/17	Not Provided	Not provided	4/9/17	4/9/17	16/8/17	2/9/17	16/8/17	2/9/17	23/11/17	31/10/17	6/11/17	31/10/17	6/11/17
		Laboratory	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek	Intertek
Analyte	Unit	LOR																				
Ca	mg/L	1	467	458	465	466	413	271	281	447	445	358	444	462	463	455	412	661	693	686	403	395
CL	mg/L	10	166510	169190	165610	168300	150390	141440	143230	164400	161100	174800	164900	162300	164100	163200	169400	120530	116100	120530	171930	166620
CI:SO4 ratio	g/L	0.01	11.56	9.54	7.54	8.14	6.90	7.72	7.97	7.44	7.31							6.49	6.37	6.43	7.33	7.01
Ion Bal	%									-1	0											
К	mg/L	2	3631	3624	3646	3635	3434	2725	2808	3410	3342	3920	3998	3809	3815	3763	3793	2907	2970	3103	3922	3805
Mg	mg/L	1	2848	2883	3688	3678	5411	9045	7594	3874	2892	3496	3408	3358	3408	2578	2618	1884	1932	2008	3570	3469
Na	mg/L	2	109802	111226	110859	111131	97631	84169	87700	106133	106071	120048	114494	113246	113415	113354	116455	76592	78947	82167	113511	110441
S	mg/L	5	4806	5922	7333	6906	7275	6114	6000	7380	7359	8028	7612	7218	7345	7433	7646	6197	6088	6259	7825	7935
SO4	mg/L	15	14399	17742	21967	20688	21793	18316	17973	22108	22046							18564	18237	18750	23441	23772
Specific Gravity	N/A	0.001	1.20	1.20	1.20	1.20	1.19	1.17	1.18	1.20	1.19							1.15	1.16	1.15	1.20	1.20
TDS	g/Kg	0.02	251.18	257.19	256.47	257.05	235.15	229.02	228.54	257.85	252.37							198.25	199.17	202.46	265.62	262.39
EC	ms/CM	0.01																>200.00	>200.00	>200.00	>200.00	>200.00



# APPENDIX A

DOW Water Information Reporting Data



## Site reference 120670009 - Gibson Desert North - Company - Company

# **Alternative Site References**

Numbering System	Reference Code	Site Name	Short Name
AWRC	120670009	Gibson Desert North - Company	Company
TEXT_HIST	2670009	GIBSON DESERT NORTH - COMPANY	Company
WIN_ID	23087686		Company

# **General Details**

Site Type	Groundwater	Sub Type	Bore or Well	Site Geofeature	Ground
Northing	7504992	Easting	450003	Zone	52
Latitude	-22.561024061	Longitude	128.513698918	Spheroid	GDA94
Thou250 Map Index	SF5210	Geographic Precision (+/- m)			
Local Govt Authority	SHIRE OF EAST PILBARA	Locality	GIBSON DESERT NORTH	DWER Region	North West
Catchment	Basin Mackay	Estuary		BOM Rainfall District	13 - Northeast
River Basin	1206 - Mackay Basin	Groundwater Area	Canning-Kimberley	Groundwater Province	Combined Fractured Rock
Surface Water Area	Mackay Basin	Surface Water SubArea	Mackay Basin	GgStn Catchment Area (km2)	N/A
Site Comment	Bore MA02				

# Depth Measurement Points (Site reference: 120670009)

	Elevation (m as per Datum Plane)		Measurement Method	Date	Comments
Ground level	0	GL	Unknown	09/08/2015	

Drilling - No Data Available



## Borehole Information (Site reference: 120670009)

Completed Date	9/08/2015	Drill Method Name	See Comment		
Owner Name	Agrimin Ltd	Drill Rig Name	Unknown		
Drill Company Name	Colling Exploration	Total Construction Depth (mbGL)	15.35	Depth Drilled (mbGL)	16.7
Comments	Method: Aircore				

Casing (Site reference: 120670009)

From (mbGL)	To (mbGL)	Element	Material	Inlet Type	Inside Dia. (mm)	Outside Dia. (mm)	Aperture (mm)	Comments
-0.350	15.350	Inlet (screen)	Unknown	Unknown		114	0.800	
0.000	15.350	Casing	PVC - Class 9	Not applicable		114		

# Fill (Site reference: 120670009)

From (mbGL)	To (mbGL)	Fill Type	Material Type	Fill Volume (m3)	Grain Size (mm)
0.000	15.350	Annular Fill	Unknown		

Aquifers - No Data Available

## Lithology Log (Site reference: 120670009)

From (mbGL)	To (mbGL)	Interpreted By	Substance	Lithological Description
0.000	0.600	Driller		Brown clay
0.600	1.800	Driller		Red brown clay
1.800	2.200	Driller		Fine cemented gypsum sand
2.200	16.000	Driller		Red brown clay with traces of gypsum
16.000	16.700	Driller		Weathered rock hard white siliceous unit



Stratigraphy Log - No Data Available

Advanced Data Summary - No Data Available



## Site reference 120670010 - Gibson Desert North - Company - Company

# Alternative Site References

Numbering System	Reference Code	Site Name	Short Name
AWRC	120670010	Gibson Desert North - Company	Company
TEXT_HIST	2670010	GIBSON DESERT NORTH - COMPANY	Company
WIN_ID	23087900		Company

# **General Details**

Site Type	Groundwater	Sub Type	Bore or Well	Site Geofeature	Ground
Northing	7515003	Easting	499801	Zone	52
Latitude	-22.471320158	Longitude	128.998065638	Spheroid	GDA94
Thou250 Map Index	SF5210	Geographic Precision (+/- m)			
Local Govt Authority	SHIRE OF EAST PILBARA	Locality	GIBSON DESERT NORTH	DWER Region	North West
Catchment	Basin Mackay	Estuary		BOM Rainfall District	13 - Northeast
River Basin	1206 - Mackay Basin	Groundwater Area	Canning-Kimberley	Groundwater Province	Combined Fractured Rock
Surface Water Area	Mackay Basin	Surface Water SubArea	Mackay Basin	GgStn Catchment Area (km2)	N/A
Site Comment					

# Depth Measurement Points (Site reference: 120670010)

Measurement Point Type	Elevation (m as per Datum Plane)	Datum	Measurement Method	Date	Comments
Ground level	0	GL	Unknown	16/08/2015	

Drilling - No Data Available



Borehole Information (Site reference: 120670010)

Completed Date	16/08/2015	Drill Method Name	See Comment		
Owner Name	Agrimin Ltd	Drill Rig Name	Unknown		
Drill Company Name	Colling Exploration	Total Construction Depth (mbGL)	30	Depth Drilled (mbGL)	30
Comments	Method: Aircore				2

Casing (Site reference: 120670010)

From (mbGL)	To (mbGL)	Element	Material	Inlet Type	Inside Dia. (mm)	Outside Dia. (mm)	Aperture (mm)	Comments
0.000	30.000	Casing	PVC - Class 9	Not applicable		114		
3.000	30.000	Inlet (screen)	PVC - Class 9	Unknown		114	0.800	

# Fill (Site reference: 120670010)

From (mbGL)	To (mbGL)	Fill Type	Material Type	Fill Volume (m3)	Grain Size (mm)
0.000	30.000	Annular Fill	Unknown		

Aquifers - No Data Available



Lithology Log (Site reference: 120670010)

From (mbGL)	To (mbGL)	Interpreted By	Substance	Lithological Description
0.000	0.600	Driller		COARSE GYPSUM SAND
0.600	2.700	Driller		RED BROWN CLAY TO SANDY CLAY
2.700	3.000	Driller		CRYSTALLINE GYPSUM
3.000	15.000	Driller		RED BROWN CLAY WITH TRACES OF GYPSUM
15.000	16.500	Driller		COARSE CRYSTALLINE GYPSUM
16.500	30.000	Driller		RED BROWN CLAY WITH TRACES OF GYPSUM

Stratigraphy Log - No Data Available

Advanced Data Summary - No Data Available



#### Site reference 120670011 - Gibson Desert North - Company - Company

# Alternative Site References

Numbering System	Reference Code	Site Name	Short Name
AWRC	120670011	Gibson Desert North - Company	Company
TEXT_HIST	2670011	GIBSON DESERT NORTH - COMPANY	Company
WIN_ID	23087901		Company

# **General Details**

Site Type	Groundwater	Sub Type	Bore or Well	Site Geofeature	Ground
Northing	7535004	Easting	490003	Zone	52
Latitude	-22.290599214	Longitude	128.902950470	Spheroid	GDA94
Thou250 Map Index	SF5210	Geographic Precision (+/- m)			
Local Govt Authority	SHIRE OF EAST PILBARA	Locality	GIBSON DESERT NORTH	DWER Region	North West
Catchment	Basin Mackay	Estuary		BOM Rainfall District	13 - Northeast
River Basin	1206 - Mackay Basin	Groundwater Area	Canning-Kimberley	Groundwater Province	Combined Fractured Rock
Surface Water Area	Mackay Basin	Surface Water SubArea	Mackay Basin	GgStn Catchment Area (km2)	N/A
Site Comment					

# Depth Measurement Points (Site reference: 120670011)

Measurement Point Type	Elevation (m as per Datum Plane)	Datum	Measurement Method	Date	Comments
Ground level	0	GL	Unknown	19/08/2015	

Drilling - No Data Available



Borehole Information (Site reference: 120670011)

Completed Date	19/08/2015	Drill Method Name	See Comment		
Owner Name	Agrimin Ltd	Drill Rig Name	Unknown		
Drill Company Name	Colling Exploration	Total Construction Depth (mbGL)	25.5	Depth Drilled (mbGL)	26
Comments	Method: Aircore				

Casing (Site reference: 120670011)

From (mbGL)	To (mbGL)	Element	Material	Inlet Type	Inside Dia. (mm)	Outside Dia. (mm)	Aperture (mm)	
0.000	25.500	Casing	PVC - Class 9	Not applicable		114		
7.500	25.500	Inlet (screen)	PVC - Class 9	Unknown		114	0.800	

#### Fill (Site reference: 120670011)

From (mbGL)	To (mbGL)	Fill Type	Material Type	Fill Volume (m3)	Grain Size (mm)
0.000	26.000	Annular Fill	Unknown		

Aquifers - No Data Available

## Lithology Log (Site reference: 120670011)

From (mbGL)	To (mbGL)	Interpreted By	Substance	Lithological Description
0.000	0.600	Driller		GYPSUM SAND
0.600	25.500	Driller		BROWN CLAY
25.500	26.000	Driller		IRONSTONE: Probably ferruginous sandstone

Stratigraphy Log - No Data Available

Advanced Data Summary - No Data Available





ID	Bore Name	Zone	Easting	Northing	Location	Asset Owner	Use	Start Date	Status
120670009	BORE	52	450003	7504992	within site area	Agirim Ltd	Unknown	Unknown	Unknown
120670010	BORE	52	499801	7515003	within site area	Agirim Ltd	Unknown	Unknown	Unknown
120670011	BORE	52	490003	7535004	within site area	Agirim Ltd	Unknown	Unknown	Unknown



# APPENDIX B

Technical Standard Operating Procedures and Sampling and Analysis Plan Our Ref: 2225 BA

360 environmental

30 June 2017

Michael Hartley Hydrogeologist Agrimin Limited 2C Loch Street Nedlands WA 6009 Via Email: mhartley@agrimin.com.au

Dear Michael

# Acid Sulfate Soil Characterisation Sampling and Analysis Plan – Lake Mackay SOP

360 Environmental is pleased to present the following sampling and analysis plan to assist Agrimin Potash Pty Ltd (Agrimin) in in undertaking the field portion of the acid sulfate soil (ASS) investigation to ensure that sample collection meets the project objectives and is undertaken in accordance with the required regulatory standards.

It is understood that Agrimin shall undertake the acid sulfate soil (ASS) sampling during trenching works at the Lake Mackay SOP Project in July/August 2017.

This sampling and analysis plan (SAP) will:

- Define the sample collection strategy to allow for a preliminary assessment of the acid generating potential of sediments/soils (on a regional scale) that may be disturbed in association with the Lake Mackay SOP Project
- Provide information on the methods of sampling to be employed to achieve outcomes acceptable to the regulatory authority

# 1. Sample Locations

It is understood that Agrimin will be excavating 20 trenches of 100 m in length and up to 6 m depth. Following trench excavation, 8 temporary groundwater piezometers will be positioned around each trench. The ASS samples shall be collected from the temporary groundwater piezometers and sample lithologies will be chosen based on the lithologies encountered in the trench.

The general sampling requirements for the characterisation of the ASS potential at the Lake Mackay SOP project are as follows:

10 Bermondsey Street, West Leederville WA 6007 • PO Box 14, West Perth WA 6872 t (+618) 9388 8360 f (+618) 9381 2360 e admin@360environmental.com.au w 360environmental.com.au abn 50 109 499 041



- Collection of 12 primary field samples and 1 duplicate sample per trench investigation area) at 0.5 m down the soil profile for pH<sub>F</sub> and pH<sub>FOX</sub>. In total there will be 240 field samples and 24 QAQC samples (duplicates)
- Laboratory analysis of samples from each identified lithology from across the site for:
  - Chromium reducible sulfur (CRS) (equal split of samples between the identified lithologies giving 80 samples and 4 duplicate QAQC)
  - Eight priority metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg), Al and Fe (equal split of samples between the identified lithologies giving 20 samples including 1 duplicate QAQC)

The laboratory soil samples shall be collected based on the highest risk sample (based on the field  $pH_F$  and  $pH_{FOX}$  tests) from each lithological unit in each soil profile

The field samples shall be collected from the temporary piezometers with one sample collected the equivalent of 0.5 m vertical intervals down the lithological profile in the piezometers. The samples need not be collected from a single piezometer so long as the collective samples cover the entire lithological profile at 0.5 m intervals from one or a combination of temporary piezometers around a trench. For example:

- If the trench indicates consistent lateral lithology across its 100 m length, soil samples could be collected at half metre intervals from a single piezometer (PZ1):
  - PZ1\_0, PZ1\_0.5, PZ1\_1.0, PZ1\_1.5, PZ1\_2.0, PZ1\_2.5, PZ1\_3.0, PZ1\_3.5, PZ1\_4.0, PZ1\_4.5, PZ1\_5.0, PZ1\_5.5
- If the trench indicates variable lateral lithology across its 100 m length, soil samples could be collected at half metre intervals from multiple piezometers (e.g PZ1, PZ3, PZ5, PZ7) in order to ensure all lithologies are targeted:
  - For example PZ1\_0 , PZ1\_0.5 , PZ3\_1.0 , PZ5\_1.5 , PZ7\_2.0 , PZ1\_2.5 , PZ5\_3.0 , PZ1\_3.5 , PZ1\_4.0 , PZ7\_4.5 , PZ5\_3.0 , PZ5\_5.5

Time permitting, Agrimin should send the trench lithology logs to 360 Environmental for review and assistance in determining the best locations for sample collection from the piezometers, prior to piezometer installation.

# 2. Inferred Lithology

Based on the geological logs of provided by Agrimin there are several distinct geological units that are expected to be encountered on site.



- Dark Grey or Red Brown SAND: The majority of the project areas has thin light to dark grey to brown/red surface sands up to 0.8 m thick. The surface sands contain variable gypsum and fine silt content.
- Dark Brown/Black OOZE: The northwestern portion of the lake around trenches
   1, 2, 3, 14 and 18 have dark brown to black with localised possible sulphide containing surface sands up to 0.25 m thick.
- Red/Brown SILTY SAND and CLAYEY SAND: The surficial sands are generally underlain by red/brown silty sands or clayey sands extending to a maximum depth of approximately 1.5 m below ground level (bgl).
- Red/Brown CLAY: Underlying the silt sands and clayey sands is a generally consistent and thick layer of variable mottled red/brown firm to hard clay. The clay extends to the maximum drilled depth of 11.25 mbgl across the site. The clay is interbedded at isolated locations with thin sand layers up to 0.25 m thick and with thin gypsum (GYPSUM) layers. The clay is generally consistent however, areas of yellow and green clay (Yellow/Green CLAY) were reported in the eastern and central southern portions of the site respectively.

Sampling should target these key lithologies. Table 1 provides an indicative distribution on how these materials should be sampled and analysed relative to their anticipated relative abundance. Actual sample numbers will be dependent upon field conditions and  $pH_F$  and  $pH_{FOX}$  results. Duplicate samples should be variably

LITHOLOGY	# Field Samples	# LABORATORY SAMPLES (SCR)	# LABORATORY SAMPLES (METALS)	SAMPLING RATIONALE
Dark Grey or Red Brown <b>SAND</b>	40	15	3	0.5 m sampling intervals
Dark Borwn∕Black <b>OOZE</b>	30	30	5	Priority sampling of this material when encountered. All samples should go to laboratory.
Red/Brown SILTY SAND and CLAYEY SAND	40	15	3	0.5 m sampling intervals
Red Brown CLAY	120	16	5	0.5 m sampling intervals
GYPSUM	5	2	1	Opportunistic sampling if encountered
Yellow/Green CLAY	5	2	1	Opportunistic sampling if encountered
QA/QC samples	24	4	1	1 - 2 duplicate samples should be collected from each trench area. At least 1 duplicate sample should be collected from the <b>OOZE</b> material.
TOTAL	264	84	19	

## **Table 1: Indicative Primary Sample Collection Distribution**



# 3. Sampling Procedure

The sampling procedure for the Agrimin field staff has been split into field sample collection and laboratory sample collection process.

# **3.1. Field Samples**

Field samples shall be collected as per Table 2 below. Laboratory requirements are detailed in Table 3. Detailed sampling procedures, including field  $pH_F$  and  $pH_{FOX}$  testing methodology are provided in Attachment A.

SAMPLING COMPONENT	REQUIREMENT
Sample logging	The lithology of the trenches and piezometers should be logged as per Agrimin's standards
Sample volume	1x 400 ml bag (in laboratory supplied soil bags)
Sample labelling	All samples bags should be labelled with the following information: Sample ID : Sample Location_depth (e.g. PZ1_0.5) Sample Date and Time: DD/MM/YYY HH:MM Sampler Name 360 Project Number: 2225
Sample Location	The geographic location of the sample should be recorded using handheld GPS or equivalent
Sample storage	Samples must be collected and stored in plastic bags and excess air removed prior to sealing.
Sample preservation	Samples should be stored on ice in the field and in transit to the laboratory. If $pH_F$ and $pH_{FOX}$ testing cannot occur within 24 hours of collection, samples should be frozen. Samples should be frozen after $pH_F$ and $pH_{FOX}$ testing until such time as they can be transported to the lab.
Field Documentation	F1 Project Field Log AS1 Soil pH <sub>F</sub> and pH <sub>FOX</sub> testing
QA/QC	1:20 blind duplicate samples to be collected Samples sent to laboratory using the provided Chain of Custody (COC) form to be provided by 360 Environmental

# **Table 2: Field Sampling Requirements**

## **Table 3: Laboratory Sampling Requirements**

SAMPLING COMPONENT	REQUIREMENT
Sample volume	1x 400ml bag
Sample Preservation	Samples are to be chilled with ice in the field and then frozen and stored in a freezer for delivery to the laboratory
Laboratory	Samples will be sent to the following Laboratory under appropriate COC. Eurofins/MGT Unit 2, 91 Leach Hwy Kewdale, WA 6105 Tel: 08 9251 9600

360 Environmental hopes this sampling and analysis plan sufficiently addresses Agrimin's requirements to facilitate commencement of its acid sulfate soil assessment at the Lake



Mackay SOP project. If you have any queries regarding the content of this plan, please feel free to contact me on 08 9388 8360.

Yours sincerely

Julie Palich Principal Environmental Geoscientist

CC: Gerry Bradley - gbradley@agrimin.com.au

Enclosures: Attachment A: Field Procedures and Forms



# ATTACHMENT A: FIELD PROCEDURES AND FORMS



Acid Sulfate Soils Technical Standard Operating Procedure

# AS1: Soil and Water Testing

Rev. 1 (12 August 2016)

• people • planet • professional



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# 1 SCOPE AND APPLICATION

This TSOP addresses acid sulfate soil, dewatering effluent and groundwater field testing techniques and is applicable to:

- ASS Investigations
- Monitoring during earthworks and dewatering by 360 Environmental
- Monitoring during earthworks and dewatering by the Contractor

# 2 METHOD SUMMARY

- Soil  $pH_F$  and  $pH_F$  testing
- Water (i.e. groundwater, surface water of dewatering effluent) quality testing

# **3** REFERENCES

This TSOP references the following literature:

- Identification and investigation of acid sulfate soils and acidic landscapes, Department of Environment Regulations, Government of Australia, June 2015
- Treatment and management of soil and water in acid sulfate soil landscapes, Department of Environment Regulations, Government of Australia, June 2015

# 4 EQUIPMENT AND SUPPLIES

The following equipment is to be used:

- Acidity Test Kit (i.e. HI3820)
- Alkalinity Test Kit(i.e. HI3811)
- Water quality Meter (i.e. YSI Pro Plus Multiparameter Instrument)
- Calibration Solutions: pH4, pH7, pH10 ,EC 1413 μs/cm
- Test tubes (heat resistant)
- Test tube rack
- Wooden stirrers
- 30% hydrogen peroxide (pH adjusted to 4.5–5.5)
- sodium hydroxide (pH adjusted to 4.5–5.5)
- deionised (DI) water
- squirt bottle for DI water
- Nitrile gloves, safety glasses, protective clothing



- Buckets and brush
- Field form AS1
- First aid kit (especially eye wash solutions)
- Disposal paper towels

# 5 PROCEDURES

# 5.1 Soil

### 5.1.1 Field pH Test

- 1 Calibrate field pH meter as per TSOP E1.
- 2 Prepare the test tubes in the test tube rack. Mark each beaker with sample location, depth, stockpile ID etc.
- 3 Remove approximately one teaspoon of soil from the sampling location. Place approximately  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>F</sub> test tube and place  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>FOX</sub> test tube.
- 4 Place enough deionised water (pH 5.5) in the pHF test tube to make a paste similar to 'grout mix' or 'white sauce', stirring with a skewer or similar to ensure all soil 'lumps' are removed. Do not leave the soil samples in the test tubes without water for more than 10 minutes.
- 5 Immediately place the pH meter probe into the test tube, ensuring that the probe is totally submerged in the soil:water paste. Never stir the paste with the electrode.
- 6 Wait for the reading to stabilise and record the pH measurement. All measurements and pH calibration should be recorded on Field Form AS1.

## 5.1.2 Field Oxidised pH Test

- 1 Adjust the pH of the 30% hydrogen peroxide to 5.0–5.5 before going into the field. This can be done by adding a few drops of sodium hydroxide at a time, checking the pH with the pH meter regularly. Sodium hydroxide is highly caustic so safety precautions must be exercised. Buffer only the amount to be used in the field at any one time.
- 2 Hydrogen peroxide should be well labelled and only small quantities should be taken into the field at any one time. This will ensure the longevity of the peroxide. Further, over time, the pH of the peroxide that has already been buffered may change. It is important to check the pH of the peroxide in the morning before departing to the field. Having a small quantity of sodium hydroxide in the field kit is recommended so the pH of the peroxide can be adjusted if required.
- 3 Calibrate the pH meter as per TSOP E1.
- 4 Prepare the test tubes in the test tube rack. Mark each beaker with sample location, depth, stockpile ID etc.



- 5 Remove approximately one teaspoon of soil from the sampling location. Place approximately  $\frac{1}{2}$  teaspoon of the soil into the pHF test tube and place  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>FOX</sub> test tube.
- 6 Add a few drops of hydrogen peroxide to the soil in a heat-resistant test tube and stir the mixture. DO NOT add the peroxide to the test tube in which the pHF test was conducted. The pH<sub>FOX</sub> test tube should not have any deionised water in it. Beakers can be used however when multiple tests are being conducted it is difficult to handle the large beaker size efficiently. DO NOT add more than a few drops of peroxide at a time. This will prevent overflow and wastage of peroxide. A day's supply of peroxide should be allowed to reach room temperature prior to use.
- 7 Allow approximately 20 minutes for any reactions to occur. If substantial sulfides are present, the reaction will be vigorous and may occur almost instantly. In this case, it may not be necessary to stir the mixture. Careful watch will be needed in the early stages to ensure that there is no cross contamination of samples in the test tube rack. If the reaction is violent and the soil/peroxide mix is escaping from the test tube, a small amount of de-ionised water can be added to calm the reaction and control overflow.
- 8 Steps 6 and 7 may be repeated until the soil/peroxide mixture reaction has slowed. This will ensure that most of the sulfides have reacted.
- 9 If there is no initial reaction, individual test tubes containing the soil/peroxide mixture can be placed into a cup of hot water (especially in cooler weather) or in direct sunlight. This will encourage the initial reaction to occur. When the sample starts to 'bubble', remove the test tube immediately from the cup and replace into the test tube rack.
- 10 Rate each sample's reaction using the LMHX (low, medium, high, extreme) scale and record on Field Form AS1.
- 11 Wait for the soil/peroxide mixture to cool (may take up to 10 minutes).
- 12 Placing the pH meter into the test tube, ensuring that the probe is totally submerged in the soil/peroxide mixture. Never stir the mixture with the electrode. Wait for the reading to stabilise and record the  $pH_{FOX}$  measurement on Field Form AS1.

## 5.2 Water Sample Collection

- 1) Collect samples:
  - a) Undertake groundwater sample collection as per TSOP G3 Groundwater Monitoring: Low Flow Purging and Sampling.
  - b) Collect samples surface water and dewatering effluent (pre-treatment and post-treatment) samples directly into sample containers.
- 2) Immediately test using multi-parameter meter and record of field sheet: temperature, dissolved oxygen, SPC, EC, pH, redox and TDS.
- 3) Undertake TTA and TAlk testing as per Sections 5.3 and 5.4.



# 5.3 Total Titratable Acidity (TTA) Testing

Using the TTA test kit (i.e. Hanna Instruments HI3820):

## 5.3.1 Methyl Orange

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5 ml mark and replace cap.
- 2 Add 1 drop dechlorinating reagent through cap port and mix by swirling cup in tight circles.
- 3 Add 1 drop bromophenol blue indicator through cap port and mix. If the solution is green or blue record methyl orange acidity as zero and skip to Phenolphthalein Acidity test (see Section 5.3.2). If solution is yellow continue to next step.
- 4 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3820-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 5 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup changes from yellow to green.
- 6 Read the millilitres of titration solution from the syringe scale and multiply by 500 to obtain mg/L TTA. Record on Field Form AS2.

### 5.3.2 Phenolphthalein

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Phenolphthalein indicator through cap port and mix. If the solution turns red or pink, than solution is alkaline and proceed to Alkalinity Test 1.2. If the solution remains colourless continue to the next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3820-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns pink.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 500 to obtain mg/L TTA. Record on Field Form AS2.

#### 5.3.3 Low Range Detections

If the TTA result is lower than 100mg/L the precision of the test can be improved follow steps below.

1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 25ml mark and replace cap.



- 2 Continue with the test as explained for high range measurements.
- 3 Read the millilitres of titration solution from the syringe scale and multiply by 100 to obtain mg/L TTA. Record on Field Form AS2.

# 5.4 Total Alkalinity (TAlk) Testing

Using the TAlk test kit (i.e. Hanna Instruments HI3811):

#### 5.4.1 Phenolphthalein

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Phenolphthalein indicator through cap port and mix. If the solution remains colourless, record the Phenolphthalein alkalinity as zero and proceed to Section 5.4.2. If the solution turns red or pink continue with the next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3811-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns colourless.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 300 to obtain mg/L TAlk. Record on Field Form AS2.

#### 5.4.2 Bromophenol Blue

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Bromophenol Blue indicator through cap port and mix. If the solution is green or blue continue to next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3811-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns yellow.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 300 to obtain mg/L TAlk. Record on Field Form AS2.

#### 5.4.3 Low Range Detections

If the result is lower than 100 mg/L the precision of the test can be improved follow steps below.

1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 25ml mark and replace cap.



- 2 Continue with the test as explained for high range measurements.
- 3 Read the millilitres of titration solution from the syringe scale and multiply by 100 to obtain mg/L TAIk. Record on Field Form AS2.

# 6 DOCUMENTATION

Field documentation needs to be undertaken as defined in 360 Environmental TSOP1. The following forms are required:

- 360 Environmental Form: ASS Field Form AS1 Soil pHF and FOX
- 360 Environmental Form: ASS Field Form AS2

# 7 DECONTAMINATION

Decontamination of field testing equipment is to be undertaken as per TSOP E2.

# 8 WASTE MANAGEMENT

Investigation derived waste is to be managed in accordance with TSOP W1.



Contaminated Sites TECHNICAL STANDARD OPERATING PROCEDURE Instrument Calibration

TSOP E-1

ople



Contaminated Sites TSOP E-1

Instrument Calibration

## 1 SCOPE AND APPLICATION

Calibration of field instruments forms part of the data quality initiative to ensure that data collected in the field can be reliably used. Field equipment used for on-site measurements will be calibrated in accordance with the manufacturer's specification before and after field use each day, or at a frequency recommended by the equipment manufacturer or industry practice. All manufacturer calibration records must accompany the equipment for each rental.

#### This TSOP applies to all instruments used at the site.

### 2 PID

The PID will be calibrated to manufacturer specifications by the rental operator and accompanied with a Calibration Certificate. The PID will be calibrated prior to the sampling event.

#### 3 YSI Pro Plus Multiparameter Meter

- YSI Pro Plus Multiparameter Instrument calibration is needed for Electrical Conductivity (EC), pH 4 and pH 7.
- YSI multi parameter meter is to be calibrated prior to use (daily) and in line with the Manufacturers Calibration Manual.
- Daily calibration must be documented.



Contaminated Sites TECHNICAL STANDARD OPERATING PROCEDURE Decontamination

# TSOP E-2

ople

#### 1 SCOPE

Decontamination is a critical QA/QC element to site investigations and must be applied appropriately. This TSOP provides the method to be employed as part of site characterisation activities.

#### 2 PROCEDURES

#### Step 1: Decon Set Up

- 1. Set up decontamination equipment in dedicated area on site, away from impacted area/s.
- 2. Place clean used large plastic bag/tarp on the ground
- 3. Place two clean unused buckets on top of the tarp. Fill one bucket with deionised water for rinsate. Fill the second bucket with Decon 90 and deionised water.
- 4. Pour deionised water in decontaminated clean spray bottle.

#### Step 2: Decontamination

The following procedures are to be undertaken in order to minimise the risk of cross contamination of samples:

- 1. All samples are to be handled using disposal nitrile gloves, which are to be replaced between each sampling event.
- 2. Decontamination of manual sampling equipment includes:
  - o Remove soil (if viable) adhering to the sampling equipment by brushing
  - Wash equipment with phosphate free detergent and rinsate water (laboratory supplied).
  - Rinse equipment in bucket with deionised water
  - o Complete second rinsing by pouring deionised water over equipment

#### Specific decontamination procedures are as follows:

- Always decontaminate the water level meter/interface probe before starting investigations and at the end of investigations (daily), and between each use
- All reusable equipment used for each monitoring well installation will be decontaminated between each well location
- Thoroughly clean the tape measure and any stainless steel sample collection equipment (if warranted) before initiation of the sampling event and between sample collection endeavours
- All drill rods will be decontaminated with Decon 90 and rinsate water between each use.
- Decon the hand-auger barrel between each soil sample collection endeavour
- The riser, well screen and annual seal installation equipment should be cleaned immediately prior to well installation or certified clean from the manufactured and delivered to the site in a protective wrapping.



# PROJECT FIELD LOG (DAILY)

Date: Project Number: Project Name:
Arrived: Departed: Weather:
РМ:
Field Personnel:
Contractors:
Client Contact: Site Contact:
Purpose of Visit (Tick Appropriate Box):
Site Inspection Usell Integrity Assessment
□ Soil Bore Advancement (Drill Rig) □ Hand Augering □ Test Pits □ Soil Sampling
□ Monitoring Well Installation (Drill Rig) □ Groundwater Monitoring □ Sediment Sampling
□ Other (Specify):
Equipment Used:
Calibration Certificate Received : Calibration Undertaken:
Sampling:
Sampling Conducted: 🗆 Y 🗆 N Matrix: 🗆 Soil 🗆 Water 🗆 Air
CoC Completed: $\Box Y \Box N$
Primary Lab: Secondary Lab:

# Acid Sulfate Soils Form AS1: Soil $pH_{\text{F}}$ and $pH_{\text{FOX}}$ Testing



Job Number:			
Site Name:	Water Quality Meter has been calibrated:	Yes 🗆	No 🗆
Client:	Hydrogen Peroxide (30%) has been buffered to pH 4.5 - 5.5:	Yes 🗆	No 🗆
Field Personnel:			

Date:

#### Hydrogen Peroxide (30%) pH:

Bore/Test	Sample			Peroxide	Bore/Test	Sample			Peroxide
Bore/ Test Pit ID	Depth	pH <sub>F</sub>	pH <sub>FOX</sub>	Reaction (LMHX)	Bore/ Test Pit ID	Depth	рН <sub>F</sub>	pH <sub>FOX</sub>	Reaction (LMHX)

Peroxide Reactions: L = low M = medium H = high X = extreme

Retain calibration forms



QC	Туре	Date and time	Primary	Media
QC				

QC	<b>Collection Point</b>	<b>Collection Location</b>	Date and time	Rinsate water batch #
RS				

QC	Date and time	Trip blank batch #
ТВ		

QC	Date and time	Collection Location	Blank water batch #
FB			



Description of Activities:	



Soil Sample Collection Register							
Time Started:		Time F	inished:				
Sample ID	Easting	Northing	Soil Lithology	Observations			

# **Procedure - Soil Sampling from Lake Mackay Sediments**

# Introduction

The Acid Sulphate Soil (ASS) study at Lake Mackay requires soil samples to be taken of the various sediment lithologies identified by Agrimin at the Lake.

An opportunity to gain access to these lithologies across a large area of the Lake and through a deep profile of the Lake is presented as a result of the trenching work currently taking place.

Ideally, at each trench, soil samples are to be taken at 0.5 m intervals from surface to the full 6 m depth of the trench (or as deep as the trench can be excavated to). This would result in 12 soil samples being obtained from each trench. It is proposed to take the soil samples from material recovered by the Excavator and placed alongside the trench for safe and easy access.

# Methodology

- Excavator arrives at location of next trench on Lake and commences excavation work;
- As the Excavator progresses the depth of the trench, material is to be removed at regular 0.5 m intervals for soil sample analysis;
- The 12 intervals required are 0.5 m, 1.0 m, 1.5 m, 2.0m, 2.5m, 3.0 m, 3.5 m, 4.0 m, 4.5 m, 5.0 m, 5.5 m and 6.0 m.
- At each 0.5 m interval, a full bucket load of material should be recovered from the trench;
- Each bucket load is to be placed on the Lake surface alongside the trench in as compact a heap as possible.
- A compact heap is required to preserve the integrity of the material for soil sampling. If a soil sample cannot be taken straight away then it may be a number of days before the sample can be retrieved. By maintaining a compact heap of material for sampling it is hoped that the material towards the centre of the heap will be less compromised by oxygen ingress over a period of time and, therefore, still provide material of reasonable integrity for sampling when the opportunity arises;
- Place the material recovered for sampling alongside the trench in order of depth, starting with the 0.5 m interval closest to the trench and placing subsequent material next to, but progressively further away from, the trench (ie 6.0 m sample to be located furthest from the trench).
- Care should be taken when relocating the Excavator that the heaps recovered for soil analysis are not disturbed.
- The procedure outlined above is to be repeated at each new trench.

• Where a trench does not obtain its full (6.0 m) depth, or is abandoned, sample material should still be recovered at 0.5 m intervals to whatever trench depth is achieved.

Queries regarding this Soil Sampling Procedure should be directed to Gerry Bradley (Sustainability Manager, Agrimin), phone 0429 777 267 or email <u>gbradley@agrimin.com.au</u> or assistance sought from Michael Hartley or Andy Fulton, Agrimin representatives at Lake Mackay.

Gerry Bradley Sustainability Manager Agrimin Limited 20<sup>th</sup> August 2017



Acid Sulfate Soils Technical Standard Operating Procedure

# AS1: Soil and Water Testing

Rev. 1 (12 August 2016) Authorised by: JP

• people • planet • professional



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# 1 SCOPE AND APPLICATION

This TSOP addresses acid sulfate soil, dewatering effluent and groundwater field testing techniques and is applicable to:

- ASS Investigations
- Monitoring during earthworks and dewatering by 360 Environmental
- Monitoring during earthworks and dewatering by the Contractor

# 2 METHOD SUMMARY

- Soil  $pH_F$  and  $pH_F$  testing
- Water (i.e. groundwater, surface water of dewatering effluent) quality testing

# **3** REFERENCES

This TSOP references the following literature:

- Identification and investigation of acid sulfate soils and acidic landscapes, Department of Environment Regulations, Government of Australia, June 2015
- Treatment and management of soil and water in acid sulfate soil landscapes, Department of Environment Regulations, Government of Australia, June 2015

# 4 EQUIPMENT AND SUPPLIES

The following equipment is to be used:

- Acidity Test Kit (i.e. HI3820)
- Alkalinity Test Kit(i.e. HI3811)
- Water quality Meter (i.e. YSI Pro Plus Multiparameter Instrument)
- Calibration Solutions: pH4, pH7, pH10 ,EC 1413 μs/cm
- Test tubes (heat resistant)
- Test tube rack
- Wooden stirrers
- 30% hydrogen peroxide (pH adjusted to 4.5–5.5)
- sodium hydroxide (pH adjusted to 4.5–5.5)
- deionised (DI) water
- squirt bottle for DI water
- Nitrile gloves, safety glasses, protective clothing



- Buckets and brush
- Field form AS1
- First aid kit (especially eye wash solutions)
- Disposal paper towels

# 5 PROCEDURES

## 5.1 Soil

#### 5.1.1 Field pH Test

- 1 Calibrate field pH meter as per TSOP E1.
- 2 Prepare the test tubes in the test tube rack. Mark each beaker with sample location, depth, stockpile ID etc.
- 3 Remove approximately one teaspoon of soil from the sampling location. Place approximately  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>F</sub> test tube and place  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>FOX</sub> test tube.
- 4 Place enough deionised water (pH 5.5) in the pHF test tube to make a paste similar to 'grout mix' or 'white sauce', stirring with a skewer or similar to ensure all soil 'lumps' are removed. Do not leave the soil samples in the test tubes without water for more than 10 minutes.
- 5 Immediately place the pH meter probe into the test tube, ensuring that the probe is totally submerged in the soil:water paste. Never stir the paste with the electrode.
- 6 Wait for the reading to stabilise and record the pH measurement. All measurements and pH calibration should be recorded on Field Form AS1.

#### 5.1.2 Field Oxidised pH Test

- 1 Adjust the pH of the 30% hydrogen peroxide to 5.0–5.5 before going into the field. This can be done by adding a few drops of sodium hydroxide at a time, checking the pH with the pH meter regularly. Sodium hydroxide is highly caustic so safety precautions must be exercised. Buffer only the amount to be used in the field at any one time.
- 2 Hydrogen peroxide should be well labelled and only small quantities should be taken into the field at any one time. This will ensure the longevity of the peroxide. Further, over time, the pH of the peroxide that has already been buffered may change. It is important to check the pH of the peroxide in the morning before departing to the field. Having a small quantity of sodium hydroxide in the field kit is recommended so the pH of the peroxide can be adjusted if required.
- 3 Calibrate the pH meter as per TSOP E1.
- 4 Prepare the test tubes in the test tube rack. Mark each beaker with sample location, depth, stockpile ID etc.



- 5 Remove approximately one teaspoon of soil from the sampling location. Place approximately  $\frac{1}{2}$  teaspoon of the soil into the pHF test tube and place  $\frac{1}{2}$  teaspoon of the soil into the pH<sub>FOX</sub> test tube.
- 6 Add a few drops of hydrogen peroxide to the soil in a heat-resistant test tube and stir the mixture. DO NOT add the peroxide to the test tube in which the pHF test was conducted. The pH<sub>FOX</sub> test tube should not have any deionised water in it. Beakers can be used however when multiple tests are being conducted it is difficult to handle the large beaker size efficiently. DO NOT add more than a few drops of peroxide at a time. This will prevent overflow and wastage of peroxide. A day's supply of peroxide should be allowed to reach room temperature prior to use.
- 7 Allow approximately 20 minutes for any reactions to occur. If substantial sulfides are present, the reaction will be vigorous and may occur almost instantly. In this case, it may not be necessary to stir the mixture. Careful watch will be needed in the early stages to ensure that there is no cross contamination of samples in the test tube rack. If the reaction is violent and the soil/peroxide mix is escaping from the test tube, a small amount of de-ionised water can be added to calm the reaction and control overflow.
- 8 Steps 6 and 7 may be repeated until the soil/peroxide mixture reaction has slowed. This will ensure that most of the sulfides have reacted.
- 9 If there is no initial reaction, individual test tubes containing the soil/peroxide mixture can be placed into a cup of hot water (especially in cooler weather) or in direct sunlight. This will encourage the initial reaction to occur. When the sample starts to 'bubble', remove the test tube immediately from the cup and replace into the test tube rack.
- 10 Rate each sample's reaction using the LMHX (low, medium, high, extreme) scale and record on Field Form AS1.
- 11 Wait for the soil/peroxide mixture to cool (may take up to 10 minutes).
- 12 Placing the pH meter into the test tube, ensuring that the probe is totally submerged in the soil/peroxide mixture. Never stir the mixture with the electrode. Wait for the reading to stabilise and record the  $pH_{FOX}$  measurement on Field Form AS1.

# 5.2 Water Sample Collection

- 1) Collect samples:
  - a) Undertake groundwater sample collection as per TSOP G3 Groundwater Monitoring: Low Flow Purging and Sampling.
  - b) Collect samples surface water and dewatering effluent (pre-treatment and post-treatment) samples directly into sample containers.
- 2) Immediately test using multi-parameter meter and record of field sheet: temperature, dissolved oxygen, SPC, EC, pH, redox and TDS.
- 3) Undertake TTA and TAlk testing as per Sections 5.3 and 5.4.



# 5.3 Total Titratable Acidity (TTA) Testing

Using the TTA test kit (i.e. Hanna Instruments HI3820):

## 5.3.1 Methyl Orange

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5 ml mark and replace cap.
- 2 Add 1 drop dechlorinating reagent through cap port and mix by swirling cup in tight circles.
- 3 Add 1 drop bromophenol blue indicator through cap port and mix. If the solution is green or blue record methyl orange acidity as zero and skip to Phenolphthalein Acidity test (see Section 5.3.2). If solution is yellow continue to next step.
- 4 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3820-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 5 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup changes from yellow to green.
- 6 Read the millilitres of titration solution from the syringe scale and multiply by 500 to obtain mg/L TTA. Record on Field Form AS2.

### 5.3.2 Phenolphthalein

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Phenolphthalein indicator through cap port and mix. If the solution turns red or pink, than solution is alkaline and proceed to Alkalinity Test 1.2. If the solution remains colourless continue to the next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3820-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns pink.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 500 to obtain mg/L TTA. Record on Field Form AS2.

#### 5.3.3 Low Range Detections

If the TTA result is lower than 100mg/L the precision of the test can be improved follow steps below.

1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 25ml mark and replace cap.



- 2 Continue with the test as explained for high range measurements.
- 3 Read the millilitres of titration solution from the syringe scale and multiply by 100 to obtain mg/L TTA. Record on Field Form AS2.

#### 5.4 Total Alkalinity (TAlk) Testing

Using the TAlk test kit (i.e. Hanna Instruments HI3811):

#### 5.4.1 Phenolphthalein

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Phenolphthalein indicator through cap port and mix. If the solution remains colourless, record the Phenolphthalein alkalinity as zero and proceed to Section 5.4.2. If the solution turns red or pink continue with the next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3811-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns colourless.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 300 to obtain mg/L TAIk. Record on Field Form AS2.

#### 5.4.2 Bromophenol Blue

- 1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 5ml mark and replace cap.
- 2 Add 1 drop Bromophenol Blue indicator through cap port and mix. If the solution is green or blue continue to next step.
- 3 Take syringe and push the plunger completely into the syringe. Insert tip into HI 3811-0 solution and pull the plunger out until the lower edge of the plunger seal is on 0ml mark.
- 4 Place syringe into the cap port and slowly add the titration solution one drop at a time, swirling between drops. Continue adding titration solution until the solution in the cup turns yellow.
- 5 Read the millilitres of titration solution from the syringe scale and multiply by 300 to obtain mg/L TAIk. Record on Field Form AS2.

#### 5.4.3 Low Range Detections

If the result is lower than 100 mg/L the precision of the test can be improved follow steps below.

1 Remove the cap from the small plastic cup. Rinse with sample, then fill to 25ml mark and replace cap.



- 2 Continue with the test as explained for high range measurements.
- 3 Read the millilitres of titration solution from the syringe scale and multiply by 100 to obtain mg/L TAIk. Record on Field Form AS2.

## 6 DOCUMENTATION

Field documentation needs to be undertaken as defined in 360 Environmental TSOP1. The following forms are required:

- 360 Environmental Form: ASS Field Form AS1 Soil pHF and FOX
- 360 Environmental Form: ASS Field Form AS2

# 7 DECONTAMINATION

Decontamination of field testing equipment is to be undertaken as per TSOP E2.

# 8 WASTE MANAGEMENT

Investigation derived waste is to be managed in accordance with TSOP W1.



Contaminated Sites TECHNICAL STANDARD OPERATING PROCEDURE Instrument Calibration

TSOP E-1

ople



Contaminated Sites TSOP E-1

Instrument Calibration

#### 1 SCOPE AND APPLICATION

Calibration of field instruments forms part of the data quality initiative to ensure that data collected in the field can be reliably used. Field equipment used for on-site measurements will be calibrated in accordance with the manufacturer's specification before and after field use each day, or at a frequency recommended by the equipment manufacturer or industry practice. All manufacturer calibration records must accompany the equipment for each rental.

#### This TSOP applies to all instruments used at the site.

#### 2 PID

The PID will be calibrated to manufacturer specifications by the rental operator and accompanied with a Calibration Certificate. The PID will be calibrated prior to the sampling event.

#### 3 YSI Pro Plus Multiparameter Meter

- YSI Pro Plus Multiparameter Instrument calibration is needed for Electrical Conductivity (EC), pH 4 and pH 7.
- YSI multi parameter meter is to be calibrated prior to use (daily) and in line with the Manufacturers Calibration Manual.
- Daily calibration must be documented.



Contaminated Sites TECHNICAL STANDARD OPERATING PROCEDURE Decontamination

# TSOP E-2

ople

#### 1 SCOPE

Decontamination is a critical QA/QC element to site investigations and must be applied appropriately. This TSOP provides the method to be employed as part of site characterisation activities.

#### 2 PROCEDURES

#### Step 1: Decon Set Up

- 1. Set up decontamination equipment in dedicated area on site, away from impacted area/s.
- 2. Place clean used large plastic bag/tarp on the ground
- 3. Place two clean unused buckets on top of the tarp. Fill one bucket with deionised water for rinsate. Fill the second bucket with Decon 90 and deionised water.
- 4. Pour deionised water in decontaminated clean spray bottle.

#### Step 2: Decontamination

The following procedures are to be undertaken in order to minimise the risk of cross contamination of samples:

- 1. All samples are to be handled using disposal nitrile gloves, which are to be replaced between each sampling event.
- 2. Decontamination of manual sampling equipment includes:
  - o Remove soil (if viable) adhering to the sampling equipment by brushing
  - Wash equipment with phosphate free detergent and rinsate water (laboratory supplied).
  - Rinse equipment in bucket with deionised water
  - o Complete second rinsing by pouring deionised water over equipment

#### Specific decontamination procedures are as follows:

- Always decontaminate the water level meter/interface probe before starting investigations and at the end of investigations (daily), and between each use
- All reusable equipment used for each monitoring well installation will be decontaminated between each well location
- Thoroughly clean the tape measure and any stainless steel sample collection equipment (if warranted) before initiation of the sampling event and between sample collection endeavours
- All drill rods will be decontaminated with Decon 90 and rinsate water between each use.
- Decon the hand-auger barrel between each soil sample collection endeavour
- The riser, well screen and annual seal installation equipment should be cleaned immediately prior to well installation or certified clean from the manufactured and delivered to the site in a protective wrapping.



# APPENDIX C

Trench Completion Reports

#### TRENCH 02

#### 1. Summary

Date Started	6 August 2017
Date Ended	11 August 2017
Trench Length (m)	115m
Trench Width (m)	8m
Average Excavated Trench Depth (m)	4.3m
Observed Brine Inflow (Low/Moderate/High)	Moderate
Trench Position North	0460022 7512116
Trench Position South	0460022 7512016
Caldme Operator	Trymorne
Agrimin Staff	Michael/Andy

#### 2. Lithology and Ground Conditions

Dark brown/black organic mud (0-0.05m) Dark Brown Clay (0.05-0.7m) Light Brown Silty Clay (0.7-1.3m) Brown Clay, stiff (1.3-1.5m) Cream/white Gypsum Sand, cemented (1.5-1.73m). All seepage on this contact. Red/brown Clay (1.73-1.85m) Cream/White Gypsum Sand (1.85-1.95m) Red/Brown Clay (1.95-2.40m) Cream/White Gypsum Sand (2.40-2.50m) Red Clay (2.50-4.30m) Cream/White Gypsum Sand (4.30-4.60m) Red/brown Clay (4.60-5.8/6m) very hard, no seepage. (only excavated in one section).

#### 3. Construction

Construction of the trench followed the cross-section A design with some battering/scrapping of the upper bench(s). The walls held up reasonably well, most likely due to the occurrence of the hard gypsum sand layering.

The trench length was 115m including ramps on North and South ends. Average width is 8m with the depth based on the lower gypsum sand layer of 4.3-4.6m.

#### TRENCH 05

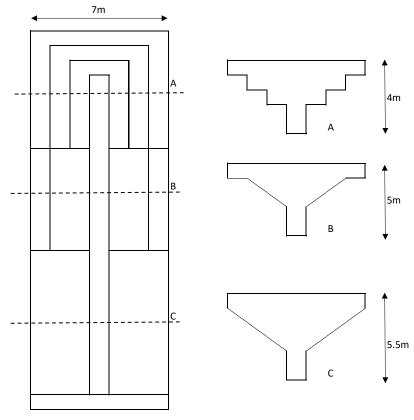
#### 1. Summary

Date Started	21 August 2017
Date Ended	26 August 2017
Trench Length (m)	100m
Trench Width (m)	7
Average Excavated Trench Depth (m)	4
Observed Brine Inflow (Low/Moderate/High)	Moderate/Low
Trench Position North	0479981E, 7508068N
Trench Position South	0479980E, 7507972N
Caldme Operator	Trymorne
Agrimin Staff	Andy/Michael

- Lithology and Ground Conditions
   Dark brown/black organic mud (0-0.005m)
   Dark Brown Clay and minor Sand (0.005-0.2m)
   Light Brown Clay (0.2-0.4m)
   Light Brown Sandy Clay (0.4-1.4m)
   Brown Clay, stiff (1.4-4m) Seepage on this contact
- 3. Construction

.

Construction of the trench followed the cross-section C design.



#### 4. Piezometer Installations

Position	Easting	Northing	Depth (mbc)	SWL (mbc)*	Casing height (magl)
20mN	0479984	7508098	5	0.965	0.5
50mN	0479984	7508123	5.2	0.98	0.57
20mE	0480009	7508031	5.27	0.99	0.47
50mE	0480034	7508034	5.26	0.915	0.44
100mE	0480084	7508035	5.13	0.88	0.46
Trench	0479985	7508075	N/A	0.75 *mbgl	N/A

# 5. Observed Hydraulic Behaviour

All inflow was between 1.5-1.8m. Low inflows observed. Collapse of lower benches noted, peeling off the walls.

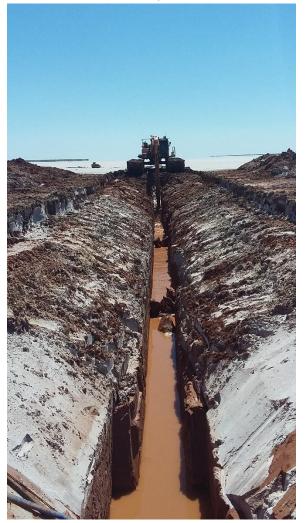


### Photo 1: Flex Drive and Seepage Line

Photo 2: Inflow Horizon



Photo 3: Some Wall Collapse



#### 6. Location

The location of trench 05 is shown in the figure below.

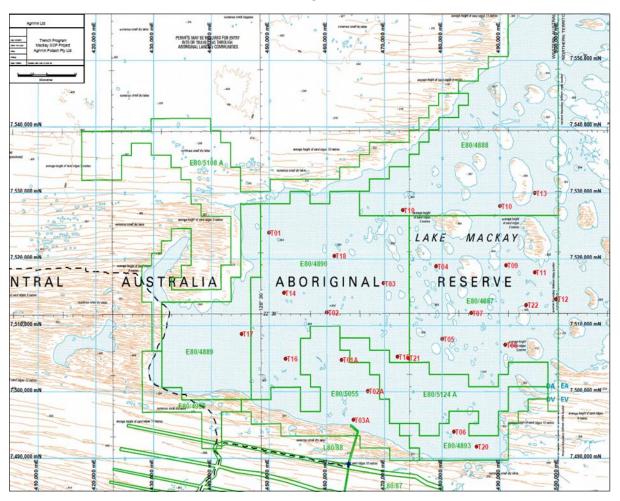
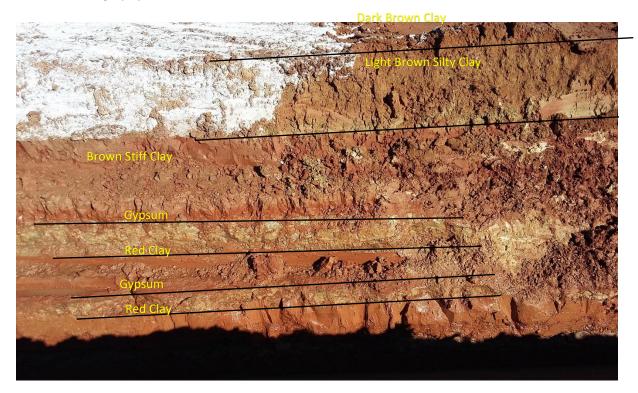
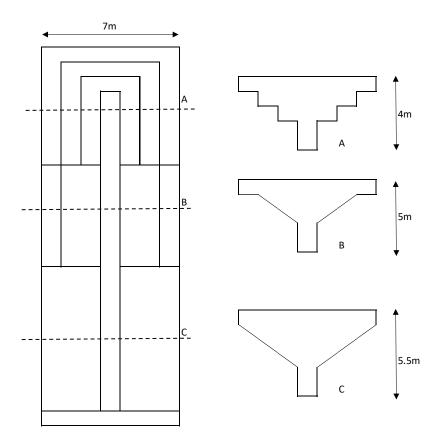


Photo 1: Trench Length at 50m



Photo 2: Stratigraphy (0.5-2.4m)





#### 4. Piezometer Installations

Position	Easting	Northing	Depth (mbc)	SWL (mbc)*	Casing height (magl)
Trench	0460022	7512116	4.5mbgl	0.76 *mbgl	n/a
20mN	0460022	7512136	4.53	1.25	0.45
50mN	0460022	7512167	4.52	1.04	0.35
20mW	0459997	7512072	4.69	1.22	0.38
50mW	0459966	7512073	4.35	1.04	0.28

#### 5. Observed Hydraulic Behaviour

All inflow observed was on the contact between the first gypsum layer and underlying clay. Low inflow noted but consistent on first 20m of trench from the Southern end. No notable inflow noted and deeper.

Two short sections of the trench dug below the lower gypsum layer to reach 6m. No inflow noted at either section.

Photo 3: Inflow Zone

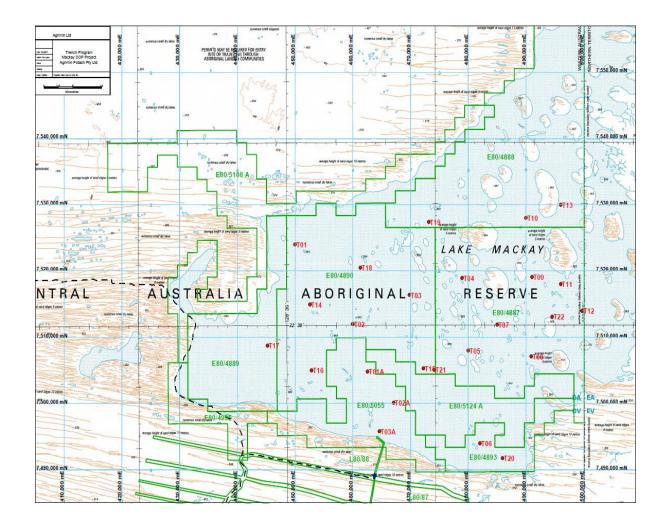


# 6. Trench Pump Out Test

Pump out test completed but data of little value.

7. <u>Trench Location</u>

The location of Trench 02 is shown below.



#### TRENCH 06

#### 1. <u>Summary</u>

Date Started	22 October 2017
Date Ended	28 October 2017
Trench Length (m)	100m
Trench Width (m)	13
Average Excavated Trench Depth (m)	6
Observed Brine Inflow (Low/Moderate/High)	High
Trench Position North	0482030 7494097
Trench Position South	0482030 7493997
Caldme Operator	Trymorne
Agrimin Staff	Michael/Nick

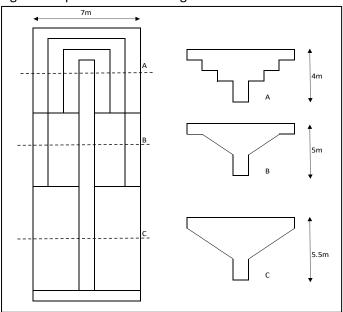
#### 2. Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- 0-0.05 (Thin salt crust thin 2-3cm thick black organic layer.
- (0.05-0.2m) Orange-Brown, coarse grained Evaporitic <u>SAND</u>. Unconsolidated.
- (0.2-0.8m) Light-brown, fine grained, silty, soft <u>CLAY</u>.
- (0.8-1.90m) Brown CLAY. Hard and highly plastic, blocked shaped. Abundant brine inflow on lower contact.
- (1.90-6m) Brown <u>CLAY.</u> Very stiff and highly plastic.
- 3. <u>Construction</u>

Construction of the trench followed the cross-section C design however with some modifications. The wide bench slopes down to almost 5m, allowing for wall collapse. The bottom of the trench consists of 1 tilt bucket width to 6m. The high inflow of brine made it impossible to observe the bottom of the trench (below 4m). Both flex drives were used to try keep water levels down.





Although most of the trench depth consists of very stiff to hard clay it was easily excavated with the tilt bucket.



Photo 1: Trench Length at 40m

Photo 2: Battered Angle



The walls held up reasonably well although areas of collapsing were evident. After 50m the trench was narrowed for a few meters however after some collapsing occurred (and the reduced width) it was decided to keep the wide trench design. The trench length was 100m including ramps on North and South ends. Average width is 13m with the depth based on the required design of 6m.

#### 4. <u>Piezometer Installations</u>

The firm surface allowed for easier piezometer installation than some of the recent trenches. Piezometers were not installed south of the trench as this area was heavily inundated with the trench water pumped out continuously for 4 days.

Position	Easting	Northing	Depth (mbc)	SWL (mbc)	Casing height (magl)
20mN	0482030	7494117	5.52	0.97	0.5
50mN	0482033	7494146	5.58	0.95	0.5
20mE	0482052	7494052	5.52	1.05	0.5
50mE	0482086	7494053	5.52	0.975	0.5
100mE	0482134	7494049	5.55	0.925	0.5
20mW	0482005	7494051	5.32	1.075	0.5
50mW	0481975	7494058	5.34	3.59	0.5

#### 5. Observed Hydraulic Behaviour

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as approximately 0.8m of unconsolidated evaporitic SANDS overlying firm CLAY horizons.

Brine ingress, was in the form diffusive flow on the contact of the upper sand horizon and lower clay margins. Inflow was noted to be particularly high on the southern extent of the trench. Conduit flow was observed when the water level was low enough to observe trench construction below 3-4m.

The collective brine ingress for this trench is recorded as high.

#### Photo 3: Southern End of T06

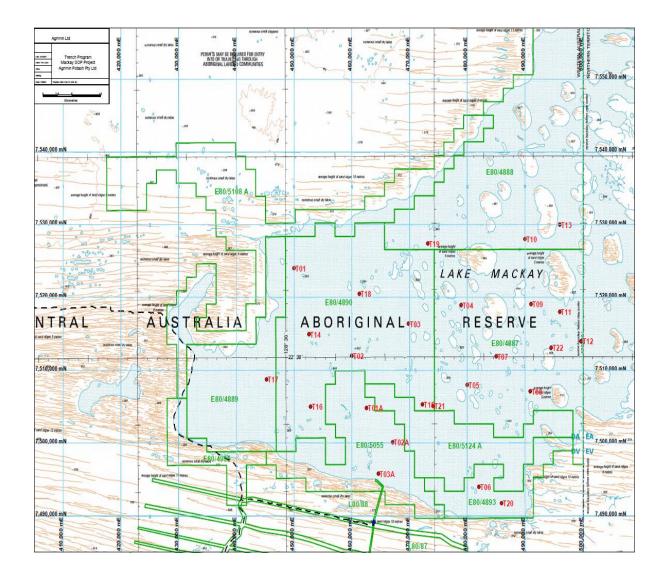


6. Trench Pump Test

Long term trench pump testing will be carried out in the future.

#### 7. Trench Position

The trench is located on southern edge the tenement boundary. The actual location is shown on Figure 2 below.



#### TRENCH 08

#### 1. <u>Summary</u>

Date Started	02.09.17
Date Ended	06.09.17
Trench Length (m)	100m
Trench Width (m)	8m
Average Excavated Trench Depth (m)	4.5m
Observed Brine Inflow (Low/Moderate/High)	Low
Trench Position North	490922 7507101
Trench Position South	490922 7507001
Caldme Operator	Damon Bright
Agrimin Staff	Michael Hartley and Nick Miles

#### 2. Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-0.005m) White, <u>SALT</u> crust, dry and moderately firm.
- (0-0.15m) Grey, evaporitic <u>SAND</u>, with minor silt. Dry.
- (0.15-4.5m) Red-Brown, <u>CLAY</u>, with minor silt and fine grained evaporate crystals. Soft-Firm and moderately plastic. Very-low brine ingress from between 700-800mm.

#### 3. Construction

Trench 08 was constructed in an area of very soft ground, in which the excavator had to drag its self through much of the way. Tramming difficulty was particularly noticeable during turning manoeuvres and piezometer installation. Construction began with the excavator using the tilting-battering bucket, to remove the softer, unconsolidated material at the surface. This bucket was then used to remove the red-brown clay to an average depth of 4.5m.

Approximately half way through the trench construction, hydraulic issues with the battering bucket, forced a change over to the 1m trenching bucket. The initial trench design was continued, with the smaller bucket. An approximate 1m deep bench was cut at the surface. A 45-degree batter then continued until a central 1mx1m central section was removed. Design B in Figure 1 below, indicates the trench design used at T08. 100m total length, and 8m surface width.

Minor slumping occurred in the lower walls, particularly on the southern side. Slumping occurred around 24 hours after initial excavation, as discrete packages of sediment with distinct failure planes.

The one-meter bench at the surface allowed for designated working area, to operate the flex-drive pump. This pump was used intermittently throughout the trenching, so as to maintain a low water level and optimise operator's visibility.

The ground conditions were sloppy and often made for a difficult working environment, as seen in figure 3. The tilt bucket enabled more efficient and cleaner battering, however the ripping teeth of the trenching bucket allowed for noticeably increased water flow in the northern half of the trench. No change in lithology was detected North-South, suggesting a possible smearing effect of the battering bucket.

Trench construction was undertaken to test the stability of the battered design, in the south-eastern margins of the current trenching program focus area. This design also allowed for a further comparison of the time taken, to remove the additional material in this wide trench model.

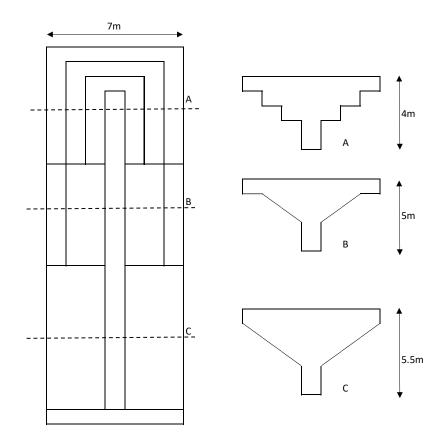


Figure 1: Trench Design Schematic

The northern end it approximately 0.5m deeper than the south. This modification was designed to allow for efficient test pumping from the northern end. The southern end also has a ramped entry/exit, to allow trapped animals to easily escape the brine, visible in figure 2.





Figure 3. Caldme Excavator in soft near surface sediments.



#### 4. <u>Piezometer Installations</u>

Position	Easting	Northing	Depth (mbc)	SWL (mbc)	Casing height (magl)
20mN	0490924	7507408	5.39	1.07	0.5
50mN	0490925	7507438	5.39	0.955	0.5
20mE	0490955	7507340	5.27	1.045	0.5
50mE	0490986	7507346	5.08	1.01	0.5
100mE	0491029	7507352	5.46	0.87	0.5

#### 5. Observed Hydraulic Behaviour

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as approximately 15cm of unconsolidated to semi-consolidated evaporite crust and silty evaporitic SANDS overlying soft-firm semi-homogeneous red-brown, silty, evaporitic CLAY. Lithologically, no distinct variations were observed along the 100m.

Brine ingress, was in the form of small mm scale conduits or flow paths through the upper margins of the clay zone, at depths of around 700-800mm below ground surface. The spatial variability of these flow paths was high. Some areas on a lateral scale of ~10m were completely dry. The northern half had noticeably higher brine ingress, and more consistent flow paths down to a depth of 2-2.5m.

The collective brine ingress for this trench is recorded at very low-to-low.

5 piezometers were installed around this trench to monitor drawn down and hydraulic conductivity at a maximum distance of 100m away from the active trench pumping. Each piezo was installed to a depth of 5.5m with a 0.5m stick up. Two piezo's were installed in the north at 20 and 50m, 3 were installed in the east at 20, 50 and 100m respectively moving perpendicular away from the trench.

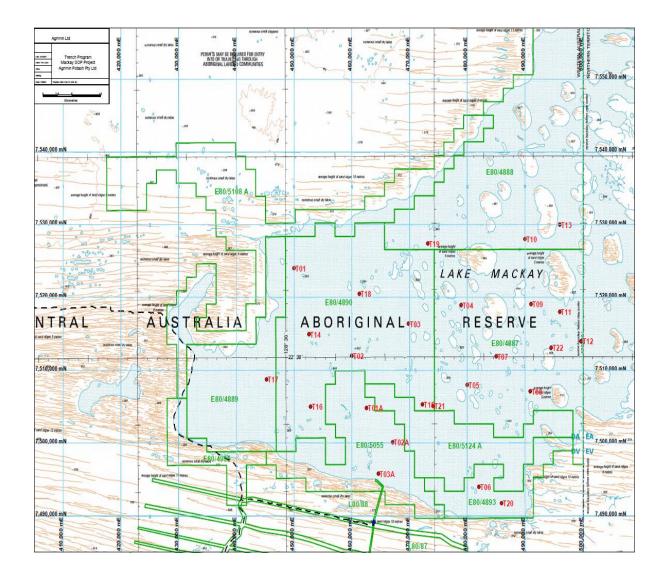
True measured hydraulic properties in this location, will not be realised until pumping tests can sufficiently stress the near surface playa lake sediments. All piezo have been flushed or developed in preparation for these tests.

#### 6. Trench Pump Test

Long term trench pump testing may be carried out in the future.

#### 7. Trench Position

T08 is located at 490922.43 mE 7507101.74 mS in the southeast of Lake Mackay, approximately 9km west of the Western Australian Northern Territory border. The actual location is shown on Figure 4 below.



# 1. TRENCH 09

Date Start	02/10/17			
Date End	09/10/17			
Trench length	100m			
Piezometers Installed	5			
Average trench depth	100m @6m SWL= 0.5m bgl			
Site	Easting	Northing		
20mN	0491048	7519251		
50mN	0491058	7519280		
20mE	0491058	7519181		
50mE	0491087	7519177		
100mE	0491134	7519167		
Trench S End	0491021	7519129		
Trench N End	0491044 7519229			
Pump Start				
Pump End				

#### 1.1 Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-0.1m) Brown Evaporitic Sand. Coarse grained and unconsolidated.
- (0.1-0.15) Black to Grey Silty Evaporitic Ooze.
- (0.15-0.5) Brown Evaporitic <u>CLAY</u>. Soft and plastic.
- (0.5-1m) Olive <u>CLAY</u>. Soft to firm and plastic. Interbedded evaporitic sand and massive evaporite crystals.
- (1-1.5m) Olive <u>CLAY</u>. Soft to firm and plastic. More dominant interbedded evaporitic sand and massive evaporite crystals.
- (1.5-2m) Orange-Brown <u>CLAY</u>. Abundant evaporite crystals up to 5cm long. Damp, firm and plastic.
- (2-2.5m) Orange-Brown <u>CLAY</u>, minor olive mottling. Abundant evaporite crystals up to 5cm long. Damp, firm and plastic with minor evaporitic sand lenses.
- (2.5-3m) Olive green, minor brown <u>CLAY</u>. Damp, firm and plastic.
- (3-3.5m) Olive green, minor brown <u>CLAY</u>. Damp, firm and plastic.
- (3.5-4) Olive green, minor brown <u>CLAY</u>. Damp, firm and plastic.

- (4-4.5) Brown <u>CLAY</u>. Damp, firm and plastic.
- (4.5-5) Brown <u>CLAY</u>. Damp, firm and plastic.
- (5-6) Mottled Olive Green and Brown <u>CLAY</u>. Damp, firm- stiff and moderately plastic.

#### Construction

T09 is located at 0491044 7519229, in the eastern margins of Lake Mackay, close to the Western Australian Northern Territory border.

Trench 09 was constructed in a very soft section of the lake, in which the excavator struggled to tram for most of the way between the previous trench, T11. Tramming difficulty was particularly noticeable during turning manoeuvres and piezometer installation. The trench was constructed entirely using the tilting-battering bucket, to remove the softer unconsolidated material at the surface, as well as the firmer clays to depth.

A consistent depth of 6m was achieved along the entire trench length. An approximate 7m wide cut was made at the surface. A 45-degree batter was then dug on each side 1m wide and depth for the first 40-45m, on the southern side. A benched design was then used for the remaining 60m, to maintain stability. T09 is essentially a modified version of Design B in Figure 1 below. The difference is the battered edges for some of the length, rather than a perpendicular to surface cut for the entire length. A 1m wide, horizontal to surface bench then follows, before a vertically excavated middle section (2m width and 6m total depth) was removed.

No slumping or wall failures occurred during construction.

A larger bench at the surface was cut to allow for a designated working area, to operate the flex-drive pump. This pump was used continuously throughout the trenching, so as to maintain a low water level and optimise operator's visibility.

Trench construction was undertaken to further test the stability of the battered design. This design also allowed for a further comparison of the time taken, to remove the additional material both at the surface and at depth.

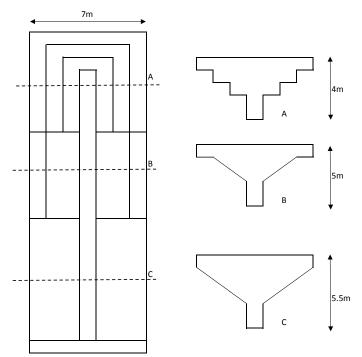


Figure 1: Trench Design Schematic

The northern end has an approximately 0.5-1m deeper sump cut in. This is to allow for brine ingress observations whilst pumping. This modification was designed to allow for efficient test pumping from the northern end. A wider side cut was made on the northern half to accommodate the pumping equipment. The northern end also has a ramped entry/exit, to allow trapped animals to easily escape the brine.

#### **1.2 Indicative Hydraulic Properties**

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as a fine salt crust, overlying unconsolidated evaporitic SANDS, overlying soft-firm CLAY horizons with an evaporitic SANDY base. Lithologically, no distinct variations were observed laterally along the 100m.

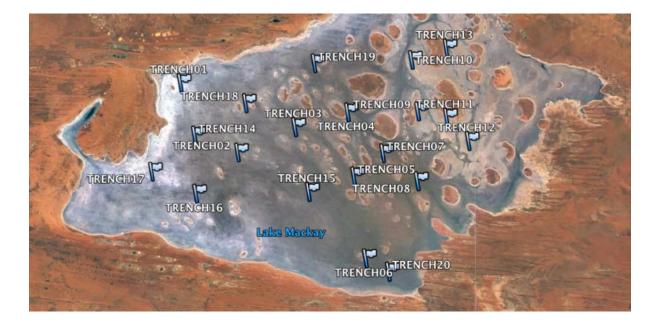
Brine ingress, was predominantly visible in the form of conduit flow from the Buff Tan Evaporitic Clay between 1.5 and 3m. Conduits were on the cm scale, and flowed freely throughout construction. The spatial variability of these flow paths was fairly consistent along the trench. Most visible surfaces above and below were completely dry.

The collective brine ingress for this trench is recorded at moderate-to-High.

10 piezometers were installed around this trench to monitor drawn down and hydraulic conductivity at a maximum distance of 100m away from the active trench pumping. Each piezo was installed to a depth of 5.5m with a 0.5m stick up.

True, measured hydraulic properties in this locations, will not be realised until pumping tests can sufficiently stress the near surface playa lake sediments. All piezo have been flushed or developed in preparation for these tests.

#### Figure 2. Trenching locations, Lake Mackay.



# 1. TRENCH 11

Date Start	30/09/17		
Date End	03/10/17		
Trench length	100m		
Piezometers Installed	10		
Average trench depth	30m@ 4m, 70m @6m	SWL= 1m bgl	
Site	Easting	Northing	
20mN	0495972	7518121	
50mN	0495967	7518149	
20mE	0496007	7518057	
50mE	0496036 7518062		
100mE	0496083 7518074		
20mS	0495995	7517978	
50mS	0495999	7517951	
20mW	0495962	7518042	
50mW	0495936	7518038	
100mW	0495896	7518027	
Trench S End	0495992	7517998	
Trench N End	0495975 7518101		
Pump Start			
Pump End			

#### 1.1 Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-1cm) White, Evaporitic Crust.
- (1cm -0.5m) Orange-Brown, coarse grained Evaporitic <u>SAND</u>. Unconsolidated.
- (0.5-1m) Dark Grey Evaporitic <u>SAND</u>. Black Organic Matrix.
- (1-1.5m) Brown- Orange Clayey <u>SAND</u>. Mildy consolidated.
- (1.5- 3m) Buff Tan, Evaporitic <u>CLAY</u>. Soft and Plastic. Numerous conduits.
- (3-3.5m) Mottled Brown and Yellow Evaporitic Sand. Mildy consolidated.

- (3.5- 4m) Olive and Brown <u>CLAY</u>. Soft- firm and plastic.
- (4-4.5m) Mottled Brown, Evaporitic Sandy <u>CLAY.</u> Soft- firm and plastic.
- (4.5-5m) Orange Brown Sandy <u>CLAY</u>. Firm and plastic.
- (5-6m) Cream and Orange Evaporitc <u>SAND</u>. Fine medium grained. Mildy consolidated

#### 1.2 Construction

T11 is located at 0495992 7517998, in the eastern margins of Lake Mackay, close to the Western Australian Northern Territory border.

Trench 11 was constructed in an area of relatively soft ground, in which the excavator struggled tram for most of the way between the previous trench T12. Tramming difficulty was particularly noticeable during turning manoeuvres and piezometer installation. Construction began with the excavator using the tilting-battering bucket, to remove the softer, unconsolidated material at the surface. This bucket was then used to remove the remaining lithological units to depth.

Approximately 30m on the southern end was excavated to 4m, due to firm sandy material at depth. Extra time was given to allow the excavator to dig to 6m for the rest of the trench. An approximate 7m wide cut was made at the surface. A 45-degree batter was then dug on each side for around 1m width and depth. T11 is essentially a modified version of Design B in Figure 1 below. The difference is the battered edges, rather than a perpendicular to surface cut. A 1m wide, horizontal to surface bench then follows, before a vertically excavated middle section (2m width and 6m total depth) was removed.

No slumping or wall failures occurred during construction.

A larger bench at the surface was cut to allow for a designated working area, to operate the flex-drive pump. This pump was used continuously throughout the trenching, so as to maintain a low water level and optimise operator's visibility.

Trench construction was undertaken to further test the stability of the battered design. This design also allowed for a further comparison of the time taken, to remove the additional material both at the surface and at depth.

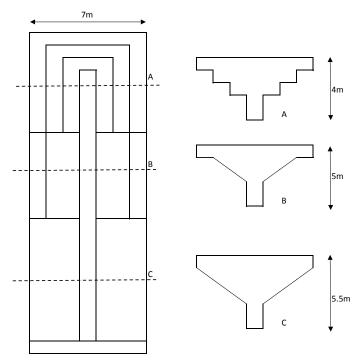


Figure 1: Trench Design Schematic

The northern end has an approximately 0.5-1m deeper sump cut in. This is to allow for brine ingress observations whilst pumping. This modification was designed to allow for efficient test pumping from the northern end. A wider side cut was made on the northern half to accommodate the pumping equipment. The northern end also has a ramped entry/exit, to allow trapped animals to easily escape the brine.

Figure 2. Trench 11 during construction, showing battered sides.

#### **1.3 Indicative Hydraulic Properties**

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as a fine salt crust, overlying unconsolidated evaporitic SANDS, overlying soft-firm CLAY horizons with an evaporitic SANDY base. Lithologically, no distinct variations were observed laterally along the 100m.

Brine ingress, was predominantly visible in the form of conduit flow from the Buff Tan Evaporitic Clay between 1.5 and 3m. Conduits were on the cm scale, and flowed freely throughout construction. The spatial variability of these flow paths was fairly consistent along the trench. Most visible surfaces above and below were completely dry.

The collective brine ingress for this trench is recorded at moderate-to-High.

10 piezometers were installed around this trench to monitor drawn down and hydraulic conductivity at a maximum distance of 100m away from the active trench pumping. Each piezo was installed to a depth of 5.5m with a 0.5m stick up.

True, measured hydraulic properties in this locations, will not be realised until pumping tests can sufficiently stress the near surface playa lake sediments. All piezo have been flushed or developed in preparation for these tests.

Figure 3. Trenching locations, Lake Mackay.



#### TRENCH 12

1. <u>Summary</u>

Date Started	24 September 2017
Date Ended	27 September 2017
Trench Length (m)	100m
Trench Width (m)	13
Average Excavated Trench Depth (m)	6
Observed Brine Inflow (Low/Moderate/High)	High (surface), low (deeper)
Trench Position North	
Trench Position South	
Caldme Operator	Block
Agrimin Staff	Michael

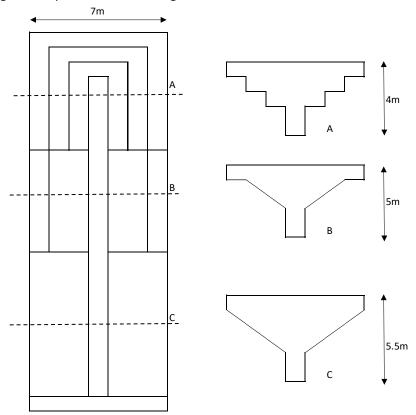
2. Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-0.6m) Orange-Brown, coarse grained Evaporitic <u>SAND</u>. Unconsolidated.
- (0.6-1m) Light-brown, fine grained, silty <u>SAND</u>.
- (1- 2m) Orange-Brown, Sandy CLAY. Soft Firm and plastic. Abundant brine inflow on contact of upper silty sand @1m.
- (2-2.4m) Creamy Gypsum SAND, fine grained and cemented. Some minor seepage on upper contact.
- (3-3.4m) Creamy Gypsum SAND, fine grained and cemented.
- (3.4- 4m) Brown <u>CLAY.</u> Firm and plastic.
- (4-4.5m) Creamy Gypsum SAND, fine grained and less consolidated.
- (4.5-5m) Greenish, saprolite CLAY, Stiff and moderately plastic.
- (5-6m) Brown <u>CLAY.</u> Firm and plastic.
- 3. Construction

Construction of the trench followed the cross-section B design however with some modifications. The initial 40m of trench was widened to 13m to try remove the liquid slosh associated with the top 1 (Photo 1). The ripper tooth was then required to get through the hard Gypsum sand.

Figure 1: Optional Trench Designs



The ripper tooth and conventional bucket were used to excavate the first 20m of the trench to a 5m depth. It was impossible to observe any inflow below 1.5-2m due to the high inflow at the 1m contact, it was therefore decided to leave a small wall in the trench and start a new trench while managing the brine inflow by damming the sides and using the flex drive pump. See photo 2

Photo 1: Trench Length at 40m



#### Photo 2: Separate Trenches.



The walls held up reasonably well, most likely due to the occurrence of the hard gypsum sand layering. The trench length was 100m including ramps on North and South ends. Average width is 13m with the depth based on the required design of 6m.

#### 4. <u>Piezometer Installations</u>

The lack of inflow observed below 2m, coupled with the inability of the excavator to move around due to the soft surface meant that only 2 piezometers were installed by hand auger. It is also highly unlikely the trench will be pumped as part of a long duration pump test.

Position	Easting	Northing	Depth (mbc)	SWL (mbc)	Casing height (magl)
20mW	0499696	7514011	2	0.8	0.5
30mW	0499689	7514010	2	0.8	0.5

#### 5. Observed Hydraulic Behaviour

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as approximately 0.6m of unconsolidated evaporitic SANDS overlying firm CLAY horizons with interbedded consolidated Gypsum layers.

Brine ingress, was in the form diffusive flow on the contact of the upper sand horizon and lower clay margins. Almost no brine inflow was observed deeper than 2m, only the occasional zone with minor seepage was noted.

The collective brine ingress for this trench is recorded as very low to low. The soft, almost aerated nature of the upper 1m sequence is likely to have high specific yield properties.

2 piezometers were installed on the western side of this trench to monitor drawn down and hydraulic conductivity at a maximum distance of 30m away from the trench although it is highly unlikely this trench will have a long-term pump test conducted on it. Each piezo was installed to a depth of 2m, gravel packed and have a 0.5m stick up.

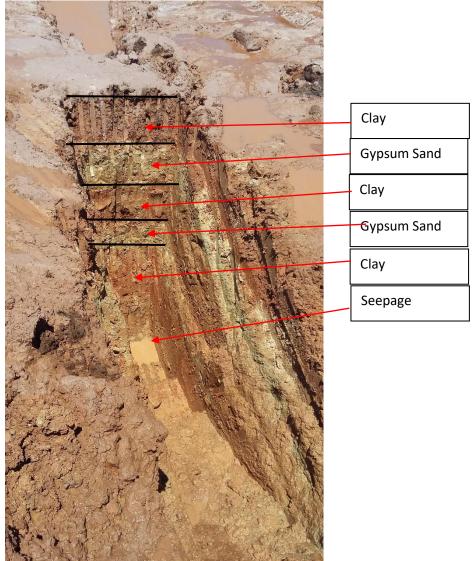


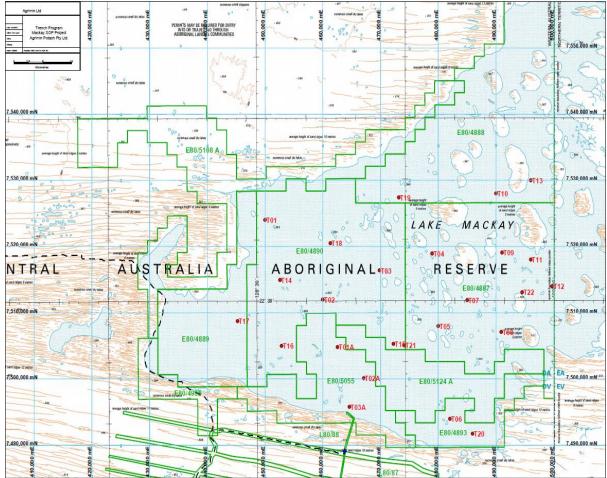
Photo 3: Stratigraphic Summary (1-6m)

# 6. Trench Pump Test

No pump testing planned at the time of writing.

# 7. Trench Position

The trench is located on the very eastern edge of the tenement boundary, on the WA/NT border. The actual location is shown on Figure 2 below.



# Figure 2: Trench Position

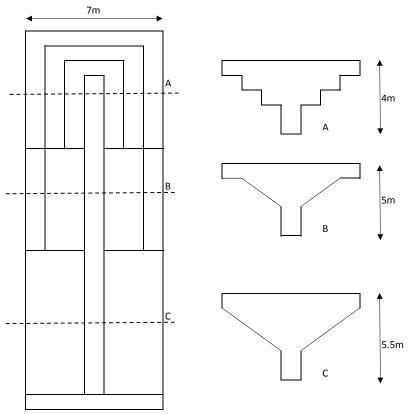
#### TRENCH 14

#### 1. Summary

Date Started	1 August 2017
Date Ended	5 August 2017
Trench Length (m)	100m
Trench Width (m)	6m
Average Excavated Trench Depth (m)	4m
Observed Brine Inflow (Low/Moderate/High)	Moderate to High
Trench Position North	
Trench Position South	
Caldme Operator	Block
Agrimin Staff	Andy/Michael (2.8.17)

- Lithology and Ground Conditions
   Dark brown/black organic mud (0-0.05m)
   Red Brown Silt and Sand (0.05-1.9m)
   Grey Brown Gypsum Sand, hard. Inflow on the contact. (1.9-2.0m)
   Brown Clay, sticky (2.0-3.5m)
   Creamy Gypsum Sand, very hard (3.5-4m) Cannot penetrate below this. Need ripper.
- 3. Construction

Construction of the trench followed the cross-section A design although only 1 bench was installed to approximately 1.9m below surface. The gypsum Sand layer was used as the base of the bench. Sides were also battered back with bucket teeth.



Tried augering through gypsum sand layer but only twisted off auger attachment.

#### 4. Piezometer Installations

Position	Easting	Northing	Depth (mbc)	SWL (mbc) 10/8/17	Casing height (magl)
20mN	0452557	7515052	5	1.15	0.5
50mN	0452553	7515081	3.90	1.16	0.58
20mE	0452590	7514995	4.2	1.39	0.52
50mE	0452619	7515001	4.84	1.32	0.6
100mE	0452670	7515012	4.12	1.14	0.52
20mS	0452580	7514905	4.1	1.37	0.4
50mS	0452586	7514876	4.16	1.17	0.42
20mW	0452545	7514968	4.13	1.38	0.43
50mW	0452513	7514964	3.43	1.18	0.41

- Observed Hydraulic Behaviour All inflow was between 0.5 and 1.9m. No inflow observed deeper in the trench.
- Trench Pump Out Test
   Not done- 2 month pumping test being undertaken.

#### TRENCH 16

# 1. Summary

Date Started	24 July 2017
Date Ended	26 July 2017
Trench Length (m)	100m
Trench Width (m)	6m
Average Excavated Trench Depth (m)	4m
Observed Brine Inflow (Low/Moderate/High)	Moderate
Trench Position North	0452706E
	7505167N
Trench Position South	0452709E
	7505056N
Caldme Operator	Damon Bright
Agrimin Staff	Andy Fulton

# 2. Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

(0-5cm) Dark brown organic mud (5cm)
(5cm- 1m) Red Brown Silt
(1m- 1.5m) Grey Grown Gypsum Sand.
(1.5m- 2m) Orange Brown Gypsum Sand
(2m-3.5m) Brown Clay
(3.5m-4m) (Dark Brown Clay

#### 3. Construction

Construction of the trench followed a modified version of cross-section design A. Only 1 bench was installed to approximately 1m below surface. This bench is nearly 2m wide, before a 2m deep central section was excavated. The softer clay horizon intercepted at depth, resulted in numerous collapses. Abundant silt has also accumulated in the bottom of the trench post construction.

The following schematic and photo indicate the design pictorially. The varying lithology and rate of brine ingress along the length of the trench, means that the final product is not uniform, in terms of bench widths and heights. Future trench design will take the lithogical, hydrological (Geotechnical) aspects into consideration in greater details, to optimise trench stability during pumping. Windrows surround the trench to provide shelter from prevailing saltating sands and windblown flooding events directly affecting standing water level within the trench.

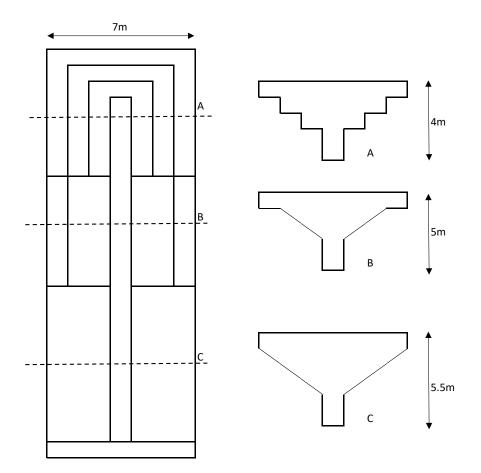


Photo 1& 2: T16 During Construction.





4. <u>Piezometer Installations</u>

The ground conditions allowed for easy piezometer installation. Piezometers were in all cardinal directions around the trench at either 20, 50 and 100m distance.

Position	Easting	Northing	Depth (mbc)	SWL (mbc) 3/8/17	Casing height (magl)
20mN	0452707	7505182	3.08	1.07	0.4
50mN	0452706	7505215	2.8	1.07	0.4
20mE	0452733	7505116	3.09	1.15	0.39
50mE	0452762	7505115	3.53	1.09	0.35
100mE	0452813	7505117	2.63	1.2	0.55
20mS	0452709	7505043	4	1.09	04
50mS	0452711	7505013	2.71	1.13	0.45
20mW	0452682	7505118	2.84	1.19	0.45
50mW	0452653	7505118	2.86	1.02	0.37
100mW	0452604	7505119	3.09	1.08	0.43

# 5. Observed Hydraulic Behaviour

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

Brine ingress, was in the form diffusive flow within the top 2.5m.

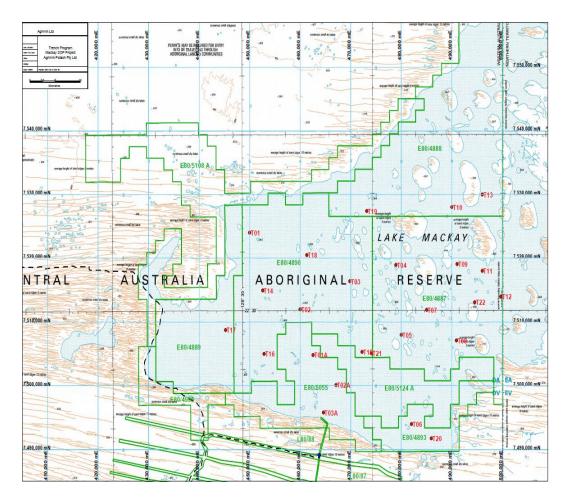
The collective brine ingress for this trench is recorded as Moderate. The shallow sediments dewater within 12-24 hours. Persistent flow is typically seen between 1m to 2.5m depths. These fluid pathways are proven to be connected at a considerable distance, as they have constantly produced a reliable flow during a >80 days pump test.

# 6. Trench Pump Test

Long term trench pump testing was carried out on this trench. Data is currently being analysed by Knight Piesold.

# 7. Trench Position

The trench is located the western side of the E90/4890 tenement package. The actual location is shown on Figure 2 below.



# TRENCH 20

# 1. <u>Summary</u>

Date Started	28 <sup>th</sup> October 2017
Date Ended	30 <sup>th</sup> October 2017
Trench Length (m)	100m
Trench Width (m)	8.5-9m
Average Excavated Trench Depth (m)	6
Observed Brine Inflow (Low/Moderate/High)	Low-Moderate
Trench Position North	0485923 7491845
Trench Position South	0485922 7491745
Caldme Operator	Trymorne
Agrimin Staff	Nick

# 2. Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-0.03) Thin salt crust with ~ 3cm black organic material and evaporitic sand.
- (0.03-0.06m) Grey, fine-medium grained Evaporitic <u>SAND</u>. Unconsolidated.
- (0.06-0.5m) Brown, silty- <u>CLAY</u>. Soft and plastic.
- (0.5-1m) Brown CLAY. Soft and plastic. Minor organic nodules.
- (1-1.5m) Brown <u>CLAY.</u> Firm and plastic. Abundant brine inflow on lower contact.
- (1.5- 2m) Creamy yellow, Clayey- <u>EVAPORITE</u> horizon, with laminations of organic material and clay. Firm and crumbly.
- (2-2.5m) Olive green <u>CLAY</u>. Soft firm and plastic.
- (2.5-6m) Brown <u>CLAY</u>. Soft-firm and plastic.
- 3. Construction

Construction of the trench followed the cross-section B design however with some modifications. A 2m wide 45-degree slope was cut directly from the surface down to a narrow 1m wide bench, before a vertical face to depth (6m). This was designed to optimise the trench stability with the small digging bucket. The deepest section of the trench is approximately 1m wide.

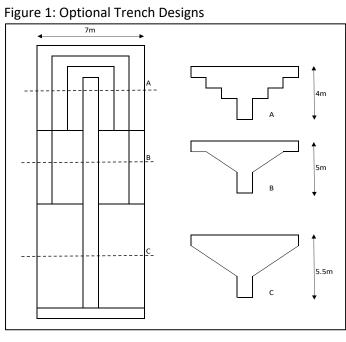


Photo 1: Trench 20 during construction.



Photo 2: Battered Angle



The walls held up well, with no collapses evident. This allows for a consistent trench width and depth for the entire 100m.

### 4. <u>Piezometer Installations</u>

Piezometers were installed in the North, East and West of the trench, to monitor radial draw down, at distances of 20, 50 and 100m.

Position	Easting	Northing	Depth (mbc)	SWL (mbc)	Casing height (magl)
20mN	0485925	7491866	5.54	0.945	0.5
50mN	0485922	7491898	5.55	0.825	0.5
20mE	0485945	7491801	5.54	1.22	0.5
50mE	0485974	7491800	5.46	0.965	0.5
100mE	0486028	7491809	5.36	0.65	0.5
20mW	0485898	7491813	5.46	1.14	0.5
50mW	0485873	7491813	5.33	0.915	0.5

# 5. Observed Hydraulic Behaviour

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

The sedimentological package along the length of the trench can be summarised as a clay dominant area with minor evaporite zones and varve like laminations of organic material dispersed throughout.

Brine ingress, was in the form diffusive flow on the contact of the upper sand horizon and lower clay margins, particularly above an evaporite zone in the top 2m. Brine ingress was low to moderate during trench besides a brief high flow period on the southern end.

No conduit style flow was observed during the construction phase. No flex drive was needed to control the water level within the trench, as the rate of recovery was less than the amount of water removed by the digging bucket.

Trench SWL= 1.5 mbgl.

Photo 3: Southern End of T20

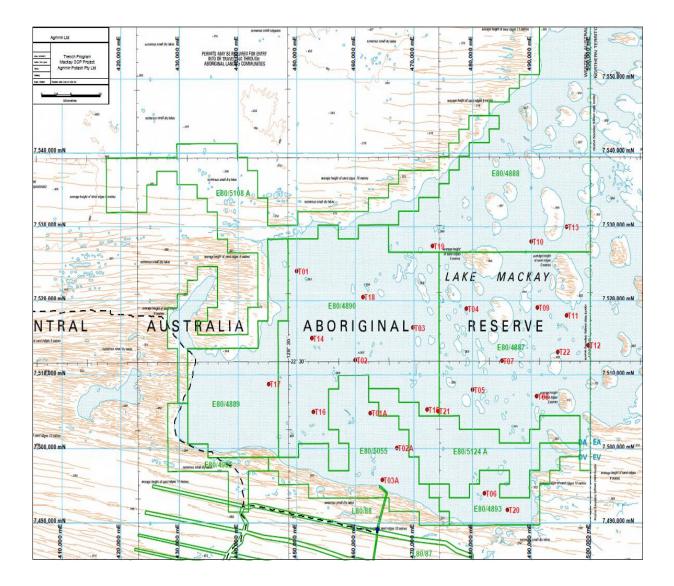


#### 6. Trench Pump Test

Long term trench pump testing will be carried out in the future, to accurately assess the hydraulic properties of the surrounding sediments. Surrounding piezometers will allow for radial draw down calculation and quantification of hydraulic conductivity.

# 7. Trench Position

The trench is located on south eastern edge the E80/4893 tenement boundary. The actual location is shown on Figure 2 below.



# 1. TRENCH 21

Date Start	15/8/17					
Date End	19/8/17					
Trench length	100m					
Piezometers Installed	6 (to increase to 8)					
Site	Easting Northing					
20mE	474048	7505047				
50mE	474147	7505043				
20mS	474098	7504965				
50mS	474098	7504937				
20mW	474071	7504965				
50mW	474043	7504937				
Trench Start	474098	7504090				
Trench End	474098	7505090				
Pump Start						
Pump End						

# 1.1 Lithology and Ground Conditions

The lithological sequence encountered included:

- Salt crust (5mm)
- Dark grey / black organic silty clay (5mm)
- Red / brown silty clay (25mm)
- Coarse brown gypsum Sand (20mm)
- Fine grey gypsum sand (10mm)
- Red brown silty clay (35mm)
- Red brown clay (5m+)



Figure 1: Cross section showing main lithological features

#### Construction

T21 is located in an area of very soft ground in which the excavator had to drag itself through the last 750m on its path from T15. Construction began with the excavator using the 1m wide bucket and shallow soil with very low strength quickly turned to a consistency of wet porridge.

The initial 20m was constructed as previously however it quickly became evident that the 1m bucket was not efficient for the material being removed. Failures occurred similar to that experienced in T15. The ground conditions also left a difficult work area for establishing a flex drive pump to dewater the trench. The tilt bucket enabled more efficient and cleaner battering and the following 20m was constructed with part bench and part batter down to a bottom slot. See Figure 2 (B). Small failures still occurred. The final 50m was constructed with a full width batter sloping to a bottom slot, of 1 bucket width. This was undertaken to both test the stability of the full batter in ground with the propensity to fail and to compare the additional time taken to complete given the additional material removed.

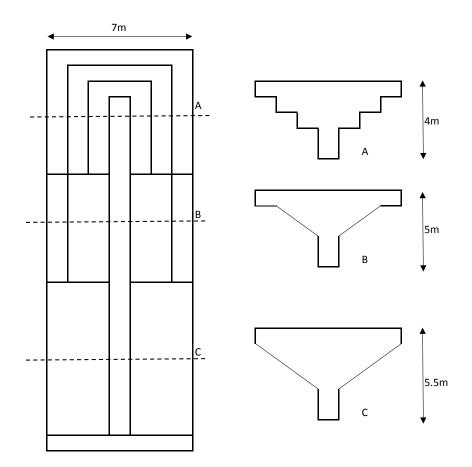


Figure 2: Trench Design Schematic



Figure 3: Trench 21 near completion

#### **1.2 Indicative Hydraulic Properties**

Observations of the trench excavation and surrounding groundwater levels provides some indication of the hydraulic properties of the shallow lake sediments in this area. The lithology shows approximately 1m of very loose unconsolidated silt sand and gypsum sand overlying a very firm homogeneous red brown clay that in this location has no visible inconsistencies in the 5m excavated along the trenches full length. Inflows were surprisingly low given the nature of the surface features, although leakage from what appears to be stringers emanating from the clay / loose soil interface and has continued so there will be a water make.

One observation of interest is that shown by Figure 4. The excavator uses purchase with the bucket to drag itself forward. This leaves pot holes out in front of the excavator. Here at the start of day 4 is such a hole with standing groundwater at 33cm below ground level. The hole is approximately 20 from the trench yet no visible impact from drainage to the trench. There is no doubt that specific yield of the top meter is reasonably high yet permeability remains low.



Figure 4: Excavator bucket hole in front trench

# 1. TRENCH 22

Date Start	09/09/17					
Date End	15/09/17					
Trench length	100m					
Piezometers Installed	5					
Average trench depth	50m@ 4m, 50m @6m SWL= 1.3m bGl					
Site	Easting Northing					
20mN	0495958 7513457					
50mN	0495952 7513489					
20mE	0496018 7513455					
50mE	0496048	7513455				
100mE	0496098	7513455				
Trench Start	0495997	7513449				
Trench End	0495897	7513411				
Pump Start	12/10/17					
Pump End						

# 1.1 Lithology and Ground Conditions

The open trench allows for a cross sectional view of the main lithological features. The observed lithological sequence is as follows:

- (0-0.5m) Orange-Brown, coarse grained Evaporitic <u>SAND</u>. Unconsolidated.
- (0.5-0.9m) Black sandy ooze on top of Orange-Brown Evaporitic <u>CLAY</u>. Soft Firm and plastic.
- (0.9-1.2m) Creamy-Grey, fine to medium grained Evaporitic <u>SAND</u>. Unconsolidated.
- (1.2- 3m) Orange-Brown, Evaporitic Sandy CLAY. Soft Firm and plastic. Abundant brine flow.
- (3-3.1m) Massive Evaporite Horizon. Needle like crystallographic structure.
- (3.1-3.4m) Orange-Brown <u>CLAY</u>. Firm and plastic. Numerous large, high flowing conduits.
- (3.4-3.7m) Buff Tan <u>CLAY.</u> Firm and plastic.
- (3.7-4m) Orange-Brown <u>CLAY.</u> Firm and plastic with numerous large, high flowing conduits.
- (4-6m) Olive Green and Mottled Brown <u>CLAY.</u> Firm and plastic. No visible conduits.

# 1.2 Construction

T22 is located at 0495997mE 7513449 mS in the southeast of Lake Mackay, approximately 5km west of the Western Australian Northern Territory border. This trench was not planned (see figure 4), and was constructed after a test pit displayed promising hydrogeological properties whilst tramming to T12.

Trench 22 was constructed in an area of very soft ground, in which the excavator had to drag it's self through much of the way. Tramming difficulty was particularly noticeable during turning manoeuvres and piezometer installation. Construction began with the excavator using the tilting-battering bucket, to remove the softer, unconsolidated material at the surface. This bucket was then used to remove the remaining lithological units to depth.

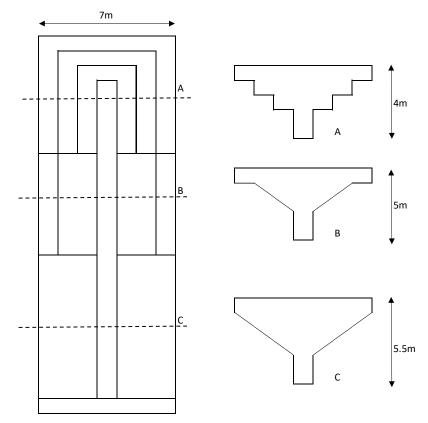
Approximately half way through the trench construction (50m), the trench design was modified to dig to 6m depths from 4m. An approximate 8m wide cut was made at the surface. A 45-degree batter then continued until a central 1.5mx2m central section was removed. T22 is essentially a modified version of Design B in Figure 1 below. The remaining 50m moving east was excavated with a 10m surface cut, to provide for slope stability (Modified design C).

Minor slumping occurred in the lower walls, particularly on the central sides. Slumping occurred during initial excavation, as discrete packages of sediment with distinct failure planes.

A larger bench at the surface was cut to allow for a designated working area, to operate the flex-drive pump. This pump was used continuously throughout the trenching, so as to maintain a low water level and optimise operator's visibility. Two pumps were used for the second 50m.

The ground conditions were sloppy and often made for a difficult working environment, as seen in figure 3. The tilt bucket enabled more efficient and cleaner battering. No significant change in lithology was detected east west.

Trench construction was undertaken to further test the stability of the battered design. This design also allowed for a further comparison of the time taken, to remove the additional material both at the surface and at depth.



#### Figure 1: Trench Design Schematic

The eastern end has an approximately 0.5m deeper sump cut in, to allow for brine ingress observations whilst pumping. This modification was designed to allow for efficient test pumping from the eastern end. A wider side cut was made on the southern side to accommodate the pumping equipment. The eastern end also has a ramped entry/exit, to allow trapped animals to easily escape the brine, visible in figure 2.

Figure 2. Trench 22 during construction, showing battered sides.



Figure 4. Caldme Excavator in soft near surface sediments.



#### 1.3 Indicative Hydraulic Properties

Observations made during trench excavation, analysis of lithology, nature of brine ingress and surrounding groundwater levels, provide some indication of the hydraulic properties of the near surface playa lake sediments in this area.

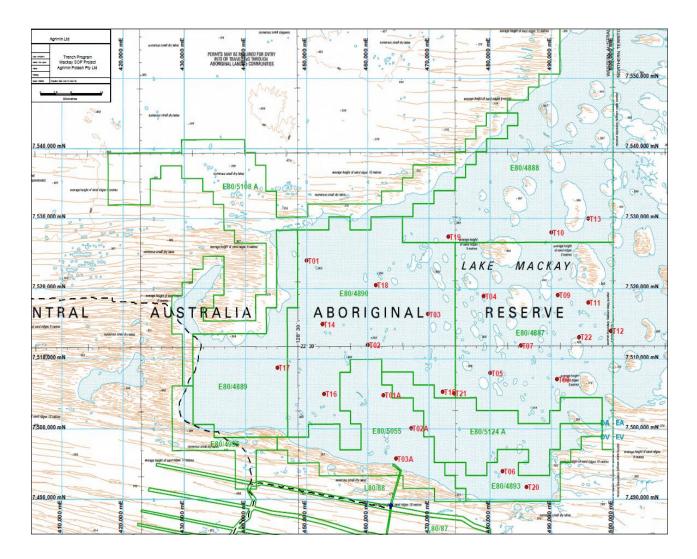
The sedimentological package along the length of the trench can be summarised as approximately 0.5m of unconsolidated evaporitic SANDS overlying soft-firm CLAY horizons. Lithologically, no distinct variations were observed laterally along the 100m.

Brine ingress, was in the form diffusive flow from the lower sand horizon and upper clay margins. Larger scale conduit flow was observed from cm scale flow paths in the clay zone, at depths of around 2-4m below ground surface. The spatial variability of these flow paths was high. Some areas were completely dry. The diffusive flow @ 1.5m was consistent throughout the entire trenching process.

The collective brine ingress for this trench is recorded at very moderate-to-High.

3 piezometers were installed on the eastern side of this trench to monitor drawn down and hydraulic conductivity at a maximum distance of 100m away from the active trench pumping. Each piezo was installed to a depth of 5.5m with a 0.5m stick up. Two more piezo's were installed on the northern side at 20 and 50m.

True measured hydraulic properties in this locations, will not be realised until pumping tests can sufficiently stress the near surface playa lake sediments. All piezo have been flushed or developed in preparation for these tests.



# Figure 4. Trenching locations, Lake Mackay.



# APPENDIX D

Site Photographs





Photograph 1: Black ooze overlaying brown sandy layer



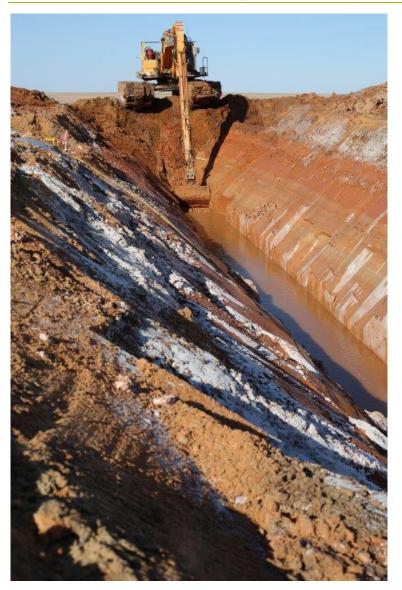
Photograph 1: Black ooze overlaying brown sandy layer





Photograph 3: Groundwater extraction for hydrogeological studies





Photograph 4: Excavation of a trench





Photograph 5: Exposed trench wall



Photograph 6: Exposed trench wall





Photograph 7:Excavation of a trench



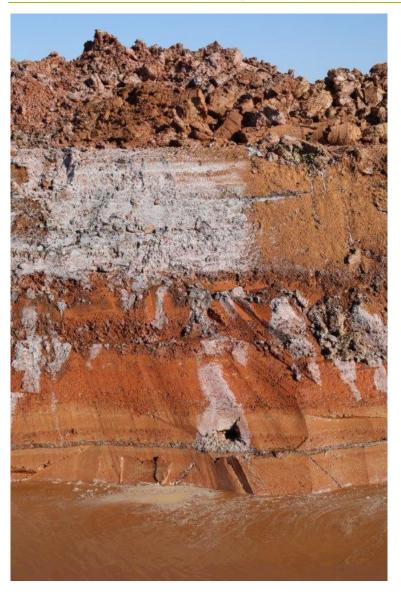
Photograph 8: Exposed trench wall





Photograph 9: Profile from surface to 0.5 mbgl





Photograph 10: Trench wall with excavated material piled on top





Photograph 11: Trench wall



# APPENDIX E

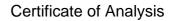
Laboratory Reports



mgt

360 Environmental 10 Bermondsey St West Leederville WA 6007





NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:

Julie Palich

Report Project name Project ID **Received Date**  560004-S Agrimin ASS Lake Mackay 2225 Aug 24, 2017

Client Sample ID			QC1	QC4	T2 0	T2 0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Au28562	P17-Au28565	P17-Au28569	P17-Au28570
Date Sampled			Aug 17, 2017	Aug 13, 2017	Aug 13, 2017	Aug 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	6000	-	9600	-
Arsenic	2	mg/kg	< 2	-	< 2	-
Cadmium	0.4	mg/kg	< 0.4	-	< 0.4	-
Chromium	5	mg/kg	13	-	18	-
Copper	5	mg/kg	5.6	-	7.8	-
Iron	20	mg/kg	8200	-	16000	-
Lead	5	mg/kg	< 5	-	< 5	-
Mercury	0.1	mg/kg	< 0.1	-	< 0.1	-
Nickel	5	mg/kg	< 5	-	5.7	-
Zinc	5	mg/kg	21	-	28	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	7.9	7.6	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	4.7	7.1	7.5
Reaction Ratings*505		comment	3.0	3.0	4.0	4.0
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	5.0	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	67	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	0.11	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	8.1	8.2	7.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	0.11	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	67	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.1	2.5	1.3	0.57
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	230	490	260	110
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.36	0.79	0.42	0.18
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1



Client Sample ID			T14_0	T14_0.5	T14_1.0	T15_0.05
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Au28571	P17-Au28572	P17-Au28573	P17-Au28575
Date Sampled			Aug 13, 2017	Aug 13, 2017	Aug 13, 2017	Aug 15, 2017
Test/Reference	LOR	Unit				
Heavy Metals	1	1				
Aluminium	10	mg/kg	-	12000	-	-
Arsenic	2	mg/kg	-	2.0	-	-
Cadmium	0.4	mg/kg	-	< 0.4	-	-
Chromium	5	mg/kg	-	20	-	-
Copper	5	mg/kg	-	9.6	-	-
Iron	20	mg/kg	-	17000	-	-
Lead	5	mg/kg	-	< 5	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	6.1	-	-
Zinc	5	mg/kg	-	25	-	-
Acid Sulfate Soils Field pH Test	•					
pH-F (Field pH test)*	0.1	pH Units	7.8	7.4	7.6	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.6	7.9	7.8	8.3
Reaction Ratings* <sup>S05</sup>		comment	4.0	4.0	4.0	4.0
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	7.9	8.2	8.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.016	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	10	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.6	1.4	2.1	1.4
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	310	290	420	270
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.50	0.46	0.67	0.44
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t		< 1	< 1	< 1

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			T15_0.5 Soil P17-Au28576 Aug 15, 2017	T16_0 Soil P17-Au28577 Aug 13, 2017	T16_1.0 Soil P17-Au28579 Aug 13, 2017	T16_1.0A Soil P17-Au28580 Aug 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	9300	-	-	-
Arsenic	2	mg/kg	< 2	-	-	-
Cadmium	0.4	mg/kg	< 0.4	-	-	-
Chromium	5	mg/kg	16	-	-	-
Copper	5	mg/kg	7.7	-	-	-



Client Sample ID			T15_0.5	T16_0	T16_1.0	T16_1.0A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Au28576	P17-Au28577	P17-Au28579	P17-Au28580
Date Sampled			Aug 15, 2017	Aug 13, 2017	Aug 13, 2017	Aug 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals	-					
Iron	20	mg/kg	14000	-	-	-
Lead	5	mg/kg	< 5	-	-	-
Mercury	0.1	mg/kg	< 0.1	-	-	-
Nickel	5	mg/kg	5.1	-	-	-
Zinc	5	mg/kg	15	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	7.6	7.5	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	6.6	7.9	8.2
Reaction Ratings* <sup>S05</sup>		comment	4.0	2.0	4.0	4.0
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.0	8.0	8.0	7.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.69	1.2	1.1	0.37
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	140	240	230	74
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.22	0.38	0.36	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled Test/Reference	LOR	Linit	T21_0 Soil P17-Au28581 Aug 15, 2017	T21_0.05 Soil P17-Au28582 Aug 15, 2017	T21_0.5 Soil P17-Au28583 Aug 15, 2017	T21_1.0 Soil P17-Au28584 Aug 17, 2017
Heavy Metals	LUK	Unit				
Aluminium	10	mg/kg	5600			9500
Arsenic	2	mg/kg	< 2		_	< 2
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	12	-	_	16
Copper	5	mg/kg	7.5	-	-	11
Iron	20	mg/kg	7900	-	-	12000
Lead	5	mg/kg	< 5	-	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	-	-	5.4
Zinc	5	mg/kg	17	-	-	30



Client Sample ID			T21_0	T21_0.05	T21_0.5	T21_1.0
Sample Matrix			Soil P17-Au28581	Soil P17-Au28582	Soil P17-Au28583	Soil P17-Au28584
Eurofins   mgt Sample No.						
Date Sampled			Aug 15, 2017	Aug 15, 2017	Aug 15, 2017	Aug 17, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	7.6	7.5	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	6.9	7.8	8.1
Reaction Ratings*505		comment	4.0	2.0	4.0	4.0
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	8.2	8.1	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.3	1.5	1.0	1.9
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	260	290	210	390
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.41	0.46	0.33	0.62
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID Sample Matrix Eurofins   mgt Sample No.			T21_2.0 Soil P17-Au28586	T21_3.0 Soil P17-Au28588	T21_4.0 Soil P17-Au28590	T21_5.0 Soil P17-Au28592
Date Sampled			Aug 17, 2017	Aug 17, 2017	Aug 17, 2017	Aug 17, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	38000	-	-	-
Arsenic	2	mg/kg	4.0	-	-	-
Cadmium	0.4	mg/kg	< 0.4	-	-	-
Chromium	5	mg/kg	47	-	-	-
Copper	5	mg/kg	19	-	-	-
Iron	20	mg/kg	39000	-	-	-
Lead	5	mg/kg	12	-	-	-
Mercury	0.1	mg/kg	< 0.1	-	-	-
Nickel	5	mg/kg	17	-	-	-
Zinc	5	mg/kg	44	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	7.9	7.7	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.0	7.2	7.1	7.3
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	3.0	3.0



Client Sample ID Sample Matrix			T21_2.0 Soil	T21_3.0 Soil	T21_4.0 Soil	T21_5.0 Soil
•						
Eurofins   mgt Sample No.			P17-Au28586	P17-Au28588	P17-Au28590	P17-Au28592
Date Sampled			Aug 17, 2017	Aug 17, 2017	Aug 17, 2017	Aug 17, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	8.4	8.4	8.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.0	2.5	2.9	2.7
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	390	490	570	540
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.63	0.79	0.92	0.87
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1



### Sample History

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

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

Description	<b>Testing Site</b>	Extracted	Holding Time
Heavy Metals	Melbourne	Aug 28, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Aug 28, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Acid Sulfate Soils Field pH Test	Brisbane	Aug 29, 2017	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (Minus ANC- WA)	Brisbane	Aug 29, 2017	6 Week
Mothed: LTM-GEN-7070			

- Method: LTM-GEN-7070

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Ac Pr	Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       Agrimin ASS Lake Mackay			Order No. Report #: Phone: Fax:				0		Received:         Aug 24, 2017 1:12 PM           004         Due:         Aug 31, 2017           0388 8360         Priority:         5 Day           0381 2360         Contact Name:         Cassie Hasan		
Pr	oject ID:	2225										Eurofins   mgt Analytical Services Manager : Robert Johnston
		Sa	mple Detail			Aluminium	HOLD	Iron	Acid Sulfate Soils Field pH Test	Metals M8	Chromium Suite (Minus ANC- WA)	
Mell	bourne Laborat	ory - NATA Site	# 1254 & 142	71		х		Х		Х		
		- NATA Site # 1										
		y - NATA Site #							Х		Х	X
		NATA Site # 237	36				Х					_
Exte	ernal Laboratory Sample ID	Sample Date	Sampling	Matrix	LAB ID							
	-	-	Time									
1	QC1	Aug 17, 2017		Soil	P17-Au28562	Х		Х	Х	Х	Х	X
2	QC2	Aug 13, 2017		Soil	P17-Au28563		X X					—
3	QC3 QC4	Aug 13, 2017		Soil Soil	P17-Au28564		X		х		x	×
4 5	QC4 QC5	Aug 13, 2017 Aug 17, 2017		Soil	P17-Au28565 P17-Au28566		х		X		X	<u>^</u>
5 6	QC6	Aug 17, 2017 Aug 13, 2017		Soil	P17-Au28566 P17-Au28567		X					
0 7	QC8 QC7	Aug 13, 2017 Aug 15, 2017		Soil	P17-Au28567 P17-Au28568	<u> </u>	X					
8	T2_0	Aug 13, 2017 Aug 13, 2017		Soil	P17-Au28569	х	~	Х	Х	Х	X	x
9	T2_0.05	Aug 13, 2017 Aug 13, 2017		Soil	P17-Au28570	Ê		~	X	~	X	
<u> </u>	1.2_0.00	, wg 10, 2017		001	1.177020070	I			~			··

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Company Name: Address:	: 360 Environn 10 Bermonds West Leeden WA 6007	sey St			Re	der N port i ione: x:		0		4 8 8360 1 2360		Received: Due: Priority: Contact Name:	Aug 24, 2017 1:12 PM Aug 31, 2017 5 Day Cassie Hasan
Project Name: Project ID:	Agrimin ASS 2225	Lake Mackay									Eurofins   I	mgt Analytical Servio	ces Manager : Robert Johnston
	Sar	nple Detail		Aluminium	HOLD	Iron	Acid Sulfate Soils Field pH Test	Metals M8	Chromium Suite (Minus ANC- WA)				
Melbourne Labora	tory - NATA Site	# 1254 & 14271		Х		х		Х					
Sydney Laborator	y - NATA Site # 18	8217								4			
Brisbane Laborato							Х		Х	4			
Perth Laboratory -					Х					4			
10 T14_0	Aug 13, 2017	Soil	P17-Au28571			<u> </u>	Х		Х	4			
11 T14_0.5	Aug 13, 2017	Soil	P17-Au28572	Х		X	X	Х	X	4			
12 T14_1.0	Aug 13, 2017	Soil	P17-Au28573				Х		Х	4			
13 T15_0	Aug 15, 2017	Soil	P17-Au28574		Х		~		~	4			
14 T15_0.05	Aug 15, 2017	Soil	P17-Au28575				X		X	4			
15 T15_0.5	Aug 15, 2017	Soil	P17-Au28576	Х		X	X X	Х	X X	+			
16 T16_0 17 T16 0.03	Aug 13, 2017	Soil	P17-Au28577		x	-	~		~	+			
	Aug 13, 2017	Soil Soil	P17-Au28578 P17-Au28579		<u> </u>		x		x	4			
18 T16_1.0 19 T16 1.0A	Aug 13, 2017 Aug 13, 2017	Soil	P17-Au28579				X		X	4			
20 T21_0	Aug 13, 2017 Aug 15, 2017	Soil	P17-Au28580	x		x	X	x	X	4			
20 121_0 21 T21_0.05	Aug 15, 2017 Aug 15, 2017	Soil	P17-Au28582				X		X	1			
21 121_0.00	Aug 15, 2017	3011	[F1/-Au20302				^			L			

Company Name:     360 Environmental Address:     Order No.: New Leederville WA 6007     Report #: Boot     550004 B 3988 3360     Due: Due: Source Aug 34, 2017 1:12 PM. Due: Source Aug 31, 2017       Project Name:     Agrimin ASS Lake Mackay Project ID:     2225     Contact Name:     Cassie Hasan       Company Mame:       Sample Detail       Melbourne Laboratory - NATA Site # 1254 & 14271     x     x     x       Ar X     x       Perty Laboratory - NATA Site # 23736     X     X     x		ofins   mgt		ABN– 50 005 ( e.mail : Enviro web : www.eur	Sales@	eurofins m.au	s.com	2- 0 Pl N	hone : · ATA #	ston Tow VIC 316 +61 3 85	Sydney         Brisbane         Perth           vn Close         Unit F3, Building F         1/21 Smallwood Place         2/91 Leact           66         16 Mars Road         Murarrie QLD 4172         Kewdale W           64 5000         Lane Cove West NSW 2066         Phone : +61 7 3902 4600         Phone : +61 2 9900 8400           271         NATA # 1261 Site # 18217         Site # 2373	/A 6105 1 8 9251 9600 161
Project ID:       2225         Build of the state of the	Address:	10 Bermondsey St West Leederville WA 6007				Re Ph	port # one:		0	8 9388	Due:         Aug 31, 2017           8 8360         Priority:         5 Day	:12 PM
Sample DetailSolutionSolutionSolutionMelbourne Laboratory - NATA Site # 1254 & 14271XXXXSydney Laboratory - NATA Site # 18217XXXXBrisbane Laboratory - NATA Site # 20794XXXXPerth Laboratory - NATA Site # 23736XXXX			У								Eurofins   mgt Analytical Services Manager : R	obert Johnston
Sydney Laboratory - NATA Site # 18217     Image: Constraint of the system       Brisbane Laboratory - NATA Site # 20794     X     X       Perth Laboratory - NATA Site # 23736     X     Image: Constraint of the system		Sample Detail			Aluminium	ногр	Iron	Acid Sulfate Soils Field pH Test	Metals M8	Suite (Minus		
Brisbane Laboratory - NATA Site # 20794       X       X       X         Perth Laboratory - NATA Site # 23736       X       X       X	Melbourne Laborator	y - NATA Site # 1254 & 142	271		х		х		х			
Perth Laboratory - NATA Site # 23736 X												
								Х		X		
						Х						
			Soil	P17-Au28583	, <u>, , , , , , , , , , , , , , , , , , </u>			X		X		
23         T21_1.0         Aug 17, 2017         Soil         P17-Au28584         X         <					X	X	X	X	X	X		
24     T21_1.5     Aug 17, 2017     Soil     P17-Au28585     X        25     T21_2.0     Aug 17, 2017     Soil     P17-Au28586     X     X     X					~	X	v	~	v			
25     T21_2.0     Aug 17, 2017     Soil     P17-Au28586     X     X     X     X       26     T21_2.5     Aug 17, 2017     Soil     P17-Au28587     X     X     X					^	×	^	^	^	<u> </u>		
						^		×		x		
						x						
	27 T21_3.0 A	ug 11, 2011						x		x		
	27         T21_3.0         #           28         T21_3.5         #	Aug 17, 2017		1. 1	1	x						
	27         T21_3.0         A           28         T21_3.5         A           29         T21_4.0         A	Aug 17, 2017 Aug 17, 2017		P17-Au28591								
	27         T21_3.0         #           28         T21_3.5         #           29         T21_4.0         #           30         T21_4.5         #	Aug 17, 2017	Soil	P17-Au28591 P17-Au28592				Х		X		
Test Counts         7         12         7         20         7         20	27         T21_3.0         /           28         T21_3.5         /           29         T21_4.0         /           30         T21_4.5         /           31         T21_5.0         /	Aug 17, 2017 Aug 17, 2017	Soil Soil	P17-Au28591 P17-Au28592 P17-Au28593				Х		X		



### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

### **QC Data General Comments**

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



### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							-		
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery								-	
Heavy Metals			-						
Arsenic			%	108			80-120	Pass	
Cadmium			%	111			80-120	Pass	
Chromium			%	113			80-120	Pass	
Copper			%	114			80-120	Pass	
Lead			%	101			80-120	Pass	
Mercury			%	112			75-125	Pass	
Nickel			%	113			80-120	Pass	
Zinc			%	111			80-120	Pass	
LCS - % Recovery									
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	101			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	92			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery				1			1		
Heavy Metals				Result 1					
Arsenic	M17-Au34677	NCP	%	91			75-125	Pass	
Cadmium	M17-Au34677	NCP	%	105			75-125	Pass	
Chromium	M17-Au34677	NCP	%	100			75-125	Pass	
Copper	M17-Au34677	NCP	%	104			75-125	Pass	
Lead	M17-Au34677	NCP	%	105			75-125	Pass	
Mercury	M17-Au34677	NCP	%	120			70-130	Pass	
Nickel	M17-Au34677	NCP	%	102			75-125	Pass	
Zinc	M17-Au34677	NCP	%	70			75-125	Fail	Q08
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals	1	1		Result 1	Result 2	RPD			
Aluminium	P17-Au28569	CP	mg/kg	9600	9500	1.0	30%	Pass	
Arsenic	P17-Au28569	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	P17-Au28569	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	P17-Au28569	CP	mg/kg	18	18	1.0	30%	Pass	
Copper	P17-Au28569	CP	mg/kg	7.8	7.9	1.0	30%	Pass	
Lead	P17-Au28569	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	P17-Au28569	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	P17-Au28569	CP	mg/kg	5.7	5.7	<1	30%	Pass	



Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-Au28571	CP	pH Units	7.8	7.6	pass	30%	Pass	
Reaction Ratings*	P17-Au28571	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate	11171020011	0.	Common	1.0		puoo	0070	1 400	
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-Au28576	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus	1117/020070	01	Ng OdOOO/I				0070	1 400	
ANC	P17-Au28576	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-Au28576	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Au28576	СР	pH Units	8.0	8.0	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Au28576	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Au28576	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Au28576	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	D17 Au20576	СР	mol H+/t	- 2	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-Au28576	-		< 3					
	P17-Au28576	CP CP	% S % S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur Net Acid soluble sulfur	P17-Au28576	CP CP	% S % S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity	P17-Au28576		% S	n/a	n/a	n/a	30%	Pass	
units Net Acid soluble sulfur - equivalent	P17-Au28576	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
S% pyrite	P17-Au28576	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt) Acid Neutralising Capacity -	P17-Au28576	CP	%CaCO3	0.69	0.80	15	30%	Pass	
equivalent S% pyrite (s-ANCbt)	P17-Au28576	СР	% S	0.22	0.26	15	30%	Pass	
ANC Fineness Factor	P17-Au28576	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-Au28576	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-Au28576	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-Au28576	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate				-				_	
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-Au28583	CP	pH Units	7.5	7.5	pass	30%	Pass	
Reaction Ratings*	P17-Au28583	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate					1		1	1	
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-Au28588	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-Au28588	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-Au28588	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Au28588	CP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Au28588	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Au28588	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Au28588	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity									
units	P17-Au28588	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P17-Au28588	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-Au28588	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur Net Acid soluble sulfur - acidity	P17-Au28588	CP	% S	n/a	n/a	n/a	30%	Pass	
units	P17-Au28588	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-Au28588	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-Au28588	CP	%CaCO3	2.5	2.5	1.0	30%	Pass	
A stal Niesstas Patra o Osara stra		0.0		0.79	0.79	1.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-Au28588	CP	% S	0.79	0.79	1.0	0070		
Acid Neutraiising Capacity - equivalent S% pyrite (s-ANCbt) ANC Fineness Factor	P17-Au28588 P17-Au28588	CP	% S factor	1.5	1.5	<1	30%	Pass	



Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Net Acidity (Acidity Units)	P17-Au28588	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-Au28588	СР	kg CaCO3/t	< 1	< 1	<1	30%	Pass	



### Comments

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

### **Qualifier Codes/Comments**

Code Description

Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference
400	

S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

### Authorised By

Robert Johnston Alex Petridis Analytical Services Manager Senior Analyst-Metal (VIC)

### Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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360 ENV	QC1	QC2	QC3	QC4	QC5	QC6	QC7	T2_0
Agrimin AS	P17-Au285	P17-Au285	P17-Au285	P17-Au285	P17-Au285	P17-Au285	P17-Au285	P17-Au285
Acid Sulfat	e Soils Field	pH Test						
pH-F (Field	7.4			7.9				7.6
pH-FOX (Fi	6.7			4.7				7.1
Reaction R	i 3			3				4

T2\_0.05T14\_0T14\_0.5T14\_1.0T15\_0T15\_0.05T15\_0.5T16\_0T16\_0.03P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285

7.5	7.8	7.4	7.6	7.6	7.5	7.6
7.5	6.6	7.9	7.8	8.3	8.1	6.6
4	4	4	4	4	4	2

T16\_1.0T16\_1.0AT21\_0T21\_0.05T21\_0.5T21\_1.0T21\_1.5T21\_2.0T21\_2.5P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285

7.6	7.5	7.5	7.6	8.1	7.6	7.5
-	8.1	7.8	6.9	7.6	8.2	7.9
	4	4	2	4	4	4

T21\_3.0T21\_3.5T21\_4.0T21\_4.5T21\_5.0T21\_5.5P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285P17-Au285

7.9	7.7	7.8
7.2	7.1	7.3
2	3	3

### Chain of Custody Record

Send samples to:			ins MG	бТ					Project r	name:		Agrimin A	SSTake	Mackay			-		
		Unit 2	2. 91 Le	each Hi	ghwav	Kewda	le WA 6105		Project number: 2225				Mackay		-				
Delivery method:		Courier						samplers		Gerry Bra	dlev				SF				
Samples from:		360 E	nviron	mental						erified by		Julie Palie							
		10 Be	rmond	sey Str	eet W	est Lee	derville WA			te referen		June Fune				env	/iror	iment	tai
Send reports to:						ental.c				und time:		Normal							
		iulier	alich	@360	)envir	onme	ntal.com.au		, and are	and third		Norman				COCIN	lumber	2315-01	1
	These samples are from	om the	followi	ng job i	number	rs:											annoer	2313 01	
	• 564573																		
	• 568325																		
	<ul><li>570737</li><li>573256</li></ul>																		
	• 573748																		
	- 373748																		
			Matr	ix/Con	tainer							Sam	ple Anal	ysis					
JCe	ne				Ħ														
ere	Nar				mei			67 <u>-</u>	1	1		A/							
Refe	ole	ar)	oag)	5	Cel			, (	N/	K 1.	1	2							
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Uranium (total)	A	X	X	M8							
P17-No25779	T6_0.02		Х				26/10/2017	X	/ (	1	1								
P17-No02825	T11_1.0		Х				27/09/2017	X										-	
P17-No02823	T11_4.5		Х				27/09/2017	X											
P17-No02826	T12_0.01		Х				27/09/2017	X											
P17-No02832			Х				27/09/2017	×											
P17-No02829	the second se		Х				27/09/2017	X											
P17-No25785	and the second se		Х				30/10/2017	X											
P17-No25788			Х				30/10/2017	X											
P17-Se27802	services with the service of the ser		Х				14/09/2017	X											
P17-Se27807	And a second sec		Х				14/09/2017	X											
P17-Se27813			Х				13/09/2017	X											
P17-Se27817	and the second s		Х				13/09/2017	X											
P17-Se27820			Х				13/09/2017	X											
P17-Se27821	T22_4.0		Х				13/09/2017	X											
P17-No25775	PP_0.02		X				Not Provided	X											
P17-No25776	PP_0.02B		X				Not Provided	×											
P17-No25778	PP_2.0		Х				Not Provided	×											
P17-Se27805	QC1		X				14/09/2017	X											
Relinquished by Sarah print name):	Breheny Borhom	~ .		Signat	ure:		Date: 6/12/17			Received (print nan	by ne): Rot	5 John	note	Signature:	AL-TA	/A	Date: Time:	6/12/	117
Relinquished by	0			Signat	ure:		Date:			Received				Signature:			Date:	1	
print name):																	MLC.		



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 20794 Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

## Sample Receipt Advice

360 Environmental
Cassie Hasan
Agrimin ASS Lake Mackay
2225

.

COC number:Not providedTurn around time:5 DayDate/Time received:Aug 24, 2017 1:12 PMEurofins | mgt reference:560004

### Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Some samples have been subcontracted.
- Custody Seals intact (if used).

### **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Cassie Hasan - CassieHasan@360environmental.com.au.



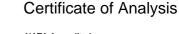


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NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:
------------

Julie Palich

Report
Project name
Project ID
Received Date

**564573-S-V2** AGRIMIN ASS LAKE MACKAY 2225 Sep 22, 2017

Client Sample ID			T5_0.05	T5_0.2	T5_0.33	QC1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27802	P17-Se27803	P17-Se27804	P17-Se27805
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit		•	•	
Heavy Metals						
Aluminium	10	mg/kg	760	-	-	1700
Arsenic	2	mg/kg	< 2	-	-	< 2
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	< 5	-	-	5.3
Copper	5	mg/kg	< 5	-	-	< 5
Iron	20	mg/kg	1300	-	-	2100
Lead	5	mg/kg	< 5	-	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	-	-	< 5
Zinc	5	mg/kg	< 5	-	-	5.9
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	6.5	6.8	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.5	8.4	8.6	5.2
Reaction Ratings* <sup>S05</sup>		comment	2.0	4.0	4.0	2.0
Extraneous Material						
<2mm Fraction	0.005	g	160	87	170	210
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	1.0
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.0	7.9	8.0	7.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.010	< 0.005	< 0.005	0.014
Chromium Reducible Sulfur -acidity units	3	mol H+/t	6.0	< 3	< 3	9.0
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.12	0.67	0.87	0.26



Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			T5_0.05 Soil P17-Se27802 Sep 14, 2017	T5_0.2 Soil P17-Se27803 Sep 14, 2017	T5_0.33 Soil P17-Se27804 Sep 14, 2017	QC1 Soil P17-Se27805 Sep 14, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	23	130	180	51
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	0.04	0.21	0.28	0.08
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	17	19	19	17

Client Sample ID			T7_0.1	T7_0.05	T7_0.3	T7_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27806	P17-Se27807	P17-Se27808	P17-Se27809
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	14000	-	-
Arsenic	2	mg/kg	-	2.6	-	-
Cadmium	0.4	mg/kg	-	< 0.4	-	-
Chromium	5	mg/kg	-	22	-	-
Copper	5	mg/kg	-	11	-	-
Iron	20	mg/kg	-	18000	-	-
Lead	5	mg/kg	-	5.4	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	6.7	-	-
Zinc	5	mg/kg	-	26	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	6.9	8.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	8.2	6.5	6.9
Reaction Ratings* <sup>S05</sup>		comment	3.0	4.0	3.0	1.0
Extraneous Material						
<2mm Fraction	0.005	g	160	160	170	120
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.5	8.1	7.7	8.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.014	< 0.005	0.006	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	9.0	< 3	4.0	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a



Client Sample ID Sample Matrix			T7_0.1 Soil	T7_0.05 Soil	T7_0.3 Soil	T7_2.0 Soil
Eurofins   mgt Sample No.			P17-Se27806	P17-Se27807	P17-Se27808	P17-Se27809
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)	•					
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.22	1.2	0.13	1.4
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	44	240	26	270
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.07	0.38	0.04	0.44
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	18	23	15	22

Client Sample ID			T7_5.0	T8_0.03	QC2	T8_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27810	P17-Se27811	P17-Se27812	P17-Se27813
Date Sampled			Sep 14, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	-	46000
Arsenic	2	mg/kg	-	-	-	5.1
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	54
Copper	5	mg/kg	-	-	-	20
Iron	20	mg/kg	-	-	-	47000
Lead	5	mg/kg	-	-	-	15
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	20
Zinc	5	mg/kg	-	-	-	54
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.2	7.9	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	6.8	6.7	7.1
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	2.0	2.0
Extraneous Material						
<2mm Fraction	0.005	g	140	170	200	120
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.5	7.5	7.4	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.006	< 0.005	0.007	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	4.0	< 3	4.0	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a



Client Sample ID			T7_5.0 Soil	T8_0.03 Soil	QC2 Soil	T8_0.5	
Sample Matrix						Soil P17-Se27813	
Eurofins   mgt Sample No.			P17-Se27810	P17-Se27811	P17-Se27812		
Date Sampled			Sep 14, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	
Test/Reference	LOR	Unit					
Chromium Suite (Minus ANC- WA)							
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.2	0.21	0.15	1.3	
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	450	41	30	260	
Acid Neutralising Capacity - equivalent S% pyrite (s- $\ensuremath{ANCbt}\xspace)^{\text{S03}}$	0.02	% S	0.71	0.07	0.05	0.42	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10	
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
% Moisture	1	%	17	14	15	21	

Client Sample ID			T8_1.5	T8_3.0	T8_4.5	T22_0.03
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27814	P17-Se27815	P17-Se27816	P17-Se27817
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals		·				
Aluminium	10	mg/kg	-	-	-	1800
Arsenic	2	mg/kg	-	-	-	< 2
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	< 5
Copper	5	mg/kg	-	-	-	< 5
Iron	20	mg/kg	-	-	-	2100
Lead	5	mg/kg	-	-	-	< 5
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	< 5
Zinc	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	7.0	6.9	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.9	7.4	7.1	6.8
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	2.0	2.0
Extraneous Material						
<2mm Fraction	0.005	g	92	160	150	97
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	8.4	8.4	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	0.008	0.006	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	5.0	4.0	< 3



Client Sample ID Sample Matrix			T8_1.5 Soil	T8_3.0 Soil	T8_4.5 Soil	T22_0.03 Soil	
Eurofins   mgt Sample No.			P17-Se27814	P17-Se27815	P17-Se27816	P17-Se27817	
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	
Test/Reference	LOR	Unit					
Chromium Suite (Minus ANC- WA)							
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a	
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.5	1.7	2.0	0.59	
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	290	340	400	120	
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.47	0.54	0.64	0.19	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10	
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
% Moisture	1	%	12	16	20	25	

Client Sample ID			T22_0.5	T22_1.0	T22_2.5	T22_4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27818	P17-Se27819	P17-Se27820	P17-Se27821
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	38000	43000
Arsenic	2	mg/kg	-	-	4.2	4.6
Cadmium	0.4	mg/kg	-	-	< 0.4	0.5
Chromium	5	mg/kg	-	-	33	48
Copper	5	mg/kg	-	-	23	22
Iron	20	mg/kg	-	-	34000	45000
Lead	5	mg/kg	-	-	19	12
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Nickel	5	mg/kg	-	-	23	21
Zinc	5	mg/kg	-	-	54	56
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	6.8	6.3	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.9	7.2	7.5	7.7
Reaction Ratings*505		comment	2.0	3.0	3.0	3.0
Extraneous Material						
<2mm Fraction	0.005	g	130	160	140	77
>2mm Fraction	0.005	g	< 0.005	3.2	< 0.005	< 0.005
Analysed Material	0.1	%	100	98	100	100
Extraneous Material	0.1	%	< 0.1	1.9	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	1.0	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.0	7.7	8.8	8.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02



Client Sample ID Sample Matrix			T22_0.5 Soil	T22_1.0 Soil	T22_2.5 Soil	T22_4.0 Soil	
Eurofins   mgt Sample No.			P17-Se27818	P17-Se27819	P17-Se27820	P17-Se27821	
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	
Test/Reference	LOR	Unit					
Chromium Suite (Minus ANC- WA)							
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	< 0.005	0.014	< 0.005	
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	< 3	9.0	< 3	
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a	
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.57	0.45	3.1	1.8	
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	110	90	620	360	
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.18	0.14	0.99	0.58	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10	
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
% Moisture	1	%	20	19	22	20	



### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Sep 27, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Sep 27, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Acid Sulfate Soils Field pH Test	Perth	Sep 22, 2017	7 Day
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Extraneous Material	Brisbane	Sep 27, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Oct 05, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 22, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

	e.mail : E				e.mail : Enviro	ABN- 50 005 085 521 e.mail : EnviroSales@eurofins.com					e ston Tow VIC 310 ⊷61 3 85 1261 54 & 14	vn Close 66 564 5000 271	Sydney         Brisbane         Perth           Unit F3, Building F         1/21 Smallwood Place         2/91 Leach Highway           16 Mars Road         Murarrie QLD 4172         Kewdale WA 6105           D Lane Cove West NSW 2066         Phone : +61 7 3902 4600         Phone : +61 8 9251 9600           Phone : +61 2 9900 8400         NATA # 1261 Site # 20794         NATA # 1261           NATA # 1261 Site # 18217         Site # 23736
Ad	mpany Name: dress:	360 Environr 10 Bermonds West Leeder WA 6007	sey St ville				Re	der N port i one: x:		08		8 8 8360 1 2360	
	oject Name: oject ID:	AGRIMIN AS 2225	S LAKE MAU	CKAY									Eurofins   mgt Analytical Services Manager : Robert Johnston
	Sample Detail						HOLD	Iron	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)	
Melb	ourne Laborate	ory - NATA Site	# 1254 & 142	271		Х		х		Х			
Sydı	ney Laboratory	- NATA Site # 1	8217										
Bris	bane Laborator	y - NATA Site #	20794								х	х	
Pert	h Laboratory - N	NATA Site # 237	'36				Х		Х				
Exte	rnal Laboratory	1											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	T5_0.05	Sep 14, 2017		Soil	P17-Se27802	х		х	Х	х	х	х	
2	T5_0.2	Sep 14, 2017		Soil	P17-Se27803				Х	ļ'	Х	Х	
3	T5_0.33	Sep 14, 2017		Soil	P17-Se27804				Х	'	Х	Х	
4	QC1	Sep 14, 2017		Soil	P17-Se27805	X		X	Х	Х	Х	Х	
5	T7_0.1	Sep 14, 2017		Soil	P17-Se27806				Х	<b>└──</b> ′	Х	Х	
6	T7_0.05	Sep 14, 2017		Soil	P17-Se27807	X		X	Х	Х	X	Х	
7	T7_0.3	Sep 14, 2017		Soil	P17-Se27808				Х	<b>├</b> ── <sup> </sup>	X	X	
8	T7_2.0	Sep 14, 2017		Soil	P17-Se27809				X	<sup> </sup>	X	X	
9	T7_5.0	Sep 14, 2017		Soil	P17-Se27810				Х		Х	Х	

🔅 eur	ABN– 50 005 ( e.mail : Enviro web : www.eur	Sales@e		s.com	2- 0 P N	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone: -61 3 8564 5000 NATA # 1261 Site # 1254 & 14271			<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079/	<b>Perth</b> 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 4 NATA # 1261 Site # 23736		
Company Name: Address:	360 Environment 10 Bermondsey S West Leederville WA 6007	St			Re	der N port # one: x:		0		8 8 8360 1 2360		Due: Priority:	Sep 22, 2017 1:33 PM Oct 2, 2017 5 Day Julie Palich
Project Name: Project ID:	•										Eurofins   r	ngt Analytical Service	es Manager : Robert Johnston
	Sample Detail						Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)			
Melbourne Laborate	ory - NATA Site # 12	254 & 14271		Х		Х		х					
Sydney Laboratory	- NATA Site # 18217	7											
Brisbane Laborator	y - NATA Site # 207	94							Х	Х			
Perth Laboratory - N	NATA Site # 23736				Х		Х						
10 T8_0.03	Sep 13, 2017	Soil	P17-Se27811		<b> </b>		Х		Х	Х			
11 QC2	Sep 13, 2017	Soil	P17-Se27812	<u>                                     </u>	<sup> </sup>		Х		Х	Х			
12 T8_0.5	Sep 13, 2017	Soil	P17-Se27813	Х	<sup> </sup>	X	Х	X	Х	Х			
13 T8_1.5	Sep 13, 2017	Soil	P17-Se27814	<b>↓</b> '	<sup> </sup>		Х		Х	Х			
14 T8_3.0	Sep 13, 2017	Soil	P17-Se27815	<u> </u> '	<sup> </sup>		Х		Х	Х			
15 T8_4.5	Sep 13, 2017	Soil	P17-Se27816	<u> </u> '	<sup> </sup>		Х		Х	Х			
16 T22_0.03	Sep 13, 2017	Soil	P17-Se27817	Х	'	Х	Х	Х	Х	X			
17 T22_0.5	Sep 13, 2017	Soil	P17-Se27818	──	'		Х		Х	X			
18 T22_1.0	Sep 13, 2017	Soil	P17-Se27819	<u> </u>	<sup> </sup>		Х		Х	Х			
19 T22_2.5	Sep 13, 2017	Soil	P17-Se27820	Х	<sup> </sup>	Х	Х	Х	Х	Х			
20 T22_4.0	Sep 13, 2017	Soil	P17-Se27821	Х		X	Х	X	Х	Х			
21 T5_0.0	Sep 14, 2017	Soil	P17-Se27822	1 '	Х	1	1	1	1				

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Company Name: Address:	360 Environmental 10 Bermondsey St West Leederville WA 6007				Re	der N port i ione: x:		0		8 8 8360 1 2360		Received: Due: Priority: Contact Name:	Sep 22, 2017 1:33 PM Oct 2, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN ASS LAK 2225	E MACKAY									Eurofins   n	ngt Analytical Service	es Manager : Robert Johnston
	Sample Detail					Iron	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)			
Melbourne Laborat	ory - NATA Site # 1254	& 14271		Х		х		х					
Sydney Laboratory	- NATA Site # 18217												
	ry - NATA Site # 20794								Х	Х			
Perth Laboratory -					Х		Х						
22 T5_0.13	Sep 14, 2017	Soil	P17-Se27823	-	Х								
23 T5_0.3	Sep 14, 2017	Soil	P17-Se27824		X					$\vdash$			
	Sep 14, 2017	Soil	P17-Se27825		X			<u> </u>		$\vdash$			
24 T7_0.03			D47 0+07000					1	1				
	Sep 14, 2017	Soil	P17-Se27826		X								
25 T7_0.2 26 T7_0.29	Sep 14, 2017 Sep 14, 2017	Soil Soil	P17-Se27827		Х								
25         T7_0.2           26         T7_0.29           27         T7_0.5	Sep 14, 2017           Sep 14, 2017           Sep 14, 2017	Soil Soil Soil	P17-Se27827 P17-Se27828		X X								
25         T7_0.2           26         T7_0.29           27         T7_0.5           28         T8_1.0	Sep 14, 2017           Sep 14, 2017           Sep 14, 2017           Sep 13, 2017	Soil Soil Soil Soil	P17-Se27827 P17-Se27828 P17-Se27829		X X X								
25         T7_0.2           26         T7_0.29           27         T7_0.5           28         T8_1.0           29         T8_2.0	Sep 14, 2017           Sep 14, 2017           Sep 14, 2017           Sep 13, 2017           Sep 13, 2017	Soil Soil Soil Soil Soil	P17-Se27827 P17-Se27828 P17-Se27829 P17-Se27830		X X X X								
25         T7_0.2           26         T7_0.29           27         T7_0.5           28         T8_1.0           29         T8_2.0           30         T8_2.5	Sep 14, 2017           Sep 14, 2017           Sep 14, 2017           Sep 13, 2017           Sep 13, 2017           Sep 13, 2017	Soil Soil Soil Soil Soil Soil	P17-Se27827           P17-Se27828           P17-Se27829           P17-Se27830           P17-Se27831		X X X X X								
25         T7_0.2           26         T7_0.29           27         T7_0.5           28         T8_1.0           29         T8_2.0	Sep 14, 2017           Sep 14, 2017           Sep 14, 2017           Sep 13, 2017           Sep 13, 2017	Soil Soil Soil Soil Soil	P17-Se27827 P17-Se27828 P17-Se27829 P17-Se27830		X X X X								

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Address: 10 We WA	ddress: 10 Bermondsey St West Leederville WA 6007 roject Name: AGRIMIN ASS LAKE MACKAY				Re	der Neport # one: x:		0		8 8 8360 1 2360	
											Eurofins   mgt Analytical Services Manager : Robert Johnston
Sample Detail					HOLD	Iron	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)	
Melbourne Laboratory - N	ATA Site # 1254 & 142	71		х		х		х			
Sydney Laboratory - NAT								-			_
Brisbane Laboratory - NA					х		x		X	Х	
Perth Laboratory - NATA34QC3Sep 1	13, 2017	Soil	P17-Se27835		X		^				-
	13, 2017		P17-Se27836		X			1			
	13, 2017		P17-Se27837		Х			1			7
	13, 2017		P17-Se27838		Х						
	13, 2017	Soil	P17-Se27839		Х						
39 T22_6.0 Sep 1					х						
Tost Counts	Counts				19	7	20	7	20	20	



### Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

### **QC Data General Comments**

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



### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	102			80-120	Pass	
Cadmium			%	107			80-120	Pass	
Chromium			%	106			80-120	Pass	
Copper			%	99			80-120	Pass	
Lead			%	109			80-120	Pass	
Mercury			%	88			75-125	Pass	
Nickel			%	100			80-120	Pass	
Zinc			%	99			80-120	Pass	
LCS - % Recovery					I				
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	109			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	100			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery		·						•	
Heavy Metals				Result 1					
Arsenic	M17-Se33333	NCP	%	85			75-125	Pass	
Cadmium	M17-Se33333	NCP	%	104			75-125	Pass	
Chromium	M17-Se33333	NCP	%	104			75-125	Pass	
Copper	M17-Se33333	NCP	%	101			75-125	Pass	
Lead	M17-Se33333	NCP	%	103			75-125	Pass	
Mercury	M17-Se33333	NCP	%	88			70-130	Pass	
Nickel	M17-Se33333	NCP	%	102			75-125	Pass	
Zinc	M17-Se33333	NCP	%	112			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate	·						•		
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	B17-Se27727	NCP	mg/kg	5200	5300	2.0	30%	Pass	
Arsenic	M17-Se33333	NCP	mg/kg	8.3	8.3	1.0	30%	Pass	
Cadmium	M17-Se33333	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M17-Se33333	NCP	mg/kg	7.4	7.4	<1	30%	Pass	
Copper	M17-Se33333	NCP	mg/kg	5.1	5.0	1.0	30%	Pass	
Lead	M17-Se33333	NCP	mg/kg	6.3	6.4	1.0	30%	Pass	
Mercury	M17-Se33333	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
						~ 1	0070	1 400	l
Nickel	M17-Se33333	NCP	mg/kg	12	12	<1	30%	Pass	



Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD	[		
pH-F (Field pH test)*	P17-Se27802	CP	pH Units	7.8	7.8		30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-Se27802	CP CP	pH Units	6.5	6.4	pass	30%	Pass	
	P17-Se27802	CP CP		2.0	2.0	pass	30%	Pass	
Reaction Ratings* Duplicate	P17-3e27602	CF	comment	2.0	2.0	pass	30%	F d 55	
Chromium Suite (Minus ANC- WA)				Booult 1	Result 2	RPD	[		
	P17-Se27802	СР	1	Result 1			200/	Deee	
Liming Rate Minus ANC	P17-Se27602	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-Se27802	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus	P17-Se27802	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Se27802	CP	pH Units	7.0	7.1	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Se27802	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Se27802	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Se27802	CP	% S	0.010	0.009	15	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-Se27802	СР	mol H+/t	6.0	6.0	15	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-Se27802	CP	%CaCO3	0.12	0.11	6.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-Se27802	СР	% S	0.04	0.03	6.0	30%	Pass	
ANC Fineness Factor	P17-Se27802	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-Se27802	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-Se27802	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-Se27802	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate			ng cuc co,r				0070	1 400	
				Result 1	Result 2	RPD			
% Moisture	P17-Se27806	CP	%	18	19	3.0	30%	Pass	
Duplicate	111 0021000	01	/0	10		0.0	0070	1 400	
Heavy Metals				Result 1	Result 2	RPD			
Iron	M17-Se28786	NCP	mg/kg	19000	19000	2.0	30%	Pass	
Duplicate						2.0		1 400	
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-Se27812	CP	pH Units	7.9	7.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-Se27812	CP	pH Units	6.7	6.9	pass	30%	Pass	
Reaction Ratings*	P17-Se27812	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate		01	oonnion	2.0	2.0		0070	1 400	
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-Se27812	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus	1 11 0027012	01	Ng 04000/1			~ 1	0070		
ANC Net Acidity (Sulfur Units) Minus	P17-Se27812	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
ANC	P17-Se27812	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Se27812	CP	pH Units	7.4	7.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Se27812	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Se27812	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Se27812	CP	% S	0.007	0.007	3.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-Se27812	СР	mol H+/t	4.0	4.0	3.0	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-Se27812	CP	%CaCO3	0.15	0.16	3.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-Se27812	СР	% S	0.05	0.05	3.0	30%	Pass	
ANC Fineness Factor	P17-Se27812	CP	factor	1.5	1.5		30%	Pass	
Net Acidity (Sulfur Units)	P17-Se27812	CP CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-Se27812	CP CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-Se27812 P17-Se27812	CP				<1	30%	Pass	
Duplicate	F11-382/012	67	kg CaCO3/t	< 1	< 1	< 1	30%	F 055	
				Result 1	Result 2	RPD			
% Moisture	P17-Se27816	СР	%	20	19	4.0	30%	Pass	
	117-0627010	0	/0	20	13	י.ד	5070	1 435	



### Comments

V2 - This report has been amended to provide CRS results minus ANC

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

### **Qualifier Codes/Comments**

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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### Certificate of Analysis

360 Environmental 10 Bermondsey St West Leederville WA 6007 Hac-MRA

WORLD RECOGNISED

NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:

Julie Palich

Report Project name Project ID Received Date **564573-S-V4** AGRIMIN ASS LAKE MACKAY 2225 Sep 22, 2017

Client Sample ID			T5_0.05	T5_0.2	T5_0.33	QC1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27802	P17-Se27803	P17-Se27804	P17-Se27805
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	760	-	-	1700
Arsenic	2	mg/kg	< 2	-	-	< 2
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	< 5	-	-	5.3
Copper	5	mg/kg	< 5	-	-	< 5
Iron	20	mg/kg	1300	-	-	2100
Lead	5	mg/kg	< 5	-	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	-	-	< 5
Uranium	10	mg/kg	< 10	-	-	< 10
Zinc	5	mg/kg	< 5	-	-	5.9
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	6.5	6.8	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.5	8.4	8.6	5.2
Reaction Ratings* <sup>S05</sup>		comment	2.0	4.0	4.0	2.0
Extraneous Material						
<2mm Fraction	0.005	g	160	87	170	210
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	1.0
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.0	7.9	8.0	7.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.010	< 0.005	< 0.005	0.014
Chromium Reducible Sulfur -acidity units	3	mol H+/t	6.0	< 3	< 3	9.0
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.12	0.67	0.87	0.26



Client Sample ID Sample Matrix			T5_0.05 Soil	T5_0.2 Soil	T5_0.33 Soil	QC1 Soil
Eurofins   mgt Sample No.			P17-Se27802	P17-Se27803	P17-Se27804	P17-Se27805
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	23	130	180	51
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.04	0.21	0.28	0.08
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	17	19	19	17

Client Sample ID			T7_0.1	T7_0.05	T7_0.3	T7_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27806	P17-Se27807	P17-Se27808	P17-Se27809
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Heavy Metals	·					
Aluminium	10	mg/kg	-	14000	-	-
Arsenic	2	mg/kg	-	2.6	-	-
Cadmium	0.4	mg/kg	-	< 0.4	-	-
Chromium	5	mg/kg	-	22	-	-
Copper	5	mg/kg	-	11	-	-
Iron	20	mg/kg	-	18000	-	-
Lead	5	mg/kg	-	5.4	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	6.7	-	-
Uranium	10	mg/kg	-	< 10	-	-
Zinc	5	mg/kg	-	26	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	6.9	8.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	8.2	6.5	6.9
Reaction Ratings* <sup>505</sup>		comment	3.0	4.0	3.0	1.0
Extraneous Material						
<2mm Fraction	0.005	g	160	160	170	120
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.5	8.1	7.7	8.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.014	< 0.005	0.006	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	9.0	< 3	4.0	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a



Client Sample ID Sample Matrix			T7_0.1 Soil	T7_0.05 Soil	T7_0.3 Soil	T7_2.0 Soil
Eurofins   mgt Sample No.			P17-Se27806	P17-Se27807	P17-Se27808	P17-Se27809
Date Sampled			Sep 14, 2017	Sep 14, 2017	Sep 14, 2017	Sep 14, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.22	1.2	0.13	1.4
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	44	240	26	270
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.07	0.38	0.04	0.44
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	18	23	15	22

Client Sample ID			T7_5.0	T8_0.03	QC2	T8_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-Se27810	P17-Se27811	P17-Se27812	P17-Se27813
Date Sampled			Sep 14, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	-	46000
Arsenic	2	mg/kg	-	-	-	5.1
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	54
Copper	5	mg/kg	-	-	-	20
Iron	20	mg/kg	-	-	-	47000
Lead	5	mg/kg	-	-	-	15
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	20
Uranium	10	mg/kg	-	-	-	< 10
Zinc	5	mg/kg	-	-	-	54
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.2	7.9	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	6.8	6.7	7.1
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	2.0	2.0
Extraneous Material						
<2mm Fraction	0.005	g	140	170	200	120
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.5	7.5	7.4	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.006	< 0.005	0.007	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	4.0	< 3	4.0	< 3



Client Sample ID Sample Matrix			T7_5.0 Soil	T8_0.03 Soil	QC2 Soil	T8_0.5 Soil
Eurofins   mgt Sample No.			P17-Se27810	P17-Se27811	P17-Se27812	P17-Se27813
Date Sampled			Sep 14, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.2	0.21	0.15	1.3
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	450	41	30	260
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.71	0.07	0.05	0.42
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	17	14	15	21

Client Sample ID Sample Matrix			T8_1.5 Soil	T8_3.0 Soil	T8_4.5 Soil	T22_0.03 Soil
Eurofins   mgt Sample No.			P17-Se27814	P17-Se27815	P17-Se27816	P17-Se27817
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
•	1.00	11.21	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	-	1800
Arsenic	2	mg/kg	-	-	-	< 2
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	< 5
Copper	5	mg/kg	-	-	-	< 5
Iron	20	mg/kg	-	-	-	2100
Lead	5	mg/kg	-	-	-	< 5
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	< 5
Uranium	10	mg/kg	-	-	-	< 10
Zinc	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	7.0	6.9	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.9	7.4	7.1	6.8
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	2.0	2.0
Extraneous Material		•				
<2mm Fraction	0.005	g	92	160	150	97
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.3	8.4	8.4	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2



Client Sample ID Sample Matrix			T8_1.5 Soil	T8_3.0 Soil	T8_4.5 Soil	T22_0.03 Soil
Eurofins   mgt Sample No.			P17-Se27814	P17-Se27815	P17-Se27816	P17-Se27817
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	0.008	0.006	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	5.0	4.0	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.5	1.7	2.0	0.59
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	290	340	400	120
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	0.47	0.54	0.64	0.19
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	12	16	20	25

Client Sample ID Sample Matrix			T22_0.5 Soil	T22_1.0 Soil	T22_2.5 Soil	T22_4.0 Soil
Eurofins   mgt Sample No.			P17-Se27818	P17-Se27819	P17-Se27820	P17-Se27821
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	38000	43000
Arsenic	2	mg/kg	-	-	4.2	4.6
Cadmium	0.4	mg/kg	-	-	< 0.4	0.5
Chromium	5	mg/kg	-	-	33	48
Copper	5	mg/kg	-	-	23	22
Iron	20	mg/kg	-	-	34000	45000
Lead	5	mg/kg	-	-	19	12
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Nickel	5	mg/kg	-	-	23	21
Uranium	10	mg/kg	-	-	< 10	< 10
Zinc	5	mg/kg	-	-	54	56
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	6.8	6.3	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.9	7.2	7.5	7.7
Reaction Ratings*505		comment	2.0	3.0	3.0	3.0
Extraneous Material						
<2mm Fraction	0.005	g	130	160	140	77
>2mm Fraction	0.005	g	< 0.005	3.2	< 0.005	< 0.005
Analysed Material	0.1	%	100	98	100	100
Extraneous Material	0.1	%	< 0.1	1.9	< 0.1	< 0.1



Client Sample ID Sample Matrix			T22_0.5 Soil	T22_1.0 Soil	T22_2.5 Soil	T22_4.0 Soil
Eurofins   mgt Sample No.			P17-Se27818	P17-Se27819	P17-Se27820	P17-Se27821
Date Sampled			Sep 13, 2017	Sep 13, 2017	Sep 13, 2017	Sep 13, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	1.0	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.0	7.7	8.8	8.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.005	< 0.005	0.014	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.0	< 3	9.0	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.57	0.45	3.1	1.8
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	110	90	620	360
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.18	0.14	0.99	0.58
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	20	19	22	20



#### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 14, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Sep 27, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Acid Sulfate Soils Field pH Test	Perth	Sep 22, 2017	7 Day
- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Extraneous Material	Brisbane	Sep 27, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Oct 05, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 22, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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Ac Pr	ompany Name: Idress: oject Name:	360 Environr 10 Bermonds West Leeder WA 6007 AGRIMIN AS	sey St ville	СКАҮ			Re	der N port i one: x:		08	64573 8 938 8 938	8 836		Received Due: Priority: Contact	Oc 5	ep 22, 2017 1:33 PM ct 2, 2017 Day lie Palich
Pr	oject ID:	2225												Eurofins   mgt Analy	tical Services	Manager : Robert Johnston
		Sa	mple Detail			Aluminium	HOLD	Iron	Uranium	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)			
Mell	oourne Laborato	ory - NATA Site	# 1254 & 142	271		Х		Х	Х		Х					
	ney Laboratory															
Bris	bane Laborator	y - NATA Site #	20794									Х	X			
	h Laboratory - N		36				Х			Х						
Exte No	ernal Laboratory Sample ID	Sample Date	Sampling Time	Matrix	LAB ID											
1	T5_0.05	Sep 14, 2017		Soil	P17-Se27802	х		Х	Х	х	Х	Х	х			
2	T5_0.2	Sep 14, 2017		Soil	P17-Se27803					х		Х	Х			
3	T5_0.33	Sep 14, 2017		Soil	P17-Se27804					х		Х	х			
4	QC1	Sep 14, 2017		Soil	P17-Se27805	х		х	х	х	х	Х	х			
5	T7_0.1	Sep 14, 2017		Soil	P17-Se27806					Х		Х	X			
6	T7_0.05	Sep 14, 2017		Soil	P17-Se27807	Х		X	Х	Х	Х	Х	X			
7	T7_0.3	Sep 14, 2017		Soil	P17-Se27808					Х		Х	X			
8	T7_2.0	Sep 14, 2017		Soil	P17-Se27809					Х		Х	X			
9	T7_5.0	Sep 14, 2017		Soil	P17-Se27810					Х		Х	Х			

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Company Name: Address:	360 Environmental 10 Bermondsey St West Leederville WA 6007				Re	der N port i ione: x:		08	64573 8 938 8 938	8 836			Received: Due: Priority: Contact Name:	Sep 22, 2017 1:33 PM Oct 2, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN ASS LAKE I 2225	МАСКАҮ										Eurofins   n	ngt Analytical Servi	ices Manager : Robert Johnston
	Sample Det	ail		Aluminium	НОГО	Iron	Uranium	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)			
Melbourne Laborat	ory - NATA Site # 1254 &	14271		Х		х	Х		Х					
Sydney Laboratory	- NATA Site # 18217													
Brisbane Laborato	ry - NATA Site # 20794									Х	Х			
Perth Laboratory -	NATA Site # 23736				Х			Х						
10 T8_0.03	Sep 13, 2017	Soil	P17-Se27811					Х		Х	X			
11 QC2	Sep 13, 2017	Soil	P17-Se27812					Х		Х	X			
12 T8_0.5	Sep 13, 2017	Soil	P17-Se27813	Х		Х	Х	X	Х	X	X			
13 T8_1.5	Sep 13, 2017	Soil	P17-Se27814					X		X	X			
14 T8_3.0	Sep 13, 2017	Soil	P17-Se27815					X		X	X			
15 T8_4.5	Sep 13, 2017	Soil	P17-Se27816	X		x	Х	X X	х	X X	X X			
16 T22_0.03	Sep 13, 2017	Soil	P17-Se27817	^		×	~	X	~	X	X			
17         T22_0.5           18         T22_1.0	Sep 13, 2017	Soil Soil	P17-Se27818 P17-Se27819					X		X	X			
	Sep 13, 2017			X		x	~	X	Х	X	X			
19         T22_2.5           20         T22_4.0	Sep 13, 2017	Soil Soil	P17-Se27820 P17-Se27821	X		X	X X		X X	X	X			
	Sep 13, 2017	Soil		<u> </u>	x		^	Х	^	^				
21 T5_0.0	Sep 14, 2017	15011	P17-Se27822		^									

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Company Name Address:	: 360 Environmental 10 Bermondsey St West Leederville WA 6007				Re	rder Ne eport # none: ix:		0	64573 8 938 8 938	8 836			Received: Due: Priority: Contact Name:	Sep 22, 2017 1:33 PM Oct 2, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN ASS LAKE 2225	MACKAY										Eurofins   r	ngt Analytical Servic	es Manager : Robert Johnston
	Sample De	tail		Aluminium	НОГД	Iron	Uranium	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)			
Melbourne Labora	atory - NATA Site # 1254 &	<u> 14271</u>		Х		Х	Х		Х					
Sydney Laborator	y - NATA Site # 18217													
Brisbane Laborate	ory - NATA Site # 20794									Х	Х			
	- NATA Site # 23736			4	Х	ļ'		Х						
22 T5_0.13	Sep 14, 2017	Soil	P17-Se27823	+	Х	<u> </u> '								
23 T5_0.3	Sep 14, 2017	Soil	P17-Se27824	+	Х	<u> </u> '		<u> </u>						
24 T7_0.03	Sep 14, 2017	Soil	P17-Se27825	+	Х	<u> </u>								
25 T7_0.2	Sep 14, 2017	Soil	P17-Se27826	+	X	<u> </u>								
26 T7_0.29	Sep 14, 2017	Soil	P17-Se27827	+	X	<u> </u> '		-						
27 T7_0.5	Sep 14, 2017	Soil	P17-Se27828	+	X	<u> </u> '		-						
28 T8_1.0	Sep 13, 2017	Soil	P17-Se27829	+	X	<u> </u> '		-						
29 T8_2.0	Sep 13, 2017	Soil	P17-Se27830	+	X	<u> </u>		-						
30 T8_2.5	Sep 13, 2017	Soil	P17-Se27831	+	Х	<u> </u> '		+			-			
31 T8_3.5	Sep 13, 2017	Soil	P17-Se27832	+	Х	<u> </u> '								
32 T8_3.5	Sep 13, 2017	Soil	P17-Se27833	+	Х	<u> </u> '								
33 T8 4.0	Sep 13, 2017	Soil	P17-Se27834	1	Х	1 1	1	1	1	1	1	1		

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Company Name Address:	10 Bermonds West Leeder WA 6007	sey St ville			Re	der N port i one: x:		0	64573 8 938 8 938	8 836		Received:         Sep 22, 2017 1:33 PM           Due:         Oct 2, 2017           Priority:         5 Day           Contact Name:         Julie Palich
Project Name: Project ID:	AGRIMIN AS 2225	S LAKE MACKAY										Eurofins   mgt Analytical Services Manager : Robert Johnston
	Sa	mple Detail		Aluminium	HOLD	Iron	Uranium	Acid Sulfate Soils Field pH Test	Metals M8	Moisture Set	Chromium Suite (Minus ANC- WA)	
	atory - NATA Site			х	<sup> </sup>	х	Х		Х			
	ry - NATA Site # 1				<sup> </sup>							_
	ory - NATA Site #							×		Х	X	-
34 QC3	- NATA Site # 237 Sep 13, 2017	36 Soil	P17-Se27835		X X			X	-			-
34 QC3 35 T22_1.5	Sep 13, 2017 Sep 13, 2017	Soil	P17-Se27835		X				1			-
36 T22_2.0	Sep 13, 2017	Soil	P17-Se27837		X				1			1
37 T22_3.0	Sep 13, 2017	Soil	P17-Se27838		X							1
38 T22_3.5	Sep 13, 2017	Soil	P17-Se27839		х			1				1
	Sep 13, 2017	Soil	P17-Se27840		Х							
				7	19	7	7	20	7	20	20	



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



## **Quality Control Results**

т	est		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Uranium			mg/kg	< 10			10	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery				1					
Heavy Metals									
Arsenic			%	102			80-120	Pass	
Cadmium			%	107			80-120	Pass	
Chromium			%	106			80-120	Pass	
Copper			%	99			80-120	Pass	
Lead			%	109			80-120	Pass	
Mercury			%	88			75-125	Pass	
Nickel			%	100			80-120	Pass	
Zinc			%	99			80-120	Pass	
LCS - % Recovery									
Chromium Suite (Minus ANC-	- WA)		-						
Chromium Reducible Sulfur			%	109			70-130	Pass	
Acid Neutralising Capacity (AN	ICbt)	-	%	100			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery				1	1				
Heavy Metals			1	Result 1					
Arsenic	M17-Se33333	NCP	%	85			75-125	Pass	
Cadmium	M17-Se33333	NCP	%	104			75-125	Pass	
Chromium	M17-Se33333	NCP	%	104			75-125	Pass	
Copper	M17-Se33333	NCP	%	101			75-125	Pass	
Lead	M17-Se33333	NCP	%	103			75-125	Pass	
Mercury	M17-Se33333	NCP	%	88			70-130	Pass	
Nickel	M17-Se33333	NCP	%	102			75-125	Pass	
Zinc	M17-Se33333	NCP	%	112			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate				1	1				
Heavy Metals	I	1		Result 1	Result 2	RPD			
Aluminium	B17-Se27727	NCP	mg/kg	5200	5300	2.0	30%	Pass	
Arsenic	M17-Se33333	NCP	mg/kg	8.3	8.3	1.0	30%	Pass	
Cadmium	M17-Se33333	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M17-Se33333	NCP	mg/kg	7.4	7.4	<1	30%	Pass	
Copper	M17-Se33333	NCP	mg/kg	5.1	5.0	1.0	30%	Pass	
Lead	M17-Se33333	NCP	mg/kg	6.3	6.4	1.0	30%	Pass	
Mercury	M17-Se33333	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M17-Se33333	NCP	mg/kg	12	12	<1	30%	Pass	
Uranium	M17-De16717	NCP	mg/kg	< 10	< 10	<1	30%	Pass	



Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-Se27802	СР	pH Units	7.8	7.8		30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-Se27802	CP	pH Units	6.5	6.4	pass	30%	Pass	
Reaction Ratings*	P17-Se27802	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate	F17-3e27602		comment	2.0	2.0	pass	30%	Fass	
				Deput 1	Deput 2				
Chromium Suite (Minus ANC- WA)	D47 C+07000			Result 1	Result 2	RPD	2007	Dees	
Liming Rate Minus ANC	P17-Se27802	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-Se27802	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-Se27802	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Se27802	CP	pH Units	7.0	7.1	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Se27802	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Se27802	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Se27802	CP	% S	0.010	0.009	15	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-Se27802	СР	mol H+/t	6.0	6.0	15	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-Se27802	CP	%CaCO3	0.12	0.11	6.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-Se27802	СР	% S	0.04	0.03	6.0	30%	Pass	
ANC Fineness Factor	P17-Se27802	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-Se27802	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-Se27802	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-Se27802	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate	111 0021002	0.					0070	1 400	
Duphoate				Result 1	Result 2	RPD			
% Moisture	P17-Se27806	СР	%	18	19	3.0	30%	Pass	
Duplicate	F17-3627800	UP	/0	10	19	3.0	30 /6	F 855	
				Booult 1	Regult 2				
Heavy Metals	M47 C-00700	NOD		Result 1	Result 2	RPD	2007	Dees	
Iron	M17-Se28786	NCP	mg/kg	19000	19000	2.0	30%	Pass	
Duplicate				Desult d	Desult 0	000			
Acid Sulfate Soils Field pH Test	D17 0-07010	0.0		Result 1	Result 2	RPD	0.00/	- Deve	
pH-F (Field pH test)*	P17-Se27812	CP	pH Units	7.9	7.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-Se27812	CP	pH Units	6.7	6.9	pass	30%	Pass	
Reaction Ratings*	P17-Se27812	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate							1		
Chromium Suite (Minus ANC- WA)			1	Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-Se27812	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-Se27812	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-Se27812	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-Se27812	CP	pH Units	7.4	7.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-Se27812	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-Se27812	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-Se27812 P17-Se27812	CP	% pyrite S	< 0.02 0.007	< 0.02 0.007	3.0	30%	Pass	
Chromium Reducible Sulfur -acidity		CP	mol H+/t	4.0	4.0	3.0		Pass	
units Acid Neutralising Capacity (ANCbt)	P17-Se27812 P17-Se27812	CP	%CaCO3	4.0 0.15	4.0 0.16	3.0	30% 30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-Se27812	СР	% S	0.05	0.05	3.0	30%	Pass	
ANC Fineness Factor	P17-Se27812	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-Se27812	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-Se27812	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
· · · · · · · · · · · · · · · · · · ·	P17-Se27812	CP				<1	30%	Pass	
Liming Rate	F11-302/012	67	kg CaCO3/t	< 1	< 1	< 1	30%	F d 55	
Duplicate				Deput 1	Beaut a				
9/ Mojeture	D17 0-07010	00	0/	Result 1	Result 2	RPD	0.001		
% Moisture	P17-Se27816	CP	%	20	19	4.0	30%	Pass	



## Comments

V4 - This report has been amended to provide Uranium results

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

mgt

#### **Qualifier Codes/Comments**

## Code Description

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kgt dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x' wet bulk density of soil in t/m3' Retained Acidity is Reported when the pHKCl is less than pH 4.5 Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5 Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.		
<ul> <li>Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5</li> <li>Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period</li> <li>Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with</li> </ul>	S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S04 Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with	S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with	S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
	S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
	S05	

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

|] |....//

Glenn Jackson National Operations Manager Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofines i ring shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofines i ring to liable for cost, out and additiones and lost production arising the interpretation given in this report. In no case shall Eurofines, the tests were production arising to the structure of the effective to the effective

Send samples to:	Eurofins MGT	Project name:	Agrimin ASS Lake Mackay	
	Unit 2, 91 Leach Highway Kewdale WA 6105	Project number:	2225	
Delivery method:	Courier	Name of samplers:	Gerry Bradley	
Samples from:	360 Environmental	Details verified by:	Julie Palich	environmental
	10 Bermondsey Street West Leederville WA	Lab quote reference:		
Send reports to:	labresults@360environmental.com.au	Turn around time:	Normal	
	juliepalich@360environmental.com.au			COC Number: 2225-02

Notes:

			Matr	rix/Con	tainer								Sample	Analysis					
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	ates 117	НоН	pHf	pFox	CRS	M8, Fe, Al							
	T5_0 -		Х			re	fer to bag	х											
	T5_0.05 🛩		Х				fer to bag		x	X	х	x							
	T5_0.13		Х				fer to bag	x											
	T5_0.2 -		Х				fer to bag		x	x	x								
	T5_0.3 -		Х				fer to bag	х											-
	T5_0.33 🗕		Х			re	fer to bag		x	x	х								-
	QC1 🖛		Х			re	fer to bag		x	x	х	x							-
	T7_0.03 🐔		Х			re	fer to bag	х											-
	T7_0.1 -		Х			re	fer to bag		x	X	х								
	T7_0.05 -		Х			re	fer to bag		x	x	х	x							
	T7_0.2 🛰		Х			re	fer to bag	x											-
	T7_0.29 -		Х			re	fer to bag	х											
	T7_0.3 👞		Х			re	fer to bag		x	x	х								
	T7_0.5 -		Х			re	fer to bag	х											
	T7_2.0 -		Х			re	fer to bag		х	х	х								
	T7_5.0 —		Х			re	febto bag		х	x	х								
	T8_0.03 -		Х			re	fer to bag		x	x	х								-
	QC2 🛩		Х			re	fer to bag		х	x	х								
	T8_0.5 -		Х			re	fer to bag		х	x	х	x	+						-
	T8_1.0	-	Х			re	fer to bag	х											
	T8_1.5 -		Х			re	fer to bag		x	x	х								
	T8_2.0 -		Х			re	fer to bag	х											
	T8_2.5 🛶	A	Х			re	fer to bag	х											
	T8_3.0 -		Х			re	fer to bag		x	x	х								
	T8_3.5 -		Х			re	fer to bag	х											
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Send sa	imples to:	Eurofi						4	Project			Agrimin	ASS Lake	Mackay					
		Unit 2	, 91 Le	each Hi	ghway	Kewc	ale WA 6105	1.1	Project	number:		2225							
Deliver	y method:	Courie	er					1.1	Name of	f samplers	:	Gerry Br	adley			L			
Sample	s from:	360 E	nviron	menta	I			2		verified by		Julie Pali					in the		
		10 Be	rmond	lsev Str	eet W	est Le	ederville WA	1		te referen						E		nment	Lai
Send re	ports to:						com.au			ound time:		Normal							
Joena re							ental.com.au		Turnarc	unu ume.		Normai					C Number		
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Notes:								() ( ) - M - M - M					0. 						
			Matr	ix/Con	tainer		_		1000 1000				Sample	Analysis		_			and the second
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	H	pFox	S	M8, Fe, Al							
		So		3	Ē	ō	-	н	pHf	Цd	CRS	Σ							
	T8_4.0 🗯		X				refer to bag	х			1								
	T8_4.5 🛏	×	Х				refer to bag		x	х	x								
	T22_0.03 🛩		Х				refer to bag		х	, х	x	x							
	QC3 r		Х				refer to bag	х											
	T22_0.5 🕌		Х				refer to bag		х	х	x								
	T22_1.0 🗢		Х				refer to bag		x	х	х								
	T22_1.5 🎜		Х				refer to bag	x											_
	T22_2.0 -		x				refer to bag	x											
	T22_2.5 -		x				refer to bag		х	x	x	x							
	T22_3.0 -		x				refer to bag	х								_			
	T22_3.5 -		x				refer to bag	x											
	T22_4.0 F		x				refer to bag		x	x	x								
	T22_6.0 -		x				refer to bag	х		~					-				
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360 ENVT5\_0.05T5\_0.2T5\_0.33QC1T7\_0.1T7\_0.05T7\_0.3T7\_2.0AGRIMIN A P17-Se278(P17-S

% Moisture	17	19	19	17	18	23	15	22
Acid Sulfate Sc	oils Field pH	Test						
pH-F (Field	7.8	6.5	6.8	8.2	8.3	6.9	8.1	6.3
pH-FOX (Fie	6.5	8.4	8.6	5.2	5	8.2	6.5	6.9
Reaction Ra	2	4	4	2	3	4	3	1

 T7\_5.0
 T8\_0.03
 QC2
 T8\_0.5
 T8\_1.5
 T8\_3.0
 T8\_4.5
 T22\_0.03
 T22\_0.5

 P17-Se278: P17-

17	14	15	21	12	16	20	25	20
7.9	8.2	7.9	7.4	6.6	7	6.9	7.6	7.8
7.3	6.8	6.7	7.1	6.9	7.4	7.1	6.8	6.9
2	2	2	2	2	2	2	2	2

 T22\_1.0
 T22\_2.5
 T22\_4.0
 T5\_0.0
 T5\_0.13
 T5\_0.3
 T7\_0.03
 T7\_0.2
 T7\_0.29

 P17-Se278: P17-Se278:

19	22	20
6.8	6.3	6.7
7.2	7.5	7.7
3	3	3

 T7\_0.5
 T8\_1.0
 T8\_2.0
 T8\_2.5
 T8\_3.5
 T8\_3.5
 T8\_4.0
 QC3
 T22\_1.5

 P17-Se278: P17-Se2

T22\_2.0 T22\_3.0 T22\_3.5 T22\_6.0 P17-Se278: P17-Se278: P17-Se278: P17-Se27840



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 20794 Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

## Sample Receipt Advice

360 Environmental
Cassie Hasan
Agrimin ASS Lake Mackay
2225

.

COC number:Not providedTurn around time:5 DayDate/Time received:Aug 24, 2017 1:12 PMEurofins | mgt reference:560004

## Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Some samples have been subcontracted.
- Custody Seals intact (if used).

## **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Cassie Hasan - CassieHasan@360environmental.com.au.





38 Years of Environmental Analysis & Experience

Send sam	nples to:	Eurofin							Project	name:		Agrimin	ASS Lak	e Mackay					
		Unit 2,	91 Le	each Hig	ghway	Kewd	ale WA 6105		Project	number:		2225				1			
Delivery	method:	Courier								f samplers	5:	Gerry B	radley						
Samples	from:	360 Env	viron	mental						verified by		Julie Pa					nuine		
		10 Berr	mond	sey Str	eet W	est Lee	ederville WA		Statement of the second second	, te referen						ŧ	enviror	iment	
end rep	orts to:	labresu								ound time		Normal							
							ental.com.au		a and a set							C	OC Number	. 2315-01	
Notes:	There are							.5. F	lease 1	nold on	e Sarv	iple ai	nt an	alyse	the	other	(Thes	e are c	luplicates
			Matr	ix/Cont	tainer								Samp	le Analysi	s				
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	pFox	CRS	M8, Fe, Al							
	T9_1.0		X		ш	0	27/09/2017		<u>Q</u>	X	0	2			-				
	T9_2.0		X				27/09/2017		X	X					-				
	T9_2.5 V		X				27/09/2017		X	X									
	T9_3.5		Х				27/09/2017	х	~	X			-	_					
	T9_3.5		X				27/09/2017	X	Х	Х									
	T9_4.5 V		X				27/09/2017	х											
		-	Х				27/09/2017	n	X	X									
	T9_5.0		Х				27/09/2017		X	X			_					-	
	T9_6.0		Х				27/09/2017		X	X									
	T9-0.5		Х				27/09/2017		X	X									
	T9-1.5		Х				27/09/2017		Х	Х									
	T11_1.5		Х				27/09/2017		Х	Х				-					
	T11_2.0		Х				27/09/2017		Х	Х									
	T11_3.5		Х				27/09/2017		Х	Х									
	T11_4.5		Х				27/09/2017		X	Х									
	T11_6.0		Х				27/09/2017		Х	Х									
	T11-0.5		Х				27/09/2017		X	Х									
	T11-1.0		Х				27/09/2017		Х	Х									
	T11-4.0		Х				27/09/2017		X	Х									
	T11-5.0		Х				27/09/2017		X	Х									
	T12_0.01		Х				27/09/2017		Х	Х									
	T12 0.45		Х				27/09/2017		Х	Х									
	T12_0.6		Х				27/09/2017		Х	Х									
	T12_1.5		Х				27/09/2017		Х	Х									
	T12_10		Х				27/09/2017		Х	Х			2					N	
telinquish print nan	ne): Sarah	Brehe	ng.	Signatu B-	ure: H		Date: 18   10 Time:	117		Received (print nar	ne): 🐴		54	Signatu	re:	2	Date: ) Time: \	8/10) 550	):>
Relinquish print nan			_	Signatı	ure:		Date: Time:			Received (print nar	by E-	Conte	1	Signatu	re:		Date: Time:	18/10/17	5682

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Send sar	nples to:		ins MG						Project	name:		Agrimin ASS	S Lake Mackay				
				ach Hi	ighway	Kewd	ale WA 6105			number:		2225				16	
elivery	method:	Courie	er						Name o	f samplers	5:	Gerry Bradl	ey				
amples	from:	360 E	nvironi	menta	l				Details	verified by	<i>r</i> :	Julie Palich	•			ronme	
							ederville WA		Lab quo	te referen	ice:				GIN		illali
Send rep	oorts to:	labres	ults@3	360en	vironm	ental.	com.au		120	ound time		Normal					
		juliep	alich	@360	Denvir	onme	ental.com.au								COC Nu	mber: 2315	-01
lotes:																	
			Matri	ix/Con	tainer							S	ample Analysis				
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	рҒох	CRS	M8, Fe, Al					
	T12_2.5	0,	X	-		0	27/09/2017	<u>_</u>	X	X							
			Х				27/09/2017		X	X							
	T12_4.5		Х				27/09/2017		X	X							
			Х				27/09/2017		X	X							
	T12-0.5		Х				27/09/2017		Х	X							
	T12-1.0		Х				27/09/2017		X	X							
	T12-2.0		Х				27/09/2017		X	X							
	T12-3.0		Х				27/09/2017		X	X							
	T12-3.5		х				27/09/2017		Х	X							
	T12-6.0		х				27/09/2017		Х	Х							
	QC1		х				27/09/2017		Х	Х							
	QC2		х				27/09/2017		Х	Х							
									_								
											2						
										-							
									-								
Relinquis print nar	hed by Sarah T ne):	Breheni	)	Signat	ure:	_	Date: 18110 Time:	117		Received (print nar	by 75 ne):	i y Tim	Signature	D	Dat	:e: 18))( ne: 1550	.)ידיו
telinquis print nar				Signat	ure!/		Date: Time:			Received (print nar	by	2	Signature	:	Dat Tim	:e:	

	🔅 eur	ofins	mgt		ABN– 50 005 ( e.mail : Enviros web : www.eur	Sales@e	2 C F eurofins.com	<b>felbourne</b> -5 Kingston Town Close Jakleigh VIC 3166 hone : +61 3 8564 5000 IATA # 1261 ite # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 4 NATA # 1261 Site # 23736
	ompany Name: Idress:	360 Environr 10 Bermonds West Leeder	sey St				Order No.: Report #: Phone:	568325 08 9388 8360		Received: Due: Priority:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day
	oject Name: oject ID:	WA 6007 AGRIMIN AS 2225	SS LAKE MAC	KAY			Fax:	08 9381 2360		Contact Name: ngt Analytical Service	Julie Palich s Manager : Robert Johnston
		Sa	mple Detail			Acid Sulfate Soils Field pH Test					
Melt	ourne Laborato	orv - NATA Site	# 1254 & 142	71							
	ney Laboratory										
	bane Laborator										
Pert	h Laboratory - N	NATA Site # 237	736			х					
Exte	rnal Laboratory	1									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	T9_1.0	Sep 27, 2017		Soil	P17-Oc21153	х					
2	T9_2.0	Sep 27, 2017		Soil	P17-Oc21154	х					
3	 T9_2.5	Sep 27, 2017		Soil	P17-Oc21155	х					
4	T9_3.0	Sep 27, 2017		Soil	P17-Oc21156	х					
5	T9_3.5	Sep 27, 2017		Soil	P17-Oc21157	х					
6	T9_4.0	Sep 27, 2017		Soil	P17-Oc21158	х					
7	T9_4.6	Sep 27, 2017		Soil	P17-Oc21159	х					
8	T9_5.0	Sep 27, 2017		Soil	P17-Oc21160	х					
9	T9_6.0	Sep 27, 2017		Soil	P17-Oc21161	х					

e.mail : Er	005 085 521 viroSales@e v.eurofins.con	urofins.com	<b>Melbourne</b> 2-5 Kingston Town Close Jakleigh VIC 3166 Phone : +61 3 8564 5000 VATA # 1261 Site # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	<b>Perth</b> 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 4 NATA # 1261 Site # 23736
Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007		Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Due: Priority:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
Project Name:AGRIMIN ASS LAKE MACKAYProject ID:2225						es Manager : Robert Johnston
Sample Detail	Acid Sulfate Soils Field pH Test					
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736	Х					
10         T9_0.5         Sep 27, 2017         Soil         P17-Oc2116						
11         T9_1.5         Sep 27, 2017         Soil         P17-Oc2116						
12 T11_1.5 Sep 27, 2017 Soil P17-Oc2116						
13         T11_2.0         Sep 27, 2017         Soil         P17-Oc2116						
14         T11_3.5         Sep 27, 2017         Soil         P17-Oc2116           45         T14_45         0         07         0.11         0.11         0.11						
15         T11_4.5         Sep 27, 2017         Soil         P17-Oc2116           40         T44         0						
16         T11_6.0         Sep 27, 2017         Soil         P17-Oc2116           17         T11_0.5         Sep 27, 2017         Soil         P17-Oc2116						
17         111_0.5         Sep 27, 2017         Soil         P17-Oc2116           18         T11_1.0         Sep 27, 2017         Soil         P17-Oc2117						
18         111_1.0         Sep 27, 2017         Soil         P17-0c2117           19         T11_4.0         Sep 27, 2017         Soil         P17-0c2117	-					
19         111_4.0         Sep 27, 2017         Soil         P17-0c2117           20         T11_5.0         Sep 27, 2017         Soil         P17-0c2117	-					
21 T12_0.01 Sep 27, 2017 Soil P17-0c2117						
	<u> </u>					

	🔅 eur	ofins	mgt	ABN– 50 005 e.mail : Enviro web : www.eur	Sales@e	2 C P eurofins.com N	telbourne -5 Kingston Town Close Jakleigh VIC 3166 hone : +61 3 8564 5000  ATA # 1261 ite # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 460 NATA # 1261 Site # 207	Perth 2/91 Leach Highway Kewdale WA 6105 0 Phone : +61 8 9251 9600 94 NATA # 1261 Site # 23736
	mpany Name: dress:	360 Environm 10 Bermonds West Leeden WA 6007	ey St			Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
	oject Name: oject ID:	AGRIMIN AS 2225	S LAKE MACKAY					Eurofins   r	ngt Analytical Servic	es Manager : Robert Johnston
		Sar	nple Detail		Acid Sulfate Soils Field pH Test					
Melb	ourne Laborato	ory - NATA Site	# 1254 & 14271							
		- NATA Site # 18								
Bris	bane Laborator	y - NATA Site #	20794							
Pert		NATA Site # 237			х					
22	T12_0.45	Sep 27, 2017	Soil	P17-Oc21174	Х					
23	T12_0.6	Sep 27, 2017	Soil	P17-Oc21175	X					
24	T12_10.0	Sep 27, 2017	Soil	P17-Oc21177	X					
25	T12_2.5	Sep 27, 2017	Soil	P17-Oc21178	X					
26 27	T12_4.0 T12_4.5	Sep 27, 2017 Sep 27, 2017	Soil Soil	P17-Oc21179 P17-Oc21180	X X					
27	T12_4.5 T12_5.0	Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21180 P17-Oc21181	X					
	T12_5.0 T12_0.5	Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21181	X					
120	112_0.0		Soil	P17-Oc21183	X					
29 30	T12 1 0	ISep 27 2017								
30	T12_1.0	Sep 27, 2017 Sep 27, 2017			х					
	T12_1.0 T12_2.0 T12_3.0	Sep 27, 2017 Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21184 P17-Oc21185	X X					

🔅 eur	ofins	mgt		ABN- 50 005 ( e.mail : Enviro: web : www.eur	Sales@e	urofins.com n.au	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone: -+61 3 8564 5000 NATA # 1261 Site # 1254 & 14271	Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	Perth 2/91 Leach Highway Kewdale WA 6105 0 Phone: +61 8 9251 9600 94 NATA # 1261 Site # 23736
Company Name: Address:	360 Environm 10 Bermonds West Leederv WA 6007	sey St ville				Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN AS 2225	S LAKE MACK	(AY					Eurofine	mat Analytical Servic	es Manager : Robert Johnston
		mple Detail			Acid Sulfate Soils Field pH Test					
Melbourne Laborato			1							
Sydney Laboratory										
Brisbane Laboratory					V					
Perth Laboratory - N			Coll	D17 0c01107	X X					
34 T12_6.0 35 QC1	Sep 27, 2017		Soil Soil	P17-Oc21187	X X					
35 QC1 36 QC2	Sep 27, 2017 Sep 27, 2017		soil Soil	P17-Oc21188 P17-Oc21189	X					
	Sep 27, 2017 Sep 27, 2017		Soil	P17-Oc21189 P17-Oc21278	X					
37 T12_1.5										

360 ENV	T9_1.0	T9_2.0	T9_2.5	T9_3.0	T9_3.5	T9_4.0	T9_4.5	T9_5.0	T9_6.0
AGRIMIN ASS LAKE MACKAY (2225)	P17-Oc21	1 P17-Oc21	L1 P17-Oc21	1 P17-Oc21	.1 P17-Oc211				
Acid Sulfate Soils Field pH Test									
pH-F (Field pH test)*	7.6	7.9	7.8	7.9	7.8	7.9	7.9	7.8	8.0
pH-FOX (Field pH Peroxide test)*	6.6	7.4	7.4	7.6	7.2	7.7	7.9	7.4	7.5
Reaction Ratings*	2.0	4.0	4.0	4.0	2.0	4.0	4.0	4.0	4.0

Т9_0.5	T9_1.5	T11_1.5	T11_2.0	T11_3.5	T11_4.5	T11_6.0	T11_0.5	T11_1.0	T11_4.0	T11_5.0	T12_0.01	T12_0.45	T12_0.6	
P17-Oc21	.1 P17-Oc21	L1 P17-Oc21	1 P17-Oc212	1 P17-Oc21	L P17-Oc211									

7.7	7.7	7.5	7.3	7.3	7.5	7.6	8.0	7.8	7.5	7.4	7.8	8.0	7.9
6.9	7.0	6.6	6.9	6.5	7.1	7.2	7.0	7.0	7.6	7.6	6.8	7.1	6.9
4.0	4.0	3.0	4.0	4.0	4.0	4.0	2.0	2.0	4.0	4.0	4.0	3.0	3.0

T12_10	.0 T12_2.5	T12_4.0	) T12_4.5	T12_5.0	T12_0.5	5 T12_1.0	T12_2.0	T12_3.0	T12_3.5	T12_6.0	QC1	QC2	T12_1.5
P17-Oc	211 P17-Oc2	11 P17-Oc2	211 P17-Oc2	11 P17-Oc2	11 P17-Oc	211 P17-Oc2	11 P17-Oc	211 P17-Oc	211 P17-Oc212				
7.1	7.4	7.3	7.5	7.6	7.9	7.3	7.0	7.2	7.2	7.6	7.9	7.4	7.0
6.5	6.6	6.4	7.9	7.4	6.9	7.3	6.3	6.6	7.2	7.0	6.6	6.0	6.5
3.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0

# Robert Johnston

Subject: To:

Request for further analysis Enviro Sample WA

From: Sarah Breheny [mailto:SarahBreheny@360environmental.com.au] Sent: Thursday, 2 November 2017 1:28 PM Subject: Request for further analysis To: Enviro Sample WA Cc: Julie Palich

Hello,

Can you please undertake additional analysis for your job reference 568325. The new COC is attached. I have also attached the previous Summary for the same batch of samples for your reference.

Thank you

Sarah



a 10 Bermondsey Street West Leederville 6007 **Senior Environmental Scientist** PO Box 14 West Perth WA 6872 360 Environmental Ptv Ltd Sarah Breheny

t (+618) 9388 8360 f (+618) 9381 2360

e sarahbreheny@360environmental.com.au

w www.360environmental.com.au

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ScannedByWebsenseForEurofins

Send samples to:	Eurofins MGT	Project name:	Agrimin ASS Lake Mackay	
	Unit 2, 91 Leach Highway Kewdale WA 6105	Project number:	2225	
Delivery method:	Courier	Name of samplers:	Gerry Bradley	
Samples from:	360 Environmental	Details verified by:	Julie Palich	environmental
	10 Bermondsey Street West Leederville WA	Lab quote reference:		and band substantial of start sectors in the sector between the
Send reports to:	labresults@360environmental.com.au	Turn around time:	Normal	
	juliepalich@360environmental.com.au			COC Number: 2315-03

Notes: Please also send results to Sarahbreheny@360environmental.com.au

			Matr	ix/Con	tainer								Sample	Analysis				
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	рюн	pHf	рҒох	crs	M8, Fe, Al						1
	T9_1.0		X				27/09/2017				x							
	T9_2.0		X				27/09/2017											
	T9_2.5		X				27/09/2017									-		
	T9_3.5		X				27/09/2017											
	T9_4.6		X				27/09/2017									 		
	T9_5.0		X				27/09/2017									 		1
	T9_6.0		X				27/09/2017				x				1			
	T9-0.5		Х				27/09/2017				x							1
	T9-1.5		Х				27/09/2017											
	T11_1.5		Х				27/09/2017				x							
	T11_2.0		X				27/09/2017											
	T11_3.5		X				27/09/2017				x					 		-
	T11_4.5		X				27/09/2017				х	x						
	T11_6.0		X				27/09/2017											
	T11-0.5		X				27/09/2017				х						1	1
	T11-1.0		X				27/09/2017					х						
	T11-4.0		X				27/09/2017											
	T11-5.0		X				27/09/2017											
	T12_0.01		X				27/09/2017				х	X						
	T12_0.45		X				27/09/2017				х							
	T12_0.6		X				27/09/2017						P.					
	T12_1.5		X				27/09/2017											1
	T12_10		X				27/09/2017				x					1		
rint nam	nquished by Signature: Date: 2/				Dpm		Received (print nam		*		Signature	e:	Date: Time:					
linquish rint nam		she	<b>U</b> .	Signat	ure:		Date: 2 (111 Time:	17		Received (print nam				Signature	2;	Date: Time:		

	In of Custo Imples to:		ins MO						Project	name:		Agrimin	ASS Lake	Mackay					
		Unit 2	2, 91 Le	each H	ighway	/ Kewc	lale WA 6105			number:		2225		macnay		(			
Deliver	y method:	Couri			• ,					f sampler:	5:	Gerry Br	adlev				36		
Sample	s from:	360 E	nviron	menta	1					verified by		Julie Pali				1			
						est Le	ederville WA			te referer		June Pan				e	nviror	nment	al
lend re	ports to:	labre:	sults@	360em	vironm	ental.	com.au			ound time		Normal						•	
	······································						ental.com.au					<u> </u>				COC	C Number	: 2315-03	
lotes:	Please also send re	esults to S				/ironm	ental.com.au												
			Matr	ix/Con	tainer	1	1			-,	,		Sample	e Analysis				· · ·	
Lab Reference	Sample Name	Soil (Jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	pFox	CRS	M8, Fe, Al							
	T12_2.5	<u> </u>	X		<u> <u> </u></u>		27/09/2017	<u> </u>	<u> </u>			<u> </u>			<u> </u>				<u> </u>
	T12_4.0		X				27/09/2017				x								
	T12_4.5		X				27/09/2017				<u> </u>		<u> </u>						
	T12_5.0		X		ţ		27/09/2017				x	·   · ·	<u> </u>						·
	T12-0.5		X		1		27/09/2017			<u> </u>	x	x							
	T12-1.0	-	X		<u> </u>		27/09/2017	<u> </u>		1		+							⊢.—
	T12-2.0		x	<u>├</u> ──			27/09/2017				x		<u> </u>				+		+
	T12-3.0		X	<b>†</b>			27/09/2017		<u> </u>						1				
	T12-3.5		x				27/09/2017												
	T12-6.0		X		·		27/09/2017											_	
	QC1		х				27/09/2017				x	x		-					+
	QC2		×				27/09/2017												
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Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

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

web : www.eurofins.com.au

Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com

## Sample Receipt Advice

Contact name:	Julie Palich
Project name:	AGRIMIN ASS LAKE MACKAY
Project ID:	2225
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 2, 2017 1:28 PM
Eurofins   mgt reference:	570737

360 Environmental

## Sample information

Company name:

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- $\square$  COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

## **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Julie Palich - juliepalich@360environmental.com.au.





38 Years of Environmental Analysis & Experience

	🔅 eur	ofins	mgt		ABN- 50 005 ( e.mail : Envirot web : www.eur	Sales@	eurofins m.au	s.com	2 C P N	<b>felbourn</b> -5 Kings Dakleigh Phone : + IATA # <sup>2</sup> Site # 12	ton To VIC 31 -61 3 8 1261	Sydney         Brisbane         Perth           Town Close         Unit F3, Building F         1/21 Smallwood Place         2/91 Leach Highway           2 3166         16 Mars Road         Murarrie QLD 4172         Kewdale WA 6105           3 8564 5000         Lane Cove West NSW 2066         Phone : +61 7 3902 4600         Phone : +61 8 9251 9600           1         Phone : +61 2 9900 8400         NATA # 1261 Site # 20794         NATA # 1261           & 14271         NATA # 1261 Site # 18217         Site # 23736	
Ad Pro	mpany Name: dress: Dject Name: Dject ID:	360 Environr 10 Bermonds West Leeder WA 6007 AGRIMIN AS 2225	sey St	ЖАҮ			Re	der N port i one: x:		0		9388 8360Priority:5 Day9381 2360Contact Name:Sarah Breheny	
			Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)		bn			
Melb	ourne Laborate	ory - NATA Site	# 1254 & 142	71		х	х	х	х	х			
		- NATA Site # 1											
		y - NATA Site #							х	Х	Х	x	
		NATA Site # 237											
Exte	rnal Laboratory	/											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	T9_1.0	Sep 27, 2017	TIME	Soil	P17-No02818					X	х	x	
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					X	X		
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820				1	X	X		
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					x	х		
5	 T11_3.5	Sep 27, 2017		Soil	P17-No02822					х	Х		
6	 T11_4.5	Sep 27, 2017		Soil	P17-No02823	х	Х	х	х		Х	x	
7	 T11_0.5	Sep 27, 2017		Soil	P17-No02824					Х	Х	x	
8	T11_1.0	Sep 27, 2017		Soil	P17-No02825	х	х	х	х				
9	T12_0.01	Sep 27, 2017		Soil	P17-No02826	х	Х	Х	Х		Х	x	

🛟 eur		ngt	ABN– 50 005 e.mail : Enviro web : www.eu	Sales@	eurofins om.au	.com	2- 0 Pl N	akleigh)	ston Tov VIC 31 +61 3 85 1261	564 5000	Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 46 NATA # 1261 Site # 20	Perth           2/91 Leach Highway           Kewdale WA 6105           00         Phone : +61 8 9251 9600           794         NATA # 1261           Site # 23736
Company Name: Address:	360 Environmenta 10 Bermondsey S West Leederville WA 6007				Re	der N port <del>i</del> one: x:		0		, 8 8360 1 2360		Received: Due: Priority: Contact Name:	Nov 2, 2017 1:28 PM Nov 9, 2017 5 Day Sarah Breheny
Project Name: Project ID:	AGRIMIN ASS LA 2225	KE MACKAY									Eurofins   r	ngt Analytical Servi	ces Manager : Robert Johnston
		Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)						
Melbourne Laborato	ory - NATA Site # 12	54 & 14271		х	х	х	х	х					
	- NATA Site # 18217												
Brisbane Laborator	y - NATA Site # 2079	4					Х	х	Х				
Perth Laboratory - I	NATA Site # 23736	1											
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827					х	х				
11 T12_10	Sep 27, 2017	Soil	P17-No02828					х	х				
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х				
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830					X	Х				
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831				~	Х	X				
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	X	Х	Х	Х		X				
16 T12_2.0	Sep 27, 2017 Sep 27, 2017	Soil Soil	P17-No02833 P17-No02834	x	х	х	x	X	X X				
17 QC1													





NATA Accredited Accreditation Number 1261 Site Number 23736

NATA

WORLD RECOGNISED

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## Certificate of Analysis

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

360 Environmental 10 Bermondsey St West Leederville WA 6007

Attention:

Sarah Breheny

Report Project name Project ID Received Date **570737-S** AGRIMIN ASS LAKE MACKAY 2225 Nov 02, 2017

Client Sample ID			T9_1.0	T9_6.0	T9-0.5	T11_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02818	P17-No02819	P17-No02820	P17-No02821
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	33	35	74	88
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.4	8.4	8.1	7.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.016	0.006	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	10	4.0	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.9	2.1	2.6	0.38
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	570	410	520	77
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.91	0.66	0.83	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	28	23	28	15



Client Sample ID			T11_3.5	T11_4.5	T11_0.5	T11_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02822	P17-No02823	P17-No02824	P17-No02825
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit	-			
Heavy Metals		1				
Aluminium	10	mg/kg	-	15000	-	4300
Arsenic	2	mg/kg	-	2.1	-	< 2
Cadmium	0.4	mg/kg	-	< 0.4	-	< 0.4
Chromium	5	mg/kg	-	18	-	7.7
Copper	5	mg/kg	-	11	-	< 5
Iron	20	mg/kg	-	17000	-	6400
Lead	5	mg/kg	-	9.3	-	< 5
Mercury	0.1	mg/kg	-	< 0.1	-	< 0.1
Nickel	5	mg/kg	-	7.8	-	< 5
Zinc	5	mg/kg	-	21	-	14
Extraneous Material						
<2mm Fraction	0.005	g	57	53	57	-
>2mm Fraction	0.005	g	8.5	< 0.005	< 0.005	-
Analysed Material	0.1	%	87	100	100	-
Extraneous Material	0.1	%	13	< 0.1	< 0.1	-
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	-
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	-
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	-
pH-KCL	0.1	pH Units	7.4	7.4	8.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	-
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	-
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	-
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.50	0.65	1.9	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	100	130	380	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	0.16	0.21	0.60	-
ANC Fineness Factor		factor	1.5	1.5	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	-
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	-
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	-
% Moisture	1	%	23	25	23	22



Client Sample ID			T12_0.01	T12_0.45	T12_10	T12_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02826	P17-No02827	P17-No02828	P17-No02829
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit			•	•
Heavy Metals						
Aluminium	10	mg/kg	2700	_	_	7500
Arsenic	2	mg/kg	< 2	-	_	< 2
Cadmium	0.4	mg/kg	< 0.4	_	-	< 0.4
Chromium	5	mg/kg	< 5	_	-	8.5
Copper	5	mg/kg	< 5	_	-	8.9
Iron	20	mg/kg	3500	-	-	8900
Lead	5	mg/kg	6.1	_	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5			< 5
Zinc	5	mg/kg	10	_	_	10
Extraneous Material	Ū	mg/kg	10			10
<2mm Fraction	0.005	g	58	54	51	46
>2mm Fraction	0.005	g	< 0.005	0.40	7.0	8.5
Analysed Material	0.003	<u> </u>	100	99	88	84
Extraneous Material	0.1	%	< 0.1	0.7	12	16
Chromium Suite (Minus ANC- WA)	0.1	/0	< 0.1	0.7	12	10
Liming Rate Minus ANC	1	1	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	kg CaCO3/t mol H+/t		< 10	< 10	< 10
	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Sulfur Units) Minus ANC pH-KCL	0.02	pH Units		8.4	6.9	7.3
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 0.005	< 0.005	< 0.005
Sulfur - KCI Extractable	0.02	% S	n/a	 	 n/a	 n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.02	%CaCO3		2.2	0.49	0.32
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		440	99	63
Acid Neutralising Capacity - acidity (a-Arcol) Acid Neutralising Capacity - equivalent S% pyrite (s-			200	-++0		
ANCbt) <sup>S03</sup>	0.02	% S	0.40	0.71	0.16	0.10
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
	1					
% Moisture	1	%	22	23	20	20



Client Sample ID			T12_4.0	T12_5.0	T12_0.5	T12_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02830	P17-No02831	P17-No02832	P17-No02833
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Heavy Metals		1				
Aluminium	10	mg/kg	-	_	2600	_
Arsenic	2	mg/kg	-	-	< 2	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	< 5	-
Copper	5	mg/kg	-	-	< 5	-
Iron	20	mg/kg	-	-	3300	-
Lead	5	mg/kg	-	-	< 5	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	_	< 5	-
Zinc	5	mg/kg	-	-	5.2	-
Extraneous Material	<b>`</b>				0.2	
<pre></pre>	0.005	g	51	46	57	100
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	7.4
Analysed Material	0.000	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	6.9
Chromium Suite (Minus ANC- WA)	0.1	70	< 0.1	< 0.1	< 0.1	0.5
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.02	pH Units	7.5	7.7	8.3	6.9
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.002	% pyrite 3	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3		1.1	1.7	0.49
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		220	330	99
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.19	0.36	0.53	0.16
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	19	20	24	19



Client Sample ID			QC1
Sample Matrix			Soil
Eurofins   mgt Sample No.			P17-No02834
Date Sampled			Sep 27, 2017
		Linit	Sep 27, 2017
Test/Reference	LOR	Unit	
Heavy Metals	40		
Aluminium	10	mg/kg	3000
Arsenic	2	mg/kg	< 2
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	5.1
Copper	5	mg/kg	< 5
Iron	20	mg/kg	3700
Lead	5	mg/kg	< 5
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
	5	mg/kg	5.8
Extraneous Material		1	
<2mm Fraction	0.005	g	46
>2mm Fraction	0.005	g	0.43
Analysed Material	0.1	%	99
Extraneous Material	0.1	%	0.9
Chromium Suite (Minus ANC- WA)	1	1	
Liming Rate Minus ANC	1	kg CaCO3/t	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02
pH-KCL	0.1	pH Units	9.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.008
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0
Sulfur - KCI Extractable	0.02	% S	n/a
HCI Extractable Sulfur	0.02	% S	n/a
Net Acid soluble sulfur	0.02	% S	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	6.0
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	1200
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) $^{\rm S03}$	0.02	% S	1.9
ANC Fineness Factor		factor	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1



#### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Nov 08, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 08, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Melbourne	Nov 02, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

eurofins mgt ABN- 50 005 00 e.mail : EnviroSt web : www.euro						085 521 Sales@eurofins.com			2 0 P N	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271		64 5000 Lane Cove West NSW 2066 Phone : +61 7 39 Phone : +61 2 9900 8400 NATA # 1261 Si	72 Kewdale WA 6105 102 4600 Phone : +61 8 9251 9600
Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY         Project ID:       2225							Re	der N port # one: x:		0		8 8360     Priority:       2360     Contact Name	,
												Eurofins   mgt Analytical S	Services Manager : Robert Johnston
	Sample Detail					Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)		
Melt	bourne Laborate	ory - NATA Site	# 1254 & 142	271		х	Х	Х	Х	Х			
-	ney Laboratory					ļ							
	bane Laborator								Х	Х	Х		
	h Laboratory - I		736										
Exte No	ernal Laboratory Sample ID	Sample Date	Sampling	Matrix	LAB ID								
	•		Time										
1	T9_1.0	Sep 27, 2017		Soil	P17-No02818					Х	Х		
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					X	X		
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820					X	X		
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					X X	X		
5 6	T11_3.5 T11_4.5	Sep 27, 2017 Sep 27, 2017		Soil Soil	P17-No02822 P17-No02823	x	x	x	x	X	X X		
6 7	T11_4.5 T11_0.5	Sep 27, 2017 Sep 27, 2017		Soil	P17-No02823 P17-No02824	×	~	<u> </u>	~	x	X		
7 8	T11_0.5	Sep 27, 2017 Sep 27, 2017		Soil	P17-No02824 P17-No02825	x	x	x	x				
8 9	T12_0.01	Sep 27, 2017 Sep 27, 2017		Soil	P17-N002825 P17-No02826	X	X	X	X		x		
9	112_0.01	13ep 21, 2017			17-17-INUU2020	^	_ ^	_ ^	^	1			

🔅 eu	rofins   <sub>n</sub>	ngt	ABN– 50 005 e.mail : Enviro web : www.eu	Sales@		s.com	2 0 P N	Dakleigh	ston To VIC 31 +61 3 8 1261	564 5000	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 460 NATA # 1261 Site # 207	
Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY				Re	der N port a one: x:		0		7 8 8360 1 2360		Received: Due: Priority: Contact Name:	Nov 2, 2017 1:28 PM Nov 9, 2017 5 Day Sarah Breheny	
Project ID:	2225										Eurofins   r	ngt Analytical Servic	ces Manager : Robert Johnston
Sample Detail				Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)				
Melbourne Labora	atory - NATA Site # 1254	4 & 14271		Х	Х	Х	х	Х					
Sydney Laborator	y - NATA Site # 18217												
Brisbane Laborate	ory - NATA Site # 20794						х	Х	х	1			
	- NATA Site # 23736									4			
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827	<u> </u>				Х	Х	4			
11 T12_10	Sep 27, 2017	Soil	P17-No02828					X	Х	4			
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х	4			
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830					X	Х	4			
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831					Х	X	4			
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	Х	Х	X	Х		X	4			
16 T12_2.0	Sep 27, 2017	Soil	P17-No02833					Х	X	4			
17 QC1	Sep 27, 2017	Soil	P17-No02834	X	Х	Х	Х		Х	-			
Test Counts				6	6	6	17	17	16				



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery								-	
Heavy Metals									
Arsenic			%	111			80-120	Pass	
Cadmium			%	111			80-120	Pass	
Chromium			%	114			80-120	Pass	
Copper			%	111			80-120	Pass	
Lead			%	113			80-120	Pass	
Mercury			%	110			75-125	Pass	
Nickel			%	110			80-120	Pass	
Zinc							80-120	Pass	
LCS - % Recovery									
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	95			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	A17-No02337	NCP	%	111			75-125	Pass	
Cadmium	A17-No02337	NCP	%	114			75-125	Pass	
Chromium	A17-No02337	NCP	%	117			75-125	Pass	
Copper	A17-No02337	NCP	%	113			75-125	Pass	
Lead	A17-No02337	NCP	%	113			75-125	Pass	
Mercury	A17-No02337	NCP	%	104			70-130	Pass	
Nickel	A17-No02337	NCP	%	111			75-125	Pass	
Zinc	A17-No02337	NCP	%	113			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No02818	CP	kg CaCO3/t	1.0	1.0	7.0	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02818	СР	mol H+/t	10	11	7.0	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02818	СР	% S	0.02	0.02	7.0	30%	Pass	
pH-KCL	P17-No02818	CP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02818	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02818	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02818	CP	% S	0.016	0.017	7.0	30%	Pass	
Chromium Reducible Sulfur -acidity							0.001		
units	P17-No02818	CP	mol H+/t	10	11	7.0	30%	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate		1					•		
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
HCI Extractable Sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity								_	
units	P17-No02818	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02818	CP	%CaCO3	2.9	2.8	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02818	СР	% S	0.91	0.91	<1	30%	Pass	
ANC Fineness Factor	P17-No02818	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02818	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02818	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02818	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate	11111002010		Ng Ou000/1				0070	1 455	
Daphoate				Result 1	Result 2	RPD			
% Moisture	P17-No02818	СР	%	28	27	3.0	30%	Pass	
Duplicate	1111002010		/0	20		5.0	0070	1 435	
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	A17-No02336	NCP	mg/kg	2.4	2.6	11	30%	Pass	
	A17-No02336	NCP		< 0.4	< 0.4	<1	30%	Pass	
Cadmium		NCP	mg/kg	< 0.4 18	20	11	30%		
Chromium	A17-No02336		mg/kg					Pass	
Copper	A17-No02336	NCP	mg/kg	9.5	11	19	30%	Pass	
Lead	A17-No02336	NCP	mg/kg	6.6	7.1	7.0	30%	Pass	
Mercury	A17-No02336	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	A17-No02336	NCP	mg/kg	8.4	9.3	10	30%	Pass	
Zinc	A17-No02336	NCP	mg/kg	21	25	18	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD		_	
Aluminium	M17-No00637	NCP	mg/kg	5500	5800	5.0	30%	Pass	
Duplicate							1		
Chromium Suite (Minus ANC- WA)		1		Result 1	Result 2	RPD	-		
Liming Rate Minus ANC	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02829	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02829	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No02829	CP	pH Units	7.3	7.3	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02829	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02829	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02829	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02829	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02829	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent									
S% pyrite	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt) Acid Neutralising Capacity -	P17-No02829	CP	%CaCO3	0.32	0.34	7.0	30%	Pass	
equivalent S% pyrite (s-ANCbt)	P17-No02829	CP	% S	0.10	0.11	7.0	30%	Pass	
ANC Fineness Factor	P17-No02829	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02829	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
	P17-No02829	CP	kg CaCO3/t			<1	30%	Pass	



#### Comments

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

#### **Qualifier Codes/Comments**

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

Glenn Jackson National Operations Manager Final report - this Report replaces any previously issued Report - Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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#### Certificate of Analysis

360 Environmental 10 Bermondsey St West Leederville WA 6007 IBC-MRA

WORLD RECOGNISED

NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:

Julie Palich

Report Project name Project ID Received Date **570737-S-V2** AGRIMIN ASS LAKE MACKAY 2225 Nov 02, 2017

Client Sample ID			T9_1.0	T9_6.0	Т9-0.5	T11_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02818	P17-No02819	P17-No02820	P17-No02821
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	33	35	74	88
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.4	8.4	8.1	7.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.016	0.006	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	10	4.0	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.9	2.1	2.6	0.38
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	570	410	520	77
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) $^{\rm S03}$	0.02	% S	0.91	0.66	0.83	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	28	23	28	15



Client Sample ID			T11_3.5	T11_4.5	T11_0.5	T11_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02822	P17-No02823	P17-No02824	P17-No02825
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit		•	•	•
Heavy Metals						
Aluminium	10	mg/kg	-	15000	-	4300
Arsenic	2	mg/kg	-	2.1	-	< 2
Cadmium	0.4	mg/kg	-	< 0.4	-	< 0.4
Chromium	5	mg/kg	-	18	-	7.7
Copper	5	mg/kg	-	11	-	< 5
Iron	20	mg/kg	-	17000	-	6400
Lead	5	mg/kg	-	9.3	-	< 5
Mercury	0.1	mg/kg	-	< 0.1	-	< 0.1
Nickel	5	mg/kg	-	7.8	-	< 5
Uranium	10	mg/kg	-	< 10	-	< 10
Zinc	5	mg/kg	-	21	-	14
Extraneous Material		-				
<2mm Fraction	0.005	g	57	53	57	-
>2mm Fraction	0.005	g	8.5	< 0.005	< 0.005	-
Analysed Material	0.1	%	87	100	100	-
Extraneous Material	0.1	%	13	< 0.1	< 0.1	-
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t		< 1	< 1	-
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	-
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	-
pH-KCL	0.1	pH Units	7.4	7.4	8.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	-
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	-
Chromium Reducible Sulfur -acidity units Sulfur - KCI Extractable	3 0.02	mol H+/t		< 3	< 3	-
HCI Extractable Sulfur	0.02	% S % S	n/a n/a	n/a n/a	n/a n/a	-
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	-
Acid Neutralising Capacity (ANCbt)	0.02	%CaCO3		0.65	1.9	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		130	380	-
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.16	0.21	0.60	_
ANC Fineness Factor		factor	1.5	1.5	1.5	_
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	_
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	-
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	<1	<1	-
% Moisture	1	%	23	25	23	22



Client Sample ID			T12_0.01	T12_0.45	T12_10	T12_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02826	P17-No02827	P17-No02828	P17-No02829
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit		•	•	•
Heavy Metals						
Aluminium	10	mg/kg	2700	-	-	7500
Arsenic	2	mg/kg	< 2	-	-	< 2
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	< 5	-	-	8.5
Copper	5	mg/kg	< 5	-	-	8.9
Iron	20	mg/kg	3500	-	-	8900
Lead	5	mg/kg	6.1	-	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	-	-	< 5
Uranium	10	mg/kg	< 10	-	-	< 10
Zinc	5	mg/kg	10	-	-	10
Extraneous Material						
<2mm Fraction	0.005	g	58	54	51	46
>2mm Fraction	0.005	g	< 0.005	0.40	7.0	8.5
Analysed Material	0.1	%	100	99	88	84
Extraneous Material	0.1	%	< 0.1	0.7	12	16
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units		8.4	6.9	7.3
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup> Acid Neutralising Capacity (ANCbt)	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt) Acid Neutralising Capacity - acidity (a-ANCbt)	0.01	%CaCO3 mol H+/t		2.2	0.49	0.32 63
Acid Neutralising Capacity - acidity (a-ANCDI) Acid Neutralising Capacity - equivalent S% pyrite (s-	<u> </u>		200	440	39	03
ACto Neutraining Capacity - equivalent 3% pyrite (s-	0.02	% S	0.40	0.71	0.16	0.10
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	22	23	20	20



Client Sample ID			T12_4.0	T12_5.0	T12_0.5	T12_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02830	P17-No02831	P17-No02832	P17-No02833
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit			•	•
Heavy Metals						
Aluminium	10	mg/kg	-	-	2600	-
Arsenic	2	mg/kg	-	-	< 2	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	< 5	-
Copper	5	mg/kg	-	-	< 5	-
Iron	20	mg/kg	-	-	3300	-
Lead	5	mg/kg	-	-	< 5	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	-	< 5	-
Uranium	10	mg/kg	-	-	< 10	-
Zinc	5	mg/kg	-	-	5.2	-
Extraneous Material						
<2mm Fraction	0.005	g	51	46	57	100
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	7.4
Analysed Material	0.1	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	6.9
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t		< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.5	7.7	8.3	6.9
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>504</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units Sulfur - KCI Extractable	<u>3</u> 0.02	mol H+/t		< 3	< 3	< 3
HCI Extractable Sulfur	0.02	% S % S	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Net Acid soluble sulfur	0.02	% S	n/a			n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.02	%CaCO3		1.1	1.7	0.49
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		220	330	99
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.19	0.36	0.53	0.16
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	19	20	24	19



Client Sample ID			QC1
Sample Matrix			Soil
Eurofins   mgt Sample No.			P17-No02834
Date Sampled			Sep 27, 2017
Test/Reference	LOR	Unit	000 21, 2011
Heavy Metals	LOK	Unit	
Aluminium	10	~~~//ca	2000
	10	mg/kg	3000
Arsenic Cadmium	2	mg/kg	< 2
	0.4	mg/kg	< 0.4 5.1
Chromium	5	mg/kg	
Copper		mg/kg	< 5
Iron	20	mg/kg	3700
Lead	5	mg/kg	< 5
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
	5	mg/kg	5.8
Extraneous Material	1		
<2mm Fraction	0.005	g	46
>2mm Fraction	0.005	g	0.43
Analysed Material	0.1	%	99
Extraneous Material	0.1	%	0.9
Chromium Suite (Minus ANC- WA)			
Liming Rate Minus ANC	1	kg CaCO3/t	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02
pH-KCL	0.1	pH Units	9.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.008
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0
Sulfur - KCI Extractable	0.02	% S	n/a
HCI Extractable Sulfur	0.02	% S	n/a
Net Acid soluble sulfur	0.02	% S	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	6.0
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	1200
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	1.9
ANC Fineness Factor		factor	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1
	·		
% Moisture	1	%	24



## Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 13, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 08, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Melbourne	Nov 02, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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Ad Pr	Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY         Project ID:       2225			Order No.: Report #: Phone: Fax:				0		Received:       Nov 2, 2017 1:28 PM         37       Due:       Nov 9, 2017         388 8360       Priority:       5 Day         381 2360       Contact Name:       Sarah Breheny		
	oject ib.	2225										Eurofins   mgt Analytical Services Manager : Robert Johnston
		Sa	mple Detail			Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)	
Melk	bourne Laborato	ory - NATA Site	# 1254 & 142	271		х	х	х	х	Х		
Syd	ney Laboratory	- NATA Site # 1	8217									
	bane Laborator								Х	х	Х	
	h Laboratory - N		736									_
	ernal Laboratory		_									_
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	T9_1.0	Sep 27, 2017		Soil	P17-No02818					х	Х	
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					х	Х	
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820					х	Х	
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					X	Х	
5	T11_3.5	Sep 27, 2017		Soil	P17-No02822					X	Х	—
6	T11_4.5	Sep 27, 2017		Soil	P17-No02823	Х	Х	X	Х		Х	
7	T11_0.5	Sep 27, 2017		Soil	P17-No02824					X	Х	
8	T11_1.0	Sep 27, 2017		Soil	P17-No02825	Х	Х	X	Х			_
9	T12_0.01	Sep 27, 2017		Soil	P17-No02826	Х	Х	Х	Х		Х	

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Company Name Address: Project Name:	: 360 Environmental 10 Bermondsey St West Leederville WA 6007 AGRIMIN ASS LAK	Е МАСКАУ			Re	der N port i one: x:		0		7 8 8360 1 2360		Received: Due: Priority: Contact Name:	Nov 2, 2017 1:28 PM Nov 9, 2017 5 Day Sarah Breheny
Project ID:	2225										Eurofins   r	ngt Analytical Servic	es Manager : Robert Johnston
	Sample D	Detail		Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)				
Melbourne Labora	atory - NATA Site # 1254	& 14271		Х	х	х	х	х					
Sydney Laborator	y - NATA Site # 18217												
Brisbane Laborate	ory - NATA Site # 20794						х	Х	Х				
	- NATA Site # 23736									1			
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827					х	Х	4			
11 T12_10	Sep 27, 2017	Soil	P17-No02828	<u> </u>	<u> </u>			Х	Х	4			
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х	4			
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830	<u> </u>				Х	Х	4			
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831					Х	Х	4			
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	Х	Х	Х	Х		Х	4			
16 T12_2.0	Sep 27, 2017	Soil	P17-No02833					X	X	4			
17 QC1	Sep 27, 2017	Soil	P17-No02834	Х	Х	Х	Х		Х	4			
Test Counts				6	6	6	17	17	16				



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper	Copper						5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	111			80-120	Pass	
Cadmium			%	111			80-120	Pass	
Chromium			%	114			80-120	Pass	
Copper			%	111			80-120	Pass	
Lead			%	113			80-120	Pass	
Mercury			%	110			75-125	Pass	
Nickel			%	110			80-120	Pass	
Zinc			%	109			80-120	Pass	
LCS - % Recovery							·		
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	95			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							-		
Heavy Metals				Result 1					
Arsenic	A17-No02337	NCP	%	111			75-125	Pass	
Cadmium	A17-No02337	NCP	%	114			75-125	Pass	
Chromium	A17-No02337	NCP	%	117			75-125	Pass	
Copper	A17-No02337	NCP	%	113			75-125	Pass	
Lead	A17-No02337	NCP	%	113			75-125	Pass	
Mercury	A17-No02337	NCP	%	104			70-130	Pass	
Nickel	A17-No02337	NCP	%	111			75-125	Pass	
Zinc	A17-No02337	NCP	%	113			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No02818	CP	kg CaCO3/t	1.0	1.0	7.0	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02818	СР	mol H+/t	10	11	7.0	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02818	СР	% S	0.02	0.02	7.0	30%	Pass	
pH-KCL	P17-No02818	CP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02818	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02818	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02818	CP	% S	0.016	0.017	7.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02818	CP	mol H+/t	10	11	7.0	30%	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate							-		
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
HCI Extractable Sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02818	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02818	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02818	CP	%CaCO3	2.9	2.8	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02818	СР	% S	0.91	0.91	<1	30%	Pass	
ANC Fineness Factor	P17-No02818	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02818	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02818	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02818	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate		<u> </u>	<u> </u>						
				Result 1	Result 2	RPD			
% Moisture	P17-No02818	CP	%	28	27	3.0	30%	Pass	
Duplicate			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		· -·	0.0			
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	A17-No02336	NCP	mg/kg	2.6	2.9	11	30%	Pass	
Cadmium	A17-No02336	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	A17-No02336	NCP	mg/kg	20	23	11	30%	Pass	
Copper	A17-No02336	NCP	mg/kg	11	13	19	30%	Pass	
	P17-No08098	NCP	mg/kg	250	280	19	30%	Pass	
Iron			~ ~ ~						
Lead	A17-No02336	NCP	mg/kg	7.3	7.9	7.0	30%	Pass	
Mercury	A17-No02336	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	A17-No02336	NCP	mg/kg	9.3	10	10	30%	Pass	
Zinc	A17-No02336	NCP	mg/kg	23	28	18	30%	Pass	
Duplicate					<b>D</b> 110			1	
Heavy Metals				Result 1	Result 2	RPD		_	
Aluminium	M17-No00637	NCP	mg/kg	5500	5800	5.0	30%	Pass	
Duplicate					1			1	
Chromium Suite (Minus ANC- WA)		1		Result 1	Result 2	RPD			
Liming Rate Minus ANC Net Acidity (Acidity Units) Minus	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
ANC	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus	P17-No02829	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No02829	CP	pH Units	7.3	7.3	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02829	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02829	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02829	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02829	СР	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02829	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02829	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02829	CP	%CaCO3	0.32	0.34	7.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02829	СР	% S	0.10	0.11	7.0	30%	Pass	
ANC Fineness Factor	P17-No02829	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02829	CP	% S	< 0.02	< 0.02	<1	30%	Pass	



Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Net Acidity (Acidity Units)	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	



#### Comments

V2 - This report has been amended to include Uranium results

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

mgt

#### **Qualifier Codes/Comments**

#### Code Description

0000	Decemption
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

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#### Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please  $\underline{\text{click here.}}$ 

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Delivery Samples	n of Custo mples to: method: from: ports to:	Eurofi Unit 2 Courie 360 E 10 Be labres	ins MG 2, 91 Le er nvironi rmond sults@3	T each Hi menta sey Str 360env	l reet We vironm	est Lee ental.c	ale WA 6105 derville WA om.au ntal.com.au		Details v Lab quo		: ce:	Agrimin / 2225 Gerry Bra Julie Pali STD		Mackay		er	iviror	2315-03	
lotes:	Please also send res	sults to Sa				ironme	ntal.com.au												
			Matr	ix/Con	tainer								Sample	Analysis					
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	pFox	CRS	M8, Fe, Al							
	PP_0.02								x	x									
	PP_0.02b								х	×									
	PP_0.30						3		x	x									
	PP_2.0								x	x									
	PP_6.0								х	x									
	TP6_0.02						26/10/2017		х	x									
	TP6_0.5						26/10/2017		x	x									
	TP6_1.0						26/10/2017		x	x									
	TP6_1.5						26/10/2017		x	x									
	TP6_2.0						26/10/2017		x	x									
	T6_2.5	6					26/10/2017		x	x									
	T6_3.0						26/10/2017		х	x									
	T6_3.5						26/10/2017		x	x									
	T6_4.0		-				26/10/2017		x	x									
	T20_0.03						30/10/2017		x	x									
	T20_0.06						30/10/2017		x	x									
	T20_0.5						30/10/2017		x	x									
	T20_1.0						30/10/2017		x	x									
	TP20_1.5						30/10/2017		x	x									
	TP20_2.0						30/10/2017		x	x									
	T20_2.5						30/10/2017		x	х									
	T20_3.0		4				30/10/2017		x	x						$\cap$			
	T20_3.5						30/10/2017		x	x						1/			
	T20_6.0						30/10/2017		x	x		,			1	V			-
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Que:

573256

# **Robert Johnston**

From:	Sarah Breheny <sarahbreheny@360environmental.com.au></sarahbreheny@360environmental.com.au>
Sent:	Wednesday, 6 December 2017 10:16 AM
To:	Robert Johnston
Subject:	Total Uranium analysis
Attachments:	signed COC 2017 12 06.pdf
Follow Up Flag:	Follow up

Flagged

Flag Status:

Hi Robert,

Please find attached the COC to undertake the total uranium analysis on the Agrimin samples.

Kind Regards

Sarah



people • planet • professional

Sarah Breheny Senior Environmental Scientist 360 Environmental Pty Ltd a 10 Bermondsey Street West Leederville 6007 PO Box 14 West Perth WA 6872 t (+618) 9388 8360 f (+618) 9381 2360 e sarahbreheny@360environmental.com.au w www.360environmental.com.au

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## Chain of Custody Record

Send samples to:			ins MG	бТ					Project r	name:		Agrimin A	SSTake	Mackay			-		
		Unit 2	2. 91 Le	each Hi	ghwav	Kewda	le WA 6105		Project r			2225	JJ LUNC	Mackay		-			
Delivery method:		Couri			0 1					samplers		Gerry Bra	dlev				SF		
Samples from:		360 E	nviron	mental						erified by		Julie Palie							
		10 Be	rmond	sey Str	eet W	est Lee	derville WA			te referen		June Fune				env	/iror	iment	tai
Send reports to:						ental.c				und time:		Normal							
		iulier	alich	@360	)envir	onme	ntal.com.au		, and are	and third		Norman				COCIN	lumber	2315-01	1
	These samples are from	om the	followi	ng job i	number	rs:											annoer	2313 01	
	• 564573																		
	• 568325																		
	<ul><li>570737</li><li>573256</li></ul>																		
	• 573748																		
	- 373748																		
			Matr	ix/Con	tainer							Sam	ple Anal	ysis					
JCe	ne				Ħ														
ere	Nar				mei			67 <u>-</u>	1	1		A/							
Refe	ole	ar)	oag)	5	Cel			, (	N/	K 1.	1	2							
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Uranium (total)	A	X	X	M8							
P17-No25779	T6_0.02		Х				26/10/2017	X	/ (	1	1								
P17-No02825	T11_1.0		Х				27/09/2017	X										-	
P17-No02823	T11_4.5		Х				27/09/2017	X											
P17-No02826	T12_0.01		Х				27/09/2017	X											
P17-No02832			Х				27/09/2017	×											
P17-No02829	the second se		Х				27/09/2017	X											
P17-No25785	and the second se		Х				30/10/2017	X											
P17-No25788			Х				30/10/2017	X											
P17-Se27802	services with the service of the ser		Х				14/09/2017	X											
P17-Se27807	And a second sec		Х				14/09/2017	X											
P17-Se27813			Х				13/09/2017	X											
P17-Se27817	and the second s		Х				13/09/2017	X											
P17-Se27820			Х				13/09/2017	X											
P17-Se27821	T22_4.0		Х				13/09/2017	X											
P17-No25775	PP_0.02		X				Not Provided	X											
P17-No25776	PP_0.02B		X				Not Provided	×											
P17-No25778	PP_2.0		Х				Not Provided	×											
P17-Se27805	QC1		X				14/09/2017	X											
Relinquished by Sarah print name):	Breheny Borhom	1.		Signat	ure:		Date: 6/12/17			Received (print nan	by ne): Rot	John	note	Signature:	AL-TA	/A	Date: Time:	6/12/	117
Relinquished by	0			Signat	ure:		Date:			Received				Signature:			Date:	1	
print name):																	MLC.		





#### Certificate of Analysis

360 Environmental 10 Bermondsey St West Leederville WA 6007 Iac-MRA



NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:

Sarah Breheny

Report Project name Project ID Received Date **573748-S-V3** AGRIMIN ASS LAKE MACKAY 2225 Nov 22, 2017

Client Sample ID			PP_0.02	PP_0.02B	PP_0.30	PP_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No25775	P17-No25776	P17-No25777	P17-No25778
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	7500	6400	-	38000
Arsenic	2	mg/kg	< 2	< 2	-	5.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	15	13	-	66
Copper	5	mg/kg	5.9	5.4	-	24
Iron	20	mg/kg	11000	10000	-	49000
Lead	5	mg/kg	< 5	< 5	-	21
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Nickel	5	mg/kg	< 5	< 5	-	19
Uranium	10	mg/kg	< 10	< 10	-	16
Zinc	5	mg/kg	22	19	-	67
Extraneous Material						
<2mm Fraction	0.005	g	29	50	51	42
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Comments			M04	M04	M04	M04
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	3.0	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	38	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	0.06	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.8	8.2	7.6	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	0.062	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	38	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.4	1.3	1.0	1.8
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	280	260	200	360
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	0.45	0.41	0.32	0.58



Client Sample ID Sample Matrix			PP_0.02 Soil	PP_0.02B Soil	PP_0.30 Soil	PP_2.0 Soil
Eurofins   mgt Sample No.			P17-No25775	P17-No25776	P17-No25777	P17-No25778
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	11	26	18	25

Client Sample ID			TP6_0.02	TP6_0.5	TP6_1.0	T6_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No25779	P17-No25780	P17-No25781	P17-No25782
Date Sampled			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	1100	-	-	-
Arsenic	2	mg/kg	< 2	-	-	-
Cadmium	0.4	mg/kg	< 0.4	-	-	-
Chromium	5	mg/kg	< 5	-	-	-
Copper	5	mg/kg	< 5	-	-	-
Iron	20	mg/kg	1500	-	-	-
Lead	5	mg/kg	< 5	-	-	-
Mercury	0.1	mg/kg	< 0.1	-	-	-
Nickel	5	mg/kg	< 5	-	-	-
Uranium	10	mg/kg	< 10	-	-	-
Zinc	5	mg/kg	< 5	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	66	70	74	55
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Comments			M04	M04	M04	M04
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.9	8.1	8.3	8.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.38	1.4	1.5	3.6
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	76	270	300	720
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	0.12	0.43	0.48	1.2



Client Sample ID Sample Matrix			TP6_0.02 Soil	TP6_0.5 Soil	TP6_1.0 Soil	T6_2.5 Soil
Eurofins   mgt Sample No.			P17-No25779	P17-No25780	P17-No25781	P17-No25782
Date Sampled			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	20	24	20	15

Client Sample ID			T20_0.03	T20_0.06	T20_1.0	T20_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No25783	P17-No25784	P17-No25785	P17-No25786
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017
Test/Reference	LOR	Unit				
Heavy Metals						
Aluminium	10	mg/kg	-	-	44000	-
Arsenic	2	mg/kg	-	-	3.9	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	44	-
Copper	5	mg/kg	-	-	25	-
Iron	20	mg/kg	-	-	52000	-
Lead	5	mg/kg	-	-	22	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	-	19	-
Uranium	10	mg/kg	-	-	< 10	-
Zinc	5	mg/kg	-	-	48	-
Extraneous Material						
<2mm Fraction	0.005	g	42	56	45	49
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Comments			M04	M04	M04	M04
Liming Rate Minus ANC	1	kg CaCO3/t	6.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	74	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.12	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.7	7.7	8.1	7.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.12	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	74	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.5	0.28	1.9	1.5
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	290	57	380	290
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.47	0.09	0.60	0.47



Client Sample ID Sample Matrix			T20_0.03 Soil	T20_0.06 Soil	T20_1.0 Soil	T20_1.5 Soil
Eurofins   mgt Sample No.			P17-No25783	P17-No25784	P17-No25785	P17-No25786
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	43	16	14	16

Client Sample ID			T20_2.0	T20_2.5	T20_6.0	T20_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No25787	P17-No25788	P17-No25789	P17-No25790
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017
Test/Reference	LOR	Unit				
Heavy Metals		01				
Aluminium	10	mg/kg	-	32000	-	_
Arsenic	2	mg/kg	-	4.2	-	-
Cadmium	0.4	mg/kg	-	< 0.4	-	-
Chromium	5	mg/kg	-	35	-	-
Copper	5	mg/kg	-	35	-	-
Iron	20	mg/kg	-	43000	-	-
Lead	5	mg/kg	-	11	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	13	-	-
Uranium	10	mg/kg	-	< 10	-	-
Zinc	5	mg/kg	-	45	-	-
Extraneous Material						
<2mm Fraction	0.005	g	56	52	53	40
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	14
Analysed Material	0.1	%	100	100	100	74
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	26
Chromium Suite (Minus ANC- WA)						
Comments			M04	M04	M04	M04
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.6	8.5	8.2	7.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	12	2.3	2.5	0.65
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2400	470	500	130
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)^{S03}	0.02	% S	3.9	0.74	0.81	0.21



Client Sample ID Sample Matrix			T20_2.0 Soil	T20_2.5 Soil	T20_6.0 Soil	T20_0.5 Soil
Eurofins   mgt Sample No.			P17-No25787	P17-No25788	P17-No25789	P17-No25790
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	20	16	18	19



## Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 13, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 23, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 23, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 23, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Nov 22, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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A d	ompany Name: ddress: roject Name:		sey St	СКАҮ			Re	der N port a one: x:		08		Received:         Nov 22, 2017 12:00 AM           18         Due:         Nov 24, 2017           88 8360         Priority:         2 Day           81 2360         Contact Name:         Julie Palich
Pr	oject ID:	2225										Eurofins   mgt Analytical Services Manager : Robert Johnston
		Sa	mple Detail			Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)	
Mel	bourne Laborate	ory - NATA Site	# 1254 & 142	271		Х	Х	Х	Х	Х		
	ney Laboratory											
	bane Laborator								Х	Х	Х	_
	th Laboratory - I		736									-
Exte No	ernal Laboratory Sample ID	/ Sample Date	Sampling	Matrix	LAB ID							-
110	•		Time									
1	PP_0.02	Not Provided		Soil	P17-No25775	Х	Х	Х	Х		х	
2	PP_0.02B	Not Provided		Soil	P17-No25776	Х	Х	Х	Х		X	
3	PP_0.30	Not Provided		Soil	P17-No25777		<u>, , , , , , , , , , , , , , , , , , , </u>			Х	X	
4	PP_2.0	Not Provided		Soil	P17-No25778	X	X	X	X		X	
5	TP6_0.02	Oct 26, 2017		Soil	P17-No25779	Х	Х	Х	Х	×	X	
6 7	TP6_0.5	Oct 26, 2017 Oct 26, 2017		Soil Soil	P17-No25780					X	X X	
7 8	TP6_1.0 T6_2.5	Oct 26, 2017 Oct 26, 2017		Soil	P17-No25781 P17-No25782					X X	X X	
8		Oct 26, 2017 Oct 30, 2017		Soil	P17-No25782 P17-No25783					X	X	
Э	T20_0.03	1001 30, 2017		301	TT1/-IN025/83	1				~	~	

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Company Name: Address:	10 Bermonds West Leeder WA 6007	sey St ville			Re	der N eport # ione: x:		0		48         Due:         Nov           388 8360         Priority:         2 Da	22, 2017 12:00 AM 24, 2017 y Palich
Project Name: Project ID:	AGRIMIN AS 2225	SS LAKE MACKAY								Eurofins   mgt Analytical Services Ma	anager : Robert Johnston
	Sa	mple Detail		Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)		
Melbourne Labora	tory - NATA Site	# 1254 & 14271		Х	х	Х	Х	Х			
Sydney Laboratory										_	
Brisbane Laborato							Х	X	X		
Perth Laboratory -			D17 No25704					~	x	_	
10 T20_0.06 11 T20_1.0	Oct 30, 2017 Oct 30, 2017	Soil Soil	P17-No25784 P17-No25785	X	x	x	х	X	XX		
11 120_1.0 12 T20_1.5	Oct 30, 2017	Soil	P17-No25786					x	X		
13 T20_2.0	Oct 30, 2017	Soil	P17-No25787					X	X		
14 T20_2.5	Oct 30, 2017	Soil	P17-No25788	х	х	х	х		Х	—	
15 T20_6.0	Oct 30, 2017	Soil	P17-No25789					х	Х		
16 T20_0.5	Oct 30, 2017	Soil	P17-No25790					х	Х		
Test Counts				6	6	6	16	16	16	3	



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank				-					
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Uranium			mg/kg	< 10			10	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery				<u> </u>	<u> </u>				
Heavy Metals									
Arsenic			%	91			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Chromium			%	94			80-120	Pass	
Copper			%	94			80-120	Pass	
Lead			%	95			80-120	Pass	
Mercury			%	89			75-125	Pass	
Nickel			%	92			80-120	Pass	
Zinc			%	94			80-120	Pass	
LCS - % Recovery			70				00 120	1 433	
Chromium Suite (Minus ANC- WA)							1		
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance	Pass Limits	Qualifying Code
Spike - % Recovery	· ·	Source					Linits	Linnis	Code
				Decult 1					
Heavy Metals			0/	Result 1			75 405	Deee	
Arsenic	M17-No27505	NCP	%	110			75-125	Pass	
Cadmium	M17-No27505	NCP	%	113			75-125	Pass	
Chromium	M17-No27505	NCP	%	117			75-125	Pass	
Copper	M17-No27505	NCP	%	116			75-125	Pass	
Lead	B17-No21034	NCP	%	98			75-125	Pass	
Mercury	M17-No27505	NCP	%	86			70-130	Pass	
Nickel	M17-No27505	NCP	%	106			75-125	Pass	
Zinc	M17-No27505	NCP	%	112			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate				1			1		
Heavy Metals	I	,		Result 1	Result 2	RPD		<u> </u>	
Aluminium	M17-No23258	NCP	mg/kg	330	340	2.0	30%	Pass	
Arsenic	B17-No21033	NCP	mg/kg	2.9	4.4	41	30%	Fail	Q15
Cadmium	B17-No21033	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	B17-No21033	NCP	mg/kg	6.7	6.1	10	30%	Pass	
Copper	B17-No21033	NCP	mg/kg	5.8	< 5	54	30%	Fail	Q15
Lead	B17-No21033	NCP	mg/kg	6.9	8.3	18	30%	Pass	
Mercury	B17-No21033	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
		NCP	mg/kg	5.1	5.8	13	30%	Pass	
Nickel	B17-No21033	NUF	шу/ку	5.1	0.0				
Nickel Uranium	B17-No21033 B17-No21059	NCP	mg/kg	< 10	< 10	<1	30%	Pass	



Duplicate									
•				Result 1	Result 2	RPD			
% Moisture	P17-No25782	CP	%	15	18	19	30%	Pass	
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No25784	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No25784	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No25784	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No25784	CP	pH Units	7.7	7.8	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No25784	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No25784	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No25784	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No25784	СР	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No25784	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No25784	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No25784	CP	%CaCO3	0.28	0.29	2.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No25784	СР	% S	0.09	0.09	2.0	30%	Pass	
ANC Fineness Factor	P17-No25784	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No25784	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No25784	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No25784	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	



#### Comments

#### V3 - This report has been amended to provide Uranium results.

Prior to analysis, the previously dried samples used for Chromium Reducible Sulfur Suite analysis still contained moisture and were not frozen. This meant the samples were inappropriately preserved for the Chromium Reducible Sulfur Suite analysis. Due to the inappropriate preservation of the samples, the Chromium Reducible Sulfur Suite results for this report are not NATA accredited.

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

mgt

#### Comments

#### **Qualifier Codes/Comments**

Code	Description
M04	Sample incorrectly preserved
Q15	The RPD reported passes Eurofins   mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Analytical Services Manager
Senior Analyst-Metal (VIC)
Senior Analyst-Metal (QLD)
Senior Analyst-Inorganic (VIC)
Senior Analyst-Inorganic (QLD)

1. July

Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofies | rigit shail not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In or case shall Eurofies | rigit be liable for cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In or case shall Eurofies, the test were been from this report. This document shall not be reported executively in full and relates only to the instructed.





NATA Accredited Accreditation Number 1261 Site Number 23736

NATA

WORLD RECOGNISED

4 Julia

#### Certificate of Analysis

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

360 Environmental 10 Bermondsey St West Leederville WA 6007

Julie Palich

Report Project name Project ID **Received Date** 

Attention:

573748-S AGRIMIN ASS LAKE MACKAY 2225 Nov 22, 2017

Client Sample ID			PP_0.02	PP_0.02B	PP_0.30	PP_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No25775	P17-No25776	P17-No25777	P17-No25778
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals	Lon	Onic				
Aluminium	10	mg/kg	7500	6400	-	38000
Arsenic	2	mg/kg	< 2	< 2	-	5.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	15	13	-	66
Copper	5	mg/kg	5.9	5.4	-	24
Iron	20	mg/kg	11000	10000	-	49000
Lead	5	mg/kg	< 5	< 5	-	21
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Nickel	5	mg/kg	< 5	< 5	-	19
Zinc	5	mg/kg	22	19	-	67
Extraneous Material						
<2mm Fraction	0.005	g	29	50	51	42
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Comments			M04	M04	M04	M04
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	3.0	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	38	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	0.06	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.8	8.2	7.6	8.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	0.062	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	38	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	1.4	1.3	1.0	1.8
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	280	260	200	360
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.45	0.41	0.32	0.58
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5



Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			PP_0.02 Soil P17-No25775 Not Provided	PP_0.02B Soil P17-No25776 Not Provided	PP_0.30 Soil P17-No25777 Not Provided	PP_2.0 Soil P17-No25778 Not Provided
Test/Reference	LOR	Unit	Not Flovided	Not Frovided	Not Frovided	Not Frovided
Chromium Suite (Minus ANC- WA)						
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	11	26	18	25

Client Sample ID			TP6_0.02	TP6_0.5	TP6_1.0	T6_2.5	
Sample Matrix			Soil	Soil	Soil	Soil	
Eurofins   mgt Sample No.			P17-No25779	P17-No25780	P17-No25781	P17-No25782	
Date Sampled			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Test/Reference	LOR	Unit					
Heavy Metals							
Aluminium	10	mg/kg	1100	-	-	-	
Arsenic	2	mg/kg	< 2	-	-	-	
Cadmium	0.4	mg/kg	< 0.4	-	-	-	
Chromium	5	mg/kg	< 5	-	-	-	
Copper	5	mg/kg	< 5	-	-	-	
Iron	20	mg/kg	1500	-	-	-	
Lead	5	mg/kg	< 5	-	-	-	
Mercury	0.1	mg/kg	< 0.1	-	-	-	
Nickel	5	mg/kg	< 5	-	-	-	
Zinc	5	mg/kg	< 5	-	-	-	
Extraneous Material							
<2mm Fraction	0.005	g	66	70	74	55	
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005	
Analysed Material	0.1	%	100	100	100	100	
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1	
Chromium Suite (Minus ANC- WA)							
Comments			M04	M04	M04	M04	
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10	
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
pH-KCL	0.1	pH Units	7.9	8.1	8.3	8.4	
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2	
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02	
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005	
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3	
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a	
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.38	1.4	1.5	3.6	
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	76	270	300	720	
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.12	0.43	0.48	1.2	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	



Client Sample ID Sample Matrix			TP6_0.02 Soil	TP6_0.5 Soil	TP6_1.0 Soil	T6_2.5 Soil
Eurofins   mgt Sample No.			P17-No25779	P17-No25780	P17-No25781	P17-No25782
Date Sampled			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017
Test/Reference	LOR	Unit				
Chromium Suite (Minus ANC- WA)						
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	20	24	20	15

Client Sample ID			T20_0.03	T20_0.06	T20_1.0	T20_1.5	
Sample Matrix			Soil	Soil	Soil	Soil	
Eurofins   mgt Sample No.		P17-No25783 P17-N		P17-No25784	P17-No25785	P17-No25786	
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	
Test/Reference	LOR	Unit					
Heavy Metals	-	-					
Aluminium	10	mg/kg	-	-	44000	-	
Arsenic	2	mg/kg	-	_	3.9	-	
Cadmium	0.4	mg/kg	-	-	< 0.4	-	
Chromium	5	mg/kg	-	-	44	-	
Copper	5	mg/kg	-	-	25	-	
Iron	20	mg/kg	-	-	52000	-	
Lead	5	mg/kg	-	-	22	-	
Mercury	0.1	mg/kg	-	-	< 0.1	-	
Nickel	5	mg/kg	-	-	19	-	
Zinc	5	mg/kg	-	-	48	-	
Extraneous Material							
<2mm Fraction	0.005	g	42	56	45	49	
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005	
Analysed Material	0.1	%	100	100	100	100	
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1	
Chromium Suite (Minus ANC- WA)							
Comments			M04	M04	M04	M04	
Liming Rate Minus ANC	1	kg CaCO3/t	6.0	< 1	< 1	< 1	
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	74	< 10	< 10	< 10	
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.12	< 0.02	< 0.02	< 0.02	
pH-KCL	0.1	pH Units	7.7	7.7	8.1	7.9	
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2	
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02	
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.12	< 0.005	< 0.005	< 0.005	
Chromium Reducible Sulfur -acidity units	3	mol H+/t	74	< 3	< 3	< 3	
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a	
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3		0.28	1.9	1.5	
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	290	57	380	290	
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.47	0.09	0.60	0.47	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10	
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1	



Client Sample ID Sample Matrix			T20_0.03 Soil	T20_0.06 Soil	T20_1.0 Soil	T20_1.5 Soil
Eurofins   mgt Sample No.			P17-No25783	P17-No25784	P17-No25785	P17-No25786
Date Sampled Test/Reference	LOR	Unit	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017
	LOIN	Onit				
% Moisture	1	%	43	16	14	16

Client Sample ID			T20 2.0	T20_2.5	T20 6.0	T20 0.5	
Sample Matrix			Soil	Soil P17-No25788	Soil	Soil P17-No25790	
Eurofins   mgt Sample No.			P17-No25787		P17-No25789		
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	
Test/Reference	LOR	Unit					
Heavy Metals	Lon	Onit					
Aluminium	10	mg/kg	_	32000	_	<u> </u>	
Arsenic	2	mg/kg	-	4.2	_	<u> </u>	
Cadmium	0.4	mg/kg	-	< 0.4	-	-	
Chromium	5	mg/kg	-	35	-	-	
Copper	5	mg/kg	-	35	-	-	
Iron	20	mg/kg	-	43000	-	-	
Lead	5	mg/kg	-	11	-	-	
Mercury	0.1	mg/kg	-	< 0.1	-	-	
Nickel	5	mg/kg	-	13	-	-	
Zinc	5	mg/kg	-	45	-	-	
Extraneous Material	•						
<2mm Fraction	0.005	g	56	52	53	40	
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	14	
Analysed Material	0.1	%	100	100	100	74	
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	26	
Chromium Suite (Minus ANC- WA)							
Comments			M04	M04	M04	M04	
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10	
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
pH-KCL	0.1	pH Units	8.6	8.5	8.2	7.6	
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2	
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02	
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005	
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3	
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a	
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a	
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a	
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	12	2.3	2.5	0.65	
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	2400	470	500	130	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) <sup>S03</sup>	0.02	% S	3.9	0.74	0.81	0.21	
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5	
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02	
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10	
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1	
% Moisture	1	%	20	16	18	19	



#### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Nov 23, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 23, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 23, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 23, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Nov 22, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

	eurofins     mgt     ABN- 50 005 08:     e.mail : EnviroSa     web : www.eurofi				Sales@eurofins.com			2- 0 Pl N	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271		3166         16 Mars Road         Murarie QLD 4172         Kewdale WA 6105           3 8564 5000         Lane Cove West NSW 2066         Phone : +61 7 3902 4600         Phone : +61 8 9251 9600           Phone : +61 2 9900 8400         NATA # 1261 Site # 20794         NATA # 1261	
A o	ompany Name: Idress: oject Name: oject ID:	10 Bermondsey St West Leederville WA 6007 AGRIMIN ASS LAKE MACKAY					Re	der N port <del>/</del> one: x:		08		Received:       Nov 22, 2017 12:00 AM         748       Due:       Nov 24, 2017         388 8360       Priority:       2 Day         381 2360       Contact Name:       Julie Palich
	Project ID: 2225 Sample Detail				Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)	Eurofins   mgt Analytical Services Manager : Robert Johnston	
Mel	bourne Laborate	ory - NATA Site	# 1254 & 142	271		Х	Х	Х	Х	Х		
-	ney Laboratory											
	bane Laborator								Х	Х	х	
	h Laboratory - N		36									
	ernal Laboratory				1	<u> </u>						_
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	PP_0.02	Not Provided		Soil	P17-No25775	х	Х	Х	Х		х	
2	PP_0.02B	Not Provided		Soil	P17-No25776	х	х	х	х		х	
3	PP_0.30	Not Provided		Soil	P17-No25777					х	х	
4	PP_2.0	Not Provided		Soil	P17-No25778	х	х	х	х		х	
5	TP6_0.02	Oct 26, 2017		Soil	P17-No25779	х	х	х	Х		х	
6	TP6_0.5	Oct 26, 2017		Soil	P17-No25780					х	х	
7	TP6_1.0	Oct 26, 2017		Soil	P17-No25781					х	х	
8	T6_2.5	Oct 26, 2017		Soil	P17-No25782					Х	х	
9	T20_0.03	Oct 30, 2017		Soil	P17-No25783					х	х	

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Company Name Address:	10 Bermond West Leeder WA 6007	sey St ville			Re	der Ne port # one: x:		0		3 8360 1 2360	Received: Due: Priority: Contact Name:	Nov 22, 2017 12:00 AM Nov 24, 2017 2 Day Julie Palich
Project Name: Project ID:	AGRIMIN AS 2225	SS LAKE MACKAY								Eurofins	mgt Analytical Servi	ces Manager : Robert Johnston
	Sample Detail				Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)			
Melbourne Labora	tory - NATA Site	# 1254 & 14271		Х	Х	Х	Х	х				
Sydney Laborator												
Brisbane Laborato							Х	Х	Х			
Perth Laboratory - 10 T20_0.06	Oct 30, 2017	36 Soil	P17-No25784					x	х			
11 T20_1.0	Oct 30, 2017 Oct 30, 2017	Soil	P17-N025785	х	Х	Х	Х		X			
12 T20_1.5	Oct 30, 2017	Soil	P17-No25786					х	X			
13 T20_2.0	Oct 30, 2017	Soil	P17-No25787					Х	х			
14 T20_2.5	Oct 30, 2017	Soil	P17-No25788	Х	Х	Х	Х		Х			
15 T20_6.0	Oct 30, 2017	Soil	P17-No25789					х	Х			
16 T20_0.5	Oct 30, 2017	Soil	P17-No25790					х	х			
Test Counts				6	6	6	16	16	16			



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery								-	
Heavy Metals									
Arsenic			%	91			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Chromium			%	94			80-120	Pass	
Copper			%	94			80-120	Pass	
Lead			%	95			80-120	Pass	
Mercury			%	89			75-125	Pass	
Nickel				92			80-120	Pass	
Zinc				94			80-120	Pass	
LCS - % Recovery									
Chromium Suite (Minus ANC- WA)									
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								-	
Heavy Metals				Result 1					
Arsenic	M17-No27505	NCP	%	110			75-125	Pass	
Cadmium	M17-No27505	NCP	%	113			75-125	Pass	
Chromium	M17-No27505	NCP	%	117			75-125	Pass	
Copper	M17-No27505	NCP	%	116			75-125	Pass	
Lead	B17-No21034	NCP	%	98			75-125	Pass	
Mercury	M17-No27505	NCP	%	86			70-130	Pass	
Nickel	M17-No27505	NCP	%	106			75-125	Pass	
Zinc	M17-No27505	NCP	%	112			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate				-			-		
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M17-No23258	NCP	mg/kg	330	340	2.0	30%	Pass	
Arsenic	B17-No21033	NCP	mg/kg	2.9	4.4	41	30%	Fail	Q15
Cadmium	B17-No21033	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	B17-No21033	NCP	mg/kg	6.7	6.1	10	30%	Pass	
Copper	B17-No21033	NCP	mg/kg	5.8	< 5	54	30%	Fail	Q15
Lead	B17-No21033	NCP	mg/kg	6.9	8.3	18	30%	Pass	
Mercury	B17-No21033	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	B17-No21033	NCP	mg/kg	5.1	5.8	13	30%	Pass	
Zinc	B17-No21033	NCP	mg/kg	15	13	13	30%	Pass	
Duplicate									
Duplicate				Result 1	Result 2	RPD			



Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No25784	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No25784	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No25784	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No25784	CP	pH Units	7.7	7.8	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No25784	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No25784	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No25784	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No25784	СР	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No25784	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No25784	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No25784	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No25784	CP	%CaCO3	0.28	0.29	2.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No25784	СР	% S	0.09	0.09	2.0	30%	Pass	
ANC Fineness Factor	P17-No25784	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No25784	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No25784	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No25784	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	



#### Comments

Prior to analysis, the previously dried samples used for Chromium Reducible Sulfur Suite analysis still contained moisture and were not frozen. This meant the samples were inappropriately preserved for the Chromium Reducible Sulfur Suite analysis. Due to the inappropriate preservation of the samples, the Chromium Reducible Sulfur Suite results for this report are not NATA accredited.

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

#### Comments

#### **Qualifier Codes/Comments**

Code	Description
M04	Sample incorrectly preserved
Q15	The RPD reported passes Eurofins   mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

12 July

Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please  $\underline{\text{click here.}}$ 

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Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

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

web : www.eurofins.com.au

Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com

#### Sample Receipt Advice

Company name:	360 Environmental
Contact name: Project name: Project ID: COC number: Turn around time: Date/Time received: Eurofins   mgt reference:	Julie Palich AGRIMIN ASS LAKE MACKAY 2225 2315-03 2 Day Nov 22, 2017 <b>573748</b>

#### Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- $\boxtimes$  Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

#### Notes

LOGGED AS 2 DAY. WILL CONFIRM AVAILABILITY OF TURNAROUND TIME.

#### **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Julie Palich - juliepalich@360environmental.com.au.



Environmental Laboratory Air Analysis Water Analysis Soil Contamination Analysis NATA Accreditation Stack Emission Sampling & Analysis Trade Waste Sampling & Analysis Groundwater Sampling & Analysis



38 Years of Environmental Analysis & Experience

#### Chain of Custody Record Send samples to: **Eurofins MGT** Project name: Agrimin ASS Lake Mackay Unit 2, 91 Leach Highway Kewdale WA 6105 Project number: 2225 Delivery method: Courier Name of samplers: Gerry Bradley Samples from: 360 Environmental Details verified by: Sarah Breheny environmental 10 Bermondsey Street West Leederville WA Lab quote reference: Send reports to: labresults@360environmental.com.au Turn around time: Fast 2-day turn around please juliepalich@360environmental.com.au COC Number: 2315-03 Notes: Please also send results to Sarahbreheny@360environmental.com.au Matrix/Container Sample Analysis Reference Sample Name Fibre Cement A Soil (bag) Soil (Jar) M8, Fe, / Nater Other Date pFox Hold Lab o⊢f CRS PP 0.02 х х PP\_0.02b х х PP 0.30 х PP\_2.0 х х PP 6.0 TP6\_0.02 26/10/2017 х х TP6 0.5 26/10/2017 х TP6 1.0 26/10/2017 х TP6\_1.5 26/10/2017 TP6 2.0 26/10/2017 T6\_2.5 26/10/2017 х T6 3.0 26/10/2017 T6\_3.5 26/10/2017 T6 4.0 26/10/2017 T20 0.03 30/10/2017 х T20 0.06 30/10/2017 х T20 0.5 30/10/2017 х T20\_1.0 30/10/2017 х х TP20 1.5 30/10/2017 х TP20\_2.0 30/10/2017 х T20 2.5 30/10/2017 х х T20\_3.0 30/10/2017 T20 3.5 30/10/2017 573748 T20 6.0 30/10/2017 х Signature: Sarah Breheny 22/11 Relinguished by Date: 22/11/2017 Received by Rach T. Signature: Date: N 12:20 pm (print name): (print name): Time: 10.15 am Time: Signature: 🂋 Date: Relinguished by Received by Signature: Date: (print name): Time: (print name): Time:





#### Certificate of Analysis

360 Environmental 10 Bermondsey St West Leederville WA 6007

Julie Palich

Report	573256-S
Project name	AGRIMIN ASS LAKE MACKAY
Project ID	2225
Received Date	Nov 20, 2017

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			PP_0.02 Soil P17-No21746 Not Provided	PP_0.02B Soil P17-No21747 Not Provided	PP_0.30 Soil P17-No21748 Not Provided	PP_2.0 Soil P17-No21749 Not Provided
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	8.4	7.4	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.5	5.0	7.5	7.9
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	4.0	4.0

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			PP_6.0 Soil P17-No21750 Not Provided	TP6_0.02 Soil P17-No21751 Oct 26, 2017	TP6_0.5 Soil P17-No21752 Oct 26, 2017	TP6_1.0 Soil P17-No21753 Oct 26, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	8.3	8.0	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	6.1	8.3	8.2
Reaction Ratings* <sup>S05</sup>		comment	4.0	2.0	4.0	4.0

Client Sample ID Sample Matrix			TP6_1.5 Soil	TP6_2.0 Soil	T6_2.5 Soil	T6_3.0 Soil	
Eurofins   mgt Sample No.			P17-No21754	P17-No21755	P17-No21756	P17-No21757	
Date Sampled			Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	Oct 26, 2017	
Test/Reference	LOR	Unit					
Acid Sulfate Soils Field pH Test							
pH-F (Field pH test)*	0.1	pH Units	7.7	7.7	7.6	7.7	
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.1	7.0	7.1	
Reaction Ratings* <sup>S05</sup>		comment	2.0	2.0	2.0	2.0	



Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			T6_3.5 Soil P17-No21758 Oct 26, 2017	T6_4.0 Soil P17-No21759 Oct 26, 2017	T20_0.03 Soil P17-No21760 Oct 30, 2017	T20_0.06 Soil P17-No21761 Oct 30, 2017
Test/Reference Acid Sulfate Soils Field pH Test	LOR	Unit				
pH-F (Field pH test)*	0.1	pH Units	7.8	7.8	8.2	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	7.2	5.1	7.4
Reaction Ratings*505		comment	2.0	2.0	4.0	4.0

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled			T20_0.5 Soil P17-No21762 Oct 30, 2017	T20_1.0 Soil P17-No21763 Oct 30, 2017	T20_1.5 Soil P17-No21764 Oct 30, 2017	T20_2.0 Soil P17-No21765 Oct 30, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	7.5	7.6	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.7	8.0	6.9	8.3
Reaction Ratings* <sup>S05</sup>		comment	4.0	4.0	4.0	4.0

Client Sample ID Sample Matrix			T20_2.5 Soil	T20_3.0 Soil	T20_3.5 Soil	T20_6.0 Soil	
Eurofins   mgt Sample No.			P17-No21766	P17-No21767	P17-No21768	P17-No21769	
Date Sampled			Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	Oct 30, 2017	
Test/Reference	LOR	Unit					
Acid Sulfate Soils Field pH Test							
pH-F (Field pH test)*	0.1	pH Units	7.8	7.7	7.8	7.6	
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	6.9	6.9	6.8	
Reaction Ratings*505		comment	2.0	2.0	2.0	2.0	



#### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Nov 20, 2017	7 Day

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

eurofins mgt ABN- 50 000 e.mail : Envir web : www.e							eurofins.com	<b>Melbourne</b> 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	<b>Perth</b> 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736
Ad Pro	mpany Name: dress: oject Name: oject ID:	360 Environr 10 Bermonds West Leeder WA 6007 AGRIMIN AS 2225	sey St	скат			Order No.: Report #: Phone: Fax:	573256 08 9388 8360 08 9381 2360	Eurofins   r	Received: Due: Priority: Contact Name: ngt Analytical Service	Nov 20, 2017 11:47 AM Nov 27, 2017 5 Day Julie Palich es Manager : Robert Johnston
Sample Detail						Acid Sulfate Soils Field pH Test					
Melb	ourne Laborato	ory - NATA Site	# 1254 & 142	71							
		- NATA Site # 1									
		y - NATA Site #									
		ATA Site # 237				Х					
Exte	rnal Laboratory	,									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
	PP_0.02	Not Provided		Soil	P17-No21746	х					
	PP_0.02B	Not Provided		Soil	P17-No21747	Х					
	PP_0.30	Not Provided		Soil	P17-No21748	Х					
	PP_2.0	Not Provided		Soil	P17-No21749	Х					
	PP_6.0	Not Provided		Soil	P17-No21750	Х					
	TP6_0.02	Oct 26, 2017		Soil	P17-No21751	Х					
	TP6_0.5	Oct 26, 2017		Soil	P17-No21752	Х					
	TP6_1.0	Oct 26, 2017		Soil	P17-No21753	X					
9	TP6_1.5	Oct 26, 2017		Soil	P17-No21754	Х					

🔅 eu	rofins   m	gt	ABN– 50 005 ( e.mail : Enviro web : www.eur	Sales@e	eurofins.com	<b>Aelbourne</b> -5 Kingston Town Close Jakleigh VIC 3166 hone : +61 3 8564 5000 JATA # 1261 site # 1254 & 14271	Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 46 NATA # 1261 Site # 20	Kewdale WA 6105 00 Phone : +61 8 9251 9600
Company Name Address:	: 360 Environmental 10 Bermondsey St West Leederville WA 6007				Order No.: Report #: Phone: Fax:	573256 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Nov 20, 2017 11:47 AM Nov 27, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN ASS LAK 2225	E MACKAY			T UX.	00 0001 2000	Eurofins		ces Manager : Robert Johnston
	Sample D	etail		Acid Sulfate Soils Field pH Test					
Melbourne Labora	atory - NATA Site # 1254	& 14271							
	y - NATA Site # 18217								
Brisbane Laborat	ory - NATA Site # 20794								
Perth Laboratory	- NATA Site # 23736			Х					
10 TP6_2.0	Oct 26, 2017	Soil	P17-No21755	х					
11 T6_2.5	Oct 26, 2017	Soil	P17-No21756	Х					
12 T6_3.0	Oct 26, 2017	Soil	P17-No21757	X					
13 T6_3.5	Oct 26, 2017	Soil	P17-No21758	X					
14 T6_4.0	Oct 26, 2017	Soil	P17-No21759	X					
15 T20_0.03	Oct 30, 2017	Soil	P17-No21760	X					
16 T20_0.06	Oct 30, 2017	Soil	P17-No21761	X					
17 T20_0.5	Oct 30, 2017	Soil	P17-No21762	X					
18 T20_1.0	Oct 30, 2017	Soil	P17-No21763	X					
19         T20_1.5           20         T20_2.0	Oct 30, 2017 Oct 30, 2017	Soil Soil	P17-No21764 P17-No21765	X X					
		Soil		X					
21 T20_2.5	Oct 30, 2017	5011	P17-No21766	^					

🔅 euro		ngt	ABN– 50 005 e.mail : Envirc web : www.eu	Sales@e	urofins.com n.au	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271	Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone :+61 7 3902 460 NATA # 1261 Site # 207	
Company Name: Address:	360 Environmenta 10 Bermondsey Si West Leederville WA 6007	t			Order No.: Report #: Phone: Fax:	573256 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Nov 20, 2017 11:47 AM Nov 27, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN ASS LA 2225	KE MACKAY					Eurofins	mgt Analytical Servic	es Manager : Robert Johnston
	Sample	Detail		Acid Sulfate Soils Field pH Test					
Melbourne Laboratory		4 & 14271							
Sydney Laboratory - I									
	Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NA				Х					
	Oct 30, 2017	Soil	P17-No21767	X					
	Oct 30, 2017	Soil	P17-No21768	X					
	Oct 30, 2017	Soil	P17-No21769	X 24					
Test Counts				24					



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-No21746	CP	pH Units	7.5	7.6	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-No21746	CP	pH Units	6.5	6.3	pass	30%	Pass	
Reaction Ratings*	P17-No21746	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-No21756	CP	pH Units	7.6	7.7	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-No21756	CP	pH Units	7.0	7.1	pass	30%	Pass	
Reaction Ratings*	P17-No21756	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P17-No21766	CP	pH Units	7.8	7.8	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P17-No21766	CP	pH Units	7.3	7.2	pass	30%	Pass	
Reaction Ratings*	P17-No21766	CP	comment	2.0	2.0	pass	30%	Pass	



#### Comments

Comple Integrity

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

#### Comments

#### **Qualifier Codes/Comments**

Description

Code

Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

#### Authorised By

Robert Johnston

Analytical Services Manager



#### National Operations Manager

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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360 ENV	PP_0.02	PP_0.02B	PP_0.30	PP_2.0	PP_6.0	TP6_0.02	TP6_0.5	TP6_1.0	TP6_1.5
AGRIMIN ASS LAKE MACKAY (2225)	P17-No21	.7 P17-No21	7 P17-No217						
Acid Sulfate Soils Field pH Test									
pH-F (Field pH test)*	7.5	8.4	7.4	7.9	7.8	8.3	8.0	7.9	7.7
pH-FOX (Field pH Peroxide test)*	6.5	5.0	7.5	7.9	7.6	6.1	8.3	8.2	7.2
Reaction Ratings*	2.0	2.0	4.0	4.0	4.0	2.0	4.0	4.0	2.0

TP6_2.0	T6_2.5	T6_3.0	T6_3.5	T6_4.0	T20_0.03	T20_0.06	T20_0.5	T20_1.0	T20_1.5	T20_2.0	T20_2.5	T20_3.0	T20_3.5
P17-No21	.7 P17-No2	17 P17-No21	17 P17-No22	17 P17-No21	7 P17-No21	.7 P17-No21	7 P17-No21	.7 P17-No21	7 P17-No217				

7.7	7.6	7.7	7.8	7.8	8.2	7.6	7.8	7.5	7.6	7.9	7.8	7.7	7.8
7.1	7.0	7.1	7.1	7.2	5.1	7.4	8.7	8.0	6.9	8.3	7.3	6.9	6.9
2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0	2.0

T20_6.0	
P17-No21769	

7.6 6.8 2.0



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

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

web : www.eurofins.com.au

Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com

#### Sample Receipt Advice

Company name:	360 Environmental
Contact name: Project name: Project ID: COC number:	Julie Palich AGRIMIN ASS LAKE MACKAY 2225 2315-03 5 Day
Turn around time: Date/Time received: Eurofins   mgt reference:	5 Day Nov 20, 2017 11:47 AM <b>573256</b>

#### Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- Custody Seals intact (if used).

#### **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Julie Palich - juliepalich@360environmental.com.au.





38 Years of Environmental Analysis & Experience

360 ENV	PP_0.02	PP_0.02B	PP_0.30	PP_2.0	PP_6.0	TP6_0.02	TP6_0.5	TP6_1.0
AGRIMIN A	P17-No21	7 P17-No217	P17-No217	P17-No217	P17-No217	P17-No217	' P17-No217	P17-No217
Acid Sulfat	e Soils Field	pH Test						
pH-F (Field	7.5	8.4	7.4	7.9	7.8	8.3	8	7.9
pH-FOX (Fi	6.5	5	7.5	7.9	7.6	6.1	8.3	8.2
Reaction R	i 2	2	4	4	4	2	4	4

 TP6\_1.5
 TP6\_2.0
 T6\_2.5
 T6\_3.0
 T6\_3.5
 T6\_4.0
 T20\_0.03
 T20\_0.06
 T20\_0.5

 P17-No217
 <td

7.7	7.7	7.6	7.7	7.8	7.8	8.2	7.6	7.8
7.2	7.1	7	7.1	7.1	7.2	5.1	7.4	8.7
2	2	2	2	2	2	4	4	4

 T20\_1.0
 T20\_1.5
 T20\_2.0
 T20\_2.5
 T20\_3.0
 T20\_3.5
 T20\_6.0

 P17-No217 P17-N

7.5	7.6	7.9	7.8	7.7	7.8	7.6
8	6.9	8.3	7.3	6.9	6.9	6.8
4	4	4	2	2	2	2

Delivery Samples	n of Custo mples to: method: from: ports to:	Eurofi Unit 2 Courie 360 E 10 Be labres	ins MG 2, 91 Le er nvironi rmond sults@3	T each Hi menta sey Str 360env	l reet We vironm	est Lee ental.c	ale WA 6105 derville WA om.au ntal.com.au		Details v Lab quo		: ce:	Agrimin ASS Lake Mackay 2225 Gerry Bradley Julie Palich STD				COC Number: 2315-03			
lotes:	Please also send res	sults to Sa				ironme	ntal.com.au												
			Matr	ix/Con	tainer								Sample	Analysis					
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	pFox	CRS	M8, Fe, Al							
	PP_0.02								x	x									
	PP_0.02b								х	×									
	PP_0.30						3		x	x									
	PP_2.0								x	x									
	PP_6.0								х	x									
	TP6_0.02						26/10/2017		х	x									
	TP6_0.5						26/10/2017		x	x									
	TP6_1.0						26/10/2017		x	x									
	TP6_1.5						26/10/2017		x	x									
	TP6_2.0						26/10/2017		x	x									
	T6_2.5	6					26/10/2017		x	x									
	T6_3.0						26/10/2017		х	x									
	T6_3.5						26/10/2017		x	x									
	T6_4.0		-				26/10/2017		x	x									
	T20_0.03						30/10/2017		x	x									
	T20_0.06						30/10/2017		x	x									
	T20_0.5						30/10/2017		x	x									
	T20_1.0						30/10/2017		x	x									
	TP20_1.5						30/10/2017		x	x									
	TP20_2.0						30/10/2017		x	x									
	T20_2.5						30/10/2017		x	х									
	T20_3.0		4				30/10/2017		x	x						$\cap$			
	T20_3.5						30/10/2017		x	x						1/			
	T20_6.0						30/10/2017		x	x		,			1	V			-
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573256





#### Certificate of Analysis

360 Environmental 10 Bermondsey St West Leederville WA 6007 IBC-MRA

WORLD RECOGNISED

NATA Accredited Accreditation Number 1261 Site Number 23736

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

Attention:

Julie Palich

Report Project name Project ID Received Date **570737-S-V2** AGRIMIN ASS LAKE MACKAY 2225 Nov 02, 2017

Client Sample ID			T9_1.0	T9_6.0	Т9-0.5	T11_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02818	P17-No02819	P17-No02820	P17-No02821
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	33	35	74	88
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.4	8.4	8.1	7.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.016	0.006	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	10	4.0	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.9	2.1	2.6	0.38
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	570	410	520	77
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) $^{\rm S03}$	0.02	% S	0.91	0.66	0.83	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	28	23	28	15



Client Sample ID			T11_3.5	T11_4.5	T11_0.5	T11_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02822	P17-No02823	P17-No02824	P17-No02825
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit		•	•	•
Heavy Metals						
Aluminium	10	mg/kg	-	15000	-	4300
Arsenic	2	mg/kg	-	2.1	-	< 2
Cadmium	0.4	mg/kg	-	< 0.4	-	< 0.4
Chromium	5	mg/kg	-	18	-	7.7
Copper	5	mg/kg	-	11	-	< 5
Iron	20	mg/kg	-	17000	-	6400
Lead	5	mg/kg	-	9.3	-	< 5
Mercury	0.1	mg/kg	-	< 0.1	-	< 0.1
Nickel	5	mg/kg	-	7.8	-	< 5
Uranium	10	mg/kg	-	< 10	-	< 10
Zinc	5	mg/kg	-	21	-	14
Extraneous Material		-				
<2mm Fraction	0.005	g	57	53	57	-
>2mm Fraction	0.005	g	8.5	< 0.005	< 0.005	-
Analysed Material	0.1	%	87	100	100	-
Extraneous Material	0.1	%	13	< 0.1	< 0.1	-
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t		< 1	< 1	-
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	-
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	-
pH-KCL	0.1	pH Units	7.4	7.4	8.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	-
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	-
Chromium Reducible Sulfur -acidity units Sulfur - KCI Extractable	3 0.02	mol H+/t		< 3	< 3	-
HCI Extractable Sulfur	0.02	% S % S	n/a n/a	n/a n/a	n/a n/a	-
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	-
Acid Neutralising Capacity (ANCbt)	0.02	%CaCO3		0.65	1.9	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		130	380	-
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.16	0.21	0.60	_
ANC Fineness Factor		factor	1.5	1.5	1.5	_
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	_
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	-
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	<1	<1	-
% Moisture	1	%	23	25	23	22



Client Sample ID			T12_0.01	T12_0.45	T12_10	T12_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02826	P17-No02827	P17-No02828	P17-No02829
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit		•	•	•
Heavy Metals						
Aluminium	10	mg/kg	2700	-	-	7500
Arsenic	2	mg/kg	< 2	-	-	< 2
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	< 5	-	-	8.5
Copper	5	mg/kg	< 5	-	-	8.9
Iron	20	mg/kg	3500	-	-	8900
Lead	5	mg/kg	6.1	-	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	-	-	< 5
Uranium	10	mg/kg	< 10	-	-	< 10
Zinc	5	mg/kg	10	-	-	10
Extraneous Material						
<2mm Fraction	0.005	g	58	54	51	46
>2mm Fraction	0.005	g	< 0.005	0.40	7.0	8.5
Analysed Material	0.1	%	100	99	88	84
Extraneous Material	0.1	%	< 0.1	0.7	12	16
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units		8.4	6.9	7.3
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup> Acid Neutralising Capacity (ANCbt)	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt) Acid Neutralising Capacity - acidity (a-ANCbt)	0.01	%CaCO3 mol H+/t		2.2	0.49	0.32 63
Acid Neutralising Capacity - acidity (a-ANCDI) Acid Neutralising Capacity - equivalent S% pyrite (s-	<u> </u>		200	440	39	03
ACto Neutraining Capacity - equivalent 3% pyrite (s-	0.02	% S	0.40	0.71	0.16	0.10
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	22	23	20	20



Client Sample ID			T12_4.0	T12_5.0	T12_0.5	T12_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02830	P17-No02831	P17-No02832	P17-No02833
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit			•	•
Heavy Metals						
Aluminium	10	mg/kg	-	-	2600	-
Arsenic	2	mg/kg	-	-	< 2	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	< 5	-
Copper	5	mg/kg	-	-	< 5	-
Iron	20	mg/kg	-	-	3300	-
Lead	5	mg/kg	-	-	< 5	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	-	< 5	-
Uranium	10	mg/kg	-	-	< 10	-
Zinc	5	mg/kg	-	-	5.2	-
Extraneous Material						
<2mm Fraction	0.005	g	51	46	57	100
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	7.4
Analysed Material	0.1	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	6.9
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t		< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	7.5	7.7	8.3	6.9
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>504</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units Sulfur - KCI Extractable	<u>3</u> 0.02	mol H+/t		< 3	< 3	< 3
HCI Extractable Sulfur	0.02	% S % S	n/a n/a	n/a n/a	n/a n/a	n/a n/a
Net Acid soluble sulfur	0.02	% S	n/a			n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.02	%CaCO3		1.1	1.7	0.49
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		220	330	99
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.19	0.36	0.53	0.16
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	19	20	24	19



Client Sample ID			QC1
Sample Matrix			Soil
Eurofins   mgt Sample No.			P17-No02834
Date Sampled			Sep 27, 2017
Test/Reference	LOR	Unit	000 21, 2011
Heavy Metals	LOK	Unit	
Aluminium	10		2000
	10	mg/kg	3000
Arsenic Cadmium	2	mg/kg	< 2
	0.4	mg/kg	< 0.4 5.1
Chromium		mg/kg	
Copper	5	mg/kg	< 5
Iron .	20	mg/kg	3700
Lead	5	mg/kg	< 5
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
Zinc	5	mg/kg	5.8
Extraneous Material			
<2mm Fraction	0.005	g	46
>2mm Fraction	0.005	g	0.43
Analysed Material	0.1	%	99
Extraneous Material	0.1	%	0.9
Chromium Suite (Minus ANC- WA)			
Liming Rate Minus ANC	1	kg CaCO3/t	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02
pH-KCL	0.1	pH Units	9.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.008
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0
Sulfur - KCI Extractable	0.02	% S	n/a
HCI Extractable Sulfur	0.02	% S	n/a
Net Acid soluble sulfur	0.02	% S	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	6.0
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	1200
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	1.9
ANC Fineness Factor		factor	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1
	·		
% Moisture	1	%	24



## Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Dec 13, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 08, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Melbourne	Nov 02, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY						Order No.: Report #: Phone: Fax:				0		Received:       Nov 2, 2017 1:28 PM         37       Due:       Nov 9, 2017         388 8360       Priority:       5 Day         381 2360       Contact Name:       Sarah Breheny
	Project ID: 2225											Eurofins   mgt Analytical Services Manager : Robert Johnston
	Sample Detail					Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)	
Melk	bourne Laborato	ory - NATA Site	# 1254 & 142	271		х	х	х	х	х		
Syd	ney Laboratory	- NATA Site # 1	8217									
	bane Laborator								Х	х	Х	
	h Laboratory - N		736									_
	ernal Laboratory		_									_
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	T9_1.0	Sep 27, 2017		Soil	P17-No02818					х	Х	
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					х	Х	
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820					х	Х	
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					X	Х	
5	T11_3.5	Sep 27, 2017		Soil	P17-No02822					X	Х	—
6	T11_4.5	Sep 27, 2017		Soil	P17-No02823	Х	Х	X	Х		Х	
7	T11_0.5	Sep 27, 2017		Soil	P17-No02824					X	Х	
8	T11_1.0	Sep 27, 2017		Soil	P17-No02825	Х	Х	X	Х			_
9	T12_0.01	Sep 27, 2017		Soil	P17-No02826	Х	Х	Х	Х		Х	

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Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY				Order No Report # Phone: Fax:							Received:Nov 2, 2017 1:28 PMDue:Nov 9, 2017Priority:5 DayContact Name:Sarah Breheny			
Project ID:	2225										Eurofins   r	ngt Analytical Servic	es Manager : Robert Johnston	
	Sample Detail				Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)					
Melbourne Labora	atory - NATA Site # 1254	& 14271		Х	х	х	х	х						
Sydney Laborator	y - NATA Site # 18217													
Brisbane Laborate	ory - NATA Site # 20794						х	Х	Х					
	- NATA Site # 23736									1				
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827					х	Х	4				
11 T12_10	Sep 27, 2017	Soil	P17-No02828	<u> </u>	<u> </u>			Х	Х	4				
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х	4				
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830	<u> </u>				Х	Х	4				
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831					Х	Х	4				
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	Х	Х	Х	Х		Х	4				
16 T12_2.0	Sep 27, 2017	Soil	P17-No02833					X	X	4				
17 QC1	Sep 27, 2017	Soil	P17-No02834	Х	Х	Х	Х		Х	4				
Test Counts				6	6	6	17	17	16					



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	111			80-120	Pass	
Cadmium			%	111			80-120	Pass	
Chromium			%	114			80-120	Pass	
Copper			%	111			80-120	Pass	
Lead			%	113			80-120	Pass	
Mercury			%	110			75-125	Pass	
Nickel			%	110			80-120	Pass	
Zinc			%	109			80-120	Pass	
LCS - % Recovery							·		
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	95			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							-		
Heavy Metals				Result 1					
Arsenic	A17-No02337	NCP	%	111			75-125	Pass	
Cadmium	A17-No02337	NCP	%	114			75-125	Pass	
Chromium	A17-No02337	NCP	%	117			75-125	Pass	
Copper	A17-No02337	NCP	%	113			75-125	Pass	
Lead	A17-No02337	NCP	%	113			75-125	Pass	
Mercury	A17-No02337	NCP	%	104			70-130	Pass	
Nickel	A17-No02337	NCP	%	111			75-125	Pass	
Zinc	A17-No02337	NCP	%	113			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No02818	CP	kg CaCO3/t	1.0	1.0	7.0	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02818	СР	mol H+/t	10	11	7.0	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02818	СР	% S	0.02	0.02	7.0	30%	Pass	
pH-KCL	P17-No02818	CP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02818	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02818	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02818	CP	% S	0.016	0.017	7.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02818	CP	mol H+/t	10	11	7.0	30%	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate							-		
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
HCI Extractable Sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02818	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02818	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02818	CP	%CaCO3	2.9	2.8	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02818	СР	% S	0.91	0.91	<1	30%	Pass	
ANC Fineness Factor	P17-No02818	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02818	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02818	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02818	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate		<u> </u>	<u> </u>						
				Result 1	Result 2	RPD			
% Moisture	P17-No02818	CP	%	28	27	3.0	30%	Pass	
Duplicate			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		· -·	0.0			
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	A17-No02336	NCP	mg/kg	2.6	2.9	11	30%	Pass	
Cadmium	A17-No02336	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	A17-No02336	NCP	mg/kg	20	23	11	30%	Pass	
Copper	A17-No02336	NCP	mg/kg	11	13	19	30%	Pass	
	P17-No08098	NCP	mg/kg	250	280	19	30%	Pass	
Iron			~ ~ ~						
Lead	A17-No02336	NCP	mg/kg	7.3	7.9	7.0	30%	Pass	
Mercury	A17-No02336	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	A17-No02336	NCP	mg/kg	9.3	10	10	30%	Pass	
Zinc	A17-No02336	NCP	mg/kg	23	28	18	30%	Pass	
Duplicate					<b>D</b> 110			1	
Heavy Metals				Result 1	Result 2	RPD		_	
Aluminium	M17-No00637	NCP	mg/kg	5500	5800	5.0	30%	Pass	
Duplicate								1	
Chromium Suite (Minus ANC- WA)		1		Result 1	Result 2	RPD			
Liming Rate Minus ANC Net Acidity (Acidity Units) Minus	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
ANC	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus	P17-No02829	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No02829	CP	pH Units	7.3	7.3	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02829	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02829	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02829	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02829	СР	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02829	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02829	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02829	CP	%CaCO3	0.32	0.34	7.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02829	СР	% S	0.10	0.11	7.0	30%	Pass	
ANC Fineness Factor	P17-No02829	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02829	CP	% S	< 0.02	< 0.02	<1	30%	Pass	



Duplicate									
Chromium Suite (Minus ANC- WA)		Result 1	Result 2	RPD					
Net Acidity (Acidity Units)	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	



#### Comments

V2 - This report has been amended to include Uranium results

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

mgt

#### **Qualifier Codes/Comments**

#### Code Description

0000	Decemption
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

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#### Glenn Jackson National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please  $\underline{\text{click here.}}$ 

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NATA Accredited Accreditation Number 1261 Site Number 23736

NATA

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#### Certificate of Analysis

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

360 Environmental 10 Bermondsey St West Leederville WA 6007

Attention:

Sarah Breheny

Report Project name Project ID Received Date **570737-S** AGRIMIN ASS LAKE MACKAY 2225 Nov 02, 2017

Client Sample ID			T9_1.0	T9_6.0	T9-0.5	T11_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02818	P17-No02819	P17-No02820	P17-No02821
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	33	35	74	88
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	1.0	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	10	< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.1	pH Units	8.4	8.4	8.1	7.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.016	0.006	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	10	4.0	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	2.9	2.1	2.6	0.38
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	570	410	520	77
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.91	0.66	0.83	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	28	23	28	15



Client Sample ID			T11_3.5	T11_4.5	T11_0.5	T11_1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02822	P17-No02823	P17-No02824	P17-No02825
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Heavy Metals		1				
Aluminium	10	mg/kg	-	15000	-	4300
Arsenic	2	mg/kg	-	2.1	-	< 2
Cadmium	0.4	mg/kg	-	< 0.4	-	< 0.4
Chromium	5	mg/kg	-	18	-	7.7
Copper	5	mg/kg	-	11	-	< 5
Iron	20	mg/kg	-	17000	-	6400
Lead	5	mg/kg	-	9.3	-	< 5
Mercury	0.1	mg/kg	-	< 0.1	-	< 0.1
Nickel	5	mg/kg	-	7.8	-	< 5
Zinc	5	mg/kg	-	21	-	14
Extraneous Material						
<2mm Fraction	0.005	g	57	53	57	-
>2mm Fraction	0.005	g	8.5	< 0.005	< 0.005	-
Analysed Material	0.1	%	87	100	100	-
Extraneous Material	0.1	%	13	< 0.1	< 0.1	-
Chromium Suite (Minus ANC- WA)						
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	-
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	-
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	-
pH-KCL	0.1	pH Units	7.4	7.4	8.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	-
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	< 0.005	< 0.005	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	-
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	-
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	0.50	0.65	1.9	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	100	130	380	-
Acid Neutralising Capacity - equivalent S% pyrite (s- $\ensuremath{ANCbt}\xspace)^{\text{S03}}$	0.02	% S	0.16	0.21	0.60	-
ANC Fineness Factor		factor	1.5	1.5	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	-
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	-
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	-
-	·					
% Moisture	1	%	23	25	23	22



Client Sample ID			T12_0.01	T12_0.45	T12_10	T12_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02826	P17-No02827	P17-No02828	P17-No02829
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit			•	•
Heavy Metals						
Aluminium	10	mg/kg	2700	_	_	7500
Arsenic	2	mg/kg	< 2	-	_	< 2
Cadmium	0.4	mg/kg	< 0.4	_	-	< 0.4
Chromium	5	mg/kg	< 5	_	-	8.5
Copper	5	mg/kg	< 5	_	-	8.9
Iron	20	mg/kg	3500	-	-	8900
Lead	5	mg/kg	6.1	_	-	< 5
Mercury	0.1	mg/kg	< 0.1	-	-	< 0.1
Nickel	5	mg/kg	< 5	_	_	< 5
Zinc	5	mg/kg	10	_	_	10
Extraneous Material		,				
<pre></pre>	0.005	g	58	54	51	46
>2mm Fraction	0.005	g	< 0.005	0.40	7.0	8.5
Analysed Material	0.000	<u> </u>	100	99	88	84
Extraneous Material	0.1	%	< 0.1	0.7	12	16
Chromium Suite (Minus ANC- WA)	0.1	/0	< 0.1	0.7	12	10
Liming Rate Minus ANC	1	1	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	kg CaCO3/t mol H+/t		< 10	< 10	< 10
Net Acidity (Acidity Onits) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.02	pH Units		8.4	6.9	7.3
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.002	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3		2.2	0.49	0.32
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		440	99	63
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.40	0.71	0.16	0.10
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t		< 1	< 1	<1
	. ·	1.9 24000/1				
% Moisture	1	%	22	23	20	20



Client Sample ID			T12_4.0	T12_5.0	T12_0.5	T12_2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins   mgt Sample No.			P17-No02830	P17-No02831	P17-No02832	P17-No02833
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit				
Heavy Metals		1				
Aluminium	10	mg/kg	-	_	2600	_
Arsenic	2	mg/kg	-	-	< 2	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	< 5	-
Copper	5	mg/kg	-	-	< 5	-
Iron	20	mg/kg	-	-	3300	-
Lead	5	mg/kg	-	-	< 5	-
Mercury	0.1	mg/kg	-	-	< 0.1	-
Nickel	5	mg/kg	-	_	< 5	-
Zinc	5	mg/kg	-	_	5.2	-
Extraneous Material	<b>`</b>				0.2	
<pre></pre>	0.005	g	51	46	57	100
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	7.4
Analysed Material	0.000	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	6.9
Chromium Suite (Minus ANC- WA)	0.1	70	< 0.1	< 0.1	< 0.1	0.5
Liming Rate Minus ANC	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t		< 10	< 10	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
pH-KCL	0.02	pH Units	7.5	7.7	8.3	6.9
Acid trail - Titratable Actual Acidity	2	mol H+/t		< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S		< 0.02	< 0.02	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.002	% pyrite 3	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t		< 3	< 3	< 3
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t		n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3		1.1	1.7	0.49
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t		220	330	99
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) <sup>S03</sup>	0.02	% S	0.19	0.36	0.53	0.16
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t		< 10	< 10	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1	< 1	< 1	< 1
% Moisture	1	%	19	20	24	19



Client Sample ID			QC1
Sample Matrix			Soil
Eurofins   mgt Sample No.			P17-No02834
Date Sampled			Sep 27, 2017
		Linit	Sep 27, 2017
Test/Reference	LOR	Unit	
Heavy Metals	40		
Aluminium	10	mg/kg	3000
Arsenic	2	mg/kg	< 2
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	5.1
Copper	5	mg/kg	< 5
Iron	20	mg/kg	3700
Lead	5	mg/kg	< 5
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
	5	mg/kg	5.8
Extraneous Material		1	
<2mm Fraction	0.005	g	46
>2mm Fraction	0.005	g	0.43
Analysed Material	0.1	%	99
Extraneous Material	0.1	%	0.9
Chromium Suite (Minus ANC- WA)	1	1	
Liming Rate Minus ANC	1	kg CaCO3/t	< 1
Net Acidity (Acidity Units) Minus ANC	10	mol H+/t	< 10
Net Acidity (Sulfur Units) Minus ANC	0.02	% S	< 0.02
pH-KCL	0.1	pH Units	9.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02
Chromium Reducible Sulfur <sup>S04</sup>	0.005	% S	0.008
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0
Sulfur - KCI Extractable	0.02	% S	n/a
HCI Extractable Sulfur	0.02	% S	n/a
Net Acid soluble sulfur	0.02	% S	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a
Net Acid soluble sulfur - equivalent S% pyrite <sup>S02</sup>	0.02	% S	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	6.0
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	1200
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) $^{\rm S03}$	0.02	% S	1.9
ANC Fineness Factor		factor	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02
Net Acidity (Acidity Units)	10	mol H+/t	< 10
Liming Rate <sup>S01</sup>	1	kg CaCO3/t	< 1



#### Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Nov 08, 2017	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Metals M8	Melbourne	Nov 08, 2017	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Extraneous Material	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Nov 03, 2017	6 Week
- Method: LTM-GEN-7070			
% Moisture	Melbourne	Nov 02, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

	🔅 eur	ofins	mgt		ABN– 50 005 ( e.mail : Enviro web : www.eur	Sales@		s.com	2 0 P N	<b>leibourr</b> -5 Kings akleigh hone : - IATA # ite # 12	ston To VIC 3 +61 3 8 1261	Sydney         Brisbane           n Close         Unit F3, Building F         1/21 Smallwood           16         16 Mars Road         Murarrie QLD 41           64 5000         Lane Cove West NSW 2066         Phone : +61 7 33           Phone : +61 2 9900 8400         NATA # 1261 Site # 18217         NATA # 1261 Site # 18217	72 Kewdale WA 6105 102 4600 Phone : +61 8 9251 9600
Ac Pr	Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       West Leederville         WA 6007       WA 6007         Project Name:       AGRIMIN ASS LAKE MACKAY         Project ID:       2225				Order No.: Report #: Phone: Fax:			570737 08 9388 8360 08 9381 2360		8 8360     Priority:       2360     Contact Name	,		
												Eurofins   mgt Analytical S	Services Manager : Robert Johnston
		Sa	mple Detail			Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)		
Melt	bourne Laborate	ory - NATA Site	# 1254 & 142	271		х	Х	Х	Х	Х			
-	ney Laboratory					ļ							
	bane Laborator								Х	Х	Х		
	h Laboratory - I		736										
Exte No	ernal Laboratory Sample ID	Sample Date	Sampling	Matrix	LAB ID								
	•		Time										
1	T9_1.0	Sep 27, 2017		Soil	P17-No02818					Х	Х		
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					X	X		
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820					X	X		
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					X X	X		
5 6	T11_3.5 T11_4.5	Sep 27, 2017 Sep 27, 2017		Soil Soil	P17-No02822 P17-No02823	x	x	x	x	X	X X		
6 7	T11_4.5 T11_0.5	Sep 27, 2017 Sep 27, 2017		Soil	P17-No02823 P17-No02824	×	~	<u> </u>	~	x	X		
7 8	T11_0.5	Sep 27, 2017 Sep 27, 2017		Soil	P17-N002824 P17-No02825	x	x	x	x				
8 9	T12_0.01	Sep 27, 2017 Sep 27, 2017		Soil	P17-N002825 P17-No02826	X	X	X	X		x		
9	112_0.01	13ep 21, 2017			17-17-INUU2020	^	_ ^	_ ^	^	1			

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Company Name Address: Project Name:	10 Bermondsey St West Leederville WA 6007 AGRIMIN ASS LAK				Re	der N port a one: x:		0		7 8 8360 1 2360		Received: Due: Priority: Contact Name:	Nov 2, 2017 1:28 PM Nov 9, 2017 5 Day Sarah Breheny
Project ID:	2225										Eurofins   r	ngt Analytical Servic	ces Manager : Robert Johnston
	Sample I	Detail		Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)				
Melbourne Labora	atory - NATA Site # 1254	4 & 14271		Х	Х	Х	х	Х					
Sydney Laborator	y - NATA Site # 18217												
Brisbane Laborate	ory - NATA Site # 20794						х	Х	Х	1			
	- NATA Site # 23736									4			
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827	<u> </u>				Х	Х	4			
11 T12_10	Sep 27, 2017	Soil	P17-No02828					X	Х	4			
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х	4			
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830					X	Х	4			
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831					Х	X	4			
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	Х	Х	X	Х		X	4			
16 T12_2.0	Sep 27, 2017	Soil	P17-No02833					Х	X	4			
17 QC1	Sep 27, 2017	Soil	P17-No02834	X	Х	Х	Х		Х	-			
Test Counts				6	6	6	17	17	16				



#### Internal Quality Control Review and Glossary

#### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.

- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. This report replaces any interim results previously issued.

#### **Holding Times**

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

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

mg/L: milligrams per litre

NTU: Nephelometric Turbidity Units

ppm: Parts per million

%: Percentage

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

\*\*NOTE: pH duplicates are reported as a range NOT as RPD

#### Units

mg/kg: milligrams per kilogram ug/L: micrograms per litre ppb: Parts per billion org/100mL: Organisms per 100 millilitres MPN/100mL: Most Probable Number of organisms per 100 millilitres

#### Terms

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

#### **QC** - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

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



#### **Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Aluminium			mg/kg	< 10			10	Pass	
Arsenic			mg/kg	< 2			2	Pass	
Cadmium			mg/kg	< 0.4			0.4	Pass	
Chromium			mg/kg	< 5			5	Pass	
Copper			mg/kg	< 5			5	Pass	
Iron			mg/kg	< 20			20	Pass	
Lead			mg/kg	< 5			5	Pass	
Mercury			mg/kg	< 0.1			0.1	Pass	
Nickel			mg/kg	< 5			5	Pass	
Zinc			mg/kg	< 5			5	Pass	
LCS - % Recovery								-	
Heavy Metals									
Arsenic			%	111			80-120	Pass	
Cadmium			%	111			80-120	Pass	
Chromium			%	114			80-120	Pass	
Copper			%	111			80-120	Pass	
Lead			%	113			80-120	Pass	
Mercury			%	110			75-125	Pass	
Nickel			%	110			80-120	Pass	
Zinc			%	109			80-120	Pass	
LCS - % Recovery									
Chromium Suite (Minus ANC- WA)									
Chromium Reducible Sulfur			%	95			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	104			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	A17-No02337	NCP	%	111			75-125	Pass	
Cadmium	A17-No02337	NCP	%	114			75-125	Pass	
Chromium	A17-No02337	NCP	%	117			75-125	Pass	
Copper	A17-No02337	NCP	%	113			75-125	Pass	
Lead	A17-No02337	NCP	%	113			75-125	Pass	
Mercury	A17-No02337	NCP	%	104			70-130	Pass	
Nickel	A17-No02337	NCP	%	111			75-125	Pass	
Zinc	A17-No02337	NCP	%	113			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
Liming Rate Minus ANC	P17-No02818	CP	kg CaCO3/t	1.0	1.0	7.0	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02818	СР	mol H+/t	10	11	7.0	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02818	СР	% S	0.02	0.02	7.0	30%	Pass	
pH-KCL	P17-No02818	CP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02818	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02818	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02818	CP	% S	0.016	0.017	7.0	30%	Pass	
Chromium Reducible Sulfur -acidity							0.001		
units	P17-No02818	CP	mol H+/t	10	11	7.0	30%	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate		1					•		
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
HCI Extractable Sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity								_	
units	P17-No02818	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P17-No02818	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P17-No02818	CP	%CaCO3	2.9	2.8	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P17-No02818	СР	% S	0.91	0.91	<1	30%	Pass	
ANC Fineness Factor	P17-No02818	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02818	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02818	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Liming Rate	P17-No02818	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate	11111002010		Ng Ou000/1				0070	1 455	
Duphoate				Result 1	Result 2	RPD			
% Moisture	P17-No02818	СР	%	28	27	3.0	30%	Pass	
Duplicate	1111002010		/0	20		5.0	0070	1 435	
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	A17-No02336	NCP	mg/kg	2.4	2.6	11	30%	Pass	
	A17-No02336	NCP		< 0.4	< 0.4	<1	30%	Pass	
Cadmium		NCP	mg/kg	< 0.4 18	20	11	30%		
Chromium	A17-No02336		mg/kg					Pass	
Copper	A17-No02336	NCP	mg/kg	9.5	11	19	30%	Pass	
Lead	A17-No02336	NCP	mg/kg	6.6	7.1	7.0	30%	Pass	
Mercury	A17-No02336	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	A17-No02336	NCP	mg/kg	8.4	9.3	10	30%	Pass	
Zinc	A17-No02336	NCP	mg/kg	21	25	18	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD		_	
Aluminium	M17-No00637	NCP	mg/kg	5500	5800	5.0	30%	Pass	
Duplicate							1		
Chromium Suite (Minus ANC- WA)		1		Result 1	Result 2	RPD	-		
Liming Rate Minus ANC	P17-No02829	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Net Acidity (Acidity Units) Minus ANC	P17-No02829	СР	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acidity (Sulfur Units) Minus ANC	P17-No02829	СР	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P17-No02829	CP	pH Units	7.3	7.3	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P17-No02829	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P17-No02829	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Chromium Reducible Sulfur	P17-No02829	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P17-No02829	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
HCI Extractable Sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P17-No02829	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent									
S% pyrite	P17-No02829	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt) Acid Neutralising Capacity -	P17-No02829	CP	%CaCO3	0.32	0.34	7.0	30%	Pass	
equivalent S% pyrite (s-ANCbt)	P17-No02829	CP	% S	0.10	0.11	7.0	30%	Pass	
ANC Fineness Factor	P17-No02829	CP	factor	1.5	1.5	<1	30%	Pass	
Net Acidity (Sulfur Units)	P17-No02829	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acidity (Acidity Units)	P17-No02829	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
	P17-No02829	CP	kg CaCO3/t			<1	30%	Pass	



#### Comments

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

#### **Qualifier Codes/Comments**

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCI is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCI if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

#### Authorised By

Robert Johnston	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Bryan Wilson	Senior Analyst-Metal (QLD)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

Glenn Jackson National Operations Manager Final report - this Report replaces any previously issued Report - Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Ad Pro	mpany Name: dress: Dject Name: Dject ID:			Re	der N port i one: x:		0		9388 8360Priority:5 Day9381 2360Contact Name:Sarah Breheny				
			Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)		bn			
Melb	ourne Laborate	ory - NATA Site	# 1254 & 142	71		х	х	х	х	х			
		- NATA Site # 1											
		y - NATA Site #							х	Х	Х	x	
		NATA Site # 237											
Exte	rnal Laboratory	/											
No	Sample ID	LAB ID											
1	T9_1.0	Sep 27, 2017	Time	Soil	P17-No02818					X	х	x	
2	T9_6.0	Sep 27, 2017		Soil	P17-No02819					X	X		
3	T9-0.5	Sep 27, 2017		Soil	P17-No02820				1	X	X		
4	T11_1.5	Sep 27, 2017		Soil	P17-No02821					x	х		
5	 T11_3.5	Sep 27, 2017		Soil	P17-No02822					х	Х		
6	 T11_4.5	Sep 27, 2017		Soil	P17-No02823	х	Х	х	х		Х	x	
7	 T11_0.5	Sep 27, 2017		Soil	P17-No02824					Х	Х	x	
8	T11_1.0	Sep 27, 2017		Soil	P17-No02825	х	х	х	х				
9	T12_0.01	Sep 27, 2017		Soil	P17-No02826	х	Х	Х	Х		Х	x	

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Company Name: Address:	Address: 10 Bermondsey St West Leederville WA 6007 Project Name: AGRIMIN ASS LAKE MACKAY					der N port <del>i</del> one: x:		0		, 8 8360 1 2360		Received: Due: Priority: Contact Name:	Nov 2, 2017 1:28 PM Nov 9, 2017 5 Day Sarah Breheny
Project Name: Project ID:		KE MACKAY									Eurofins   r	ngt Analytical Servi	ces Manager : Robert Johnston
	Aluminium	Iron	Metals M8	Moisture Set	Moisture Set	Chromium Suite (Minus ANC- WA)							
Melbourne Laborato	ory - NATA Site # 12	54 & 14271		х	х	х	х	х					
	- NATA Site # 18217												
Brisbane Laborator	y - NATA Site # 2079	4					Х	х	Х				
Perth Laboratory - I	NATA Site # 23736	1											
10 T12_0.45	Sep 27, 2017	Soil	P17-No02827					х	х				
11 T12_10	Sep 27, 2017	Soil	P17-No02828					х	х				
12 T12_2.5	Sep 27, 2017	Soil	P17-No02829	Х	Х	Х	Х		Х				
13 T12_4.0	Sep 27, 2017	Soil	P17-No02830					X	Х				
14 T12_5.0	Sep 27, 2017	Soil	P17-No02831				~	Х	X				
15 T12_0.5	Sep 27, 2017	Soil	P17-No02832	X	Х	Х	Х		X				
16 T12_2.0	Sep 27, 2017 Sep 27, 2017	Soil Soil	P17-No02833 P17-No02834	x	х	х	x	X	X X				
17 QC1													



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

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

web : www.eurofins.com.au

Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com

# Sample Receipt Advice

Contact name:	Julie Palich
Project name:	AGRIMIN ASS LAKE MACKAY
Project ID:	2225
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 2, 2017 1:28 PM
Eurofins   mgt reference:	570737

360 Environmental

## Sample information

Company name:

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

## **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Julie Palich - juliepalich@360environmental.com.au.





38 Years of Environmental Analysis & Experience

# Robert Johnston

Subject: To:

Request for further analysis Enviro Sample WA

From: Sarah Breheny [mailto:SarahBreheny@360environmental.com.au] Sent: Thursday, 2 November 2017 1:28 PM Subject: Request for further analysis To: Enviro Sample WA Cc: Julie Palich

Hello,

Can you please undertake additional analysis for your job reference 568325. The new COC is attached. I have also attached the previous Summary for the same batch of samples for your reference.

Thank you

Sarah



a 10 Bermondsey Street West Leederville 6007 **Senior Environmental Scientist** PO Box 14 West Perth WA 6872 360 Environmental Ptv Ltd Sarah Breheny

t (+618) 9388 8360 f (+618) 9381 2360

e sarahbreheny@360environmental.com.au

w www.360environmental.com.au

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# **Chain of Custody Record**

Send samples to:	Eurofins MGT	Project name:	Agrimin ASS Lake Mackay	
	Unit 2, 91 Leach Highway Kewdale WA 6105	Project number:	2225	
Delivery method:	Courier	Name of samplers:	Gerry Bradley	
Samples from:	360 Environmental	Details verified by:	Julie Palich	environmental
	10 Bermondsey Street West Leederville WA	Lab quote reference:		and being substantial of start sectors in the sector being and
Send reports to:	labresults@360environmental.com.au	Turn around time:	Normal	
	juliepalich@360environmental.com.au			COC Number: 2315-03

Notes: Please also send results to Sarahbreheny@360environmental.com.au

Matrix/Container													Sample	Analysis				
Lab Reference	Sample Name	Soil (jar)	Soil (bag)	Water	Fibre Cement	Other	Date	рюн	pHf	рҒох	crs	M8, Fe, Al						1
	T9_1.0		X				27/09/2017				x							
	T9_2.0		X				27/09/2017											
	T9_2.5		X				27/09/2017									-		
	T9_3.5		X				27/09/2017											
	T9_4.6		X				27/09/2017									 		
	T9_5.0		X				27/09/2017									 		1
	T9_6.0		X				27/09/2017				x				1			
	T9-0.5		Х				27/09/2017				x							1
	T9-1.5		Х				27/09/2017											
	T11_1.5		Х				27/09/2017				x							
	T11_2.0		X				27/09/2017											
	T11_3.5		X				27/09/2017				x							-
	T11_4.5		X				27/09/2017				х	x						
	T11_6.0		X				27/09/2017											
	T11-0.5		X				27/09/2017				х						1	1
	T11-1.0		X				27/09/2017					х						
	T11-4.0		X				27/09/2017											
	T11-5.0		X				27/09/2017											
	T12_0.01		X				27/09/2017				х	X						
	T12_0.45		X				27/09/2017				х							
	T12_0.6		X				27/09/2017						P.					
	T12_1.5		X				27/09/2017											1
	T12_10		X				27/09/2017				x					1		
rint nam	t name): Sarah Brchany Signature: Date: 21 Time: 1-							Dpm		Received (print nam		*		Signature	e:	Date: Time:		
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# Chain of Custody Record

	In of Custo Imples to:		ins MO						Project	name:		Agrimin	ASS Lake	Mackay					
		Unit 2	2, 91 Le	each H	ighway	/ Kewc	lale WA 6105			number:		2225		macnay		(			
Deliver	y method:	Couri			• ,					f sampler:	5:	Gerry Br	adlev				36		
Sample	s from:	360 E	nviron	menta	1					verified by		Julie Pali				1			
						est Le	ederville WA			te referer		June Pan				e	nviror	nment	al
lend re	ports to:	labre:	sults@	360em	vironm	ental.	com.au			ound time		Normal						•	
	······································						ental.com.au					<u> </u>				COC	C Number	: 2315-03	
lotes:	Please also send re	esults to S				/ironm	ental.com.au												
			Matr	ix/Con	tainer	1	1			-,	,		Sample	e Analysis				· · ·	
Lab Reference	Sample Name	Soil (Jar)	Soil (bag)	Water	Fibre Cement	Other	Date	Hold	pHf	pFox	CRS	M8, Fe, Al		3					
	T12_2.5	<u> </u>	X		<u> </u>		27/09/2017	<u> </u>	<u> </u>			<u> </u>			<u> </u>				<u> </u>
	T12_4.0		X				27/09/2017				x								
	T12_4.5		X				27/09/2017				<u> </u>		<u> </u>						
	T12_5.0		X		ţ		27/09/2017				x	·   · ·	<u> </u>						·
	T12-0.5		X		1		27/09/2017				x	x							
	T12-1.0	-	X		<u> </u>		27/09/2017	<u> </u>		1		+							⊢.—
	T12-2.0		x	<u>├</u> ──			27/09/2017				x		i				+		
	T12-3.0		X	<b>†</b>			27/09/2017		<u> </u>						1				
	T12-3.5		x				27/09/2017												
	T12-6.0		X		·		27/09/2017											_	
	QC1		х				27/09/2017				x	x		-					+
	QC2		×				27/09/2017												
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	nquished by Signature: Date:							(print nan Deserved						-	Time:				
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				L			Line.			Decore use	114J.	-		1			Time:		

360 ENV	T9_1.0	T9_2.0	T9_2.5	T9_3.0	T9_3.5	T9_4.0	T9_4.5	T9_5.0	T9_6.0
AGRIMIN ASS LAKE MACKAY (2225)	P17-Oc21	1 P17-Oc21	L1 P17-Oc21	1 P17-Oc21	.1 P17-Oc211				
Acid Sulfate Soils Field pH Test									
pH-F (Field pH test)*	7.6	7.9	7.8	7.9	7.8	7.9	7.9	7.8	8.0
pH-FOX (Field pH Peroxide test)*	6.6	7.4	7.4	7.6	7.2	7.7	7.9	7.4	7.5
Reaction Ratings*	2.0	4.0	4.0	4.0	2.0	4.0	4.0	4.0	4.0

Т9_0.5	T9_1.5	T11_1.5	T11_2.0	T11_3.5	T11_4.5	T11_6.0	T11_0.5	T11_1.0	T11_4.0	T11_5.0	T12_0.01	T12_0.45	T12_0.6	
P17-Oc21	.1 P17-Oc21	L1 P17-Oc21	1 P17-Oc212	1 P17-Oc21	L P17-Oc211									

7.7	7.7	7.5	7.3	7.3	7.5	7.6	8.0	7.8	7.5	7.4	7.8	8.0	7.9
6.9	7.0	6.6	6.9	6.5	7.1	7.2	7.0	7.0	7.6	7.6	6.8	7.1	6.9
4.0	4.0	3.0	4.0	4.0	4.0	4.0	2.0	2.0	4.0	4.0	4.0	3.0	3.0

T12_10	.0 T12_2.5	T12_4.0	) T12_4.5	T12_5.0	T12_0.5	5 T12_1.0	T12_2.0	T12_3.0	T12_3.5	T12_6.0	QC1	QC2	T12_1.5
P17-Oc	211 P17-Oc2	11 P17-Oc2	211 P17-Oc2	11 P17-Oc2	11 P17-Oc	211 P17-Oc2	11 P17-Oc	211 P17-Oc	211 P17-Oc212				
7.1	7.4	7.3	7.5	7.6	7.9	7.3	7.0	7.2	7.2	7.6	7.9	7.4	7.0
6.5	6.6	6.4	7.9	7.4	6.9	7.3	6.3	6.6	7.2	7.0	6.6	6.0	6.5
3.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0

	🔅 eur	ofins	mgt		ABN– 50 005 ( e.mail : Enviros web : www.eur	Sales@e	2 C F eurofins.com	<b>felbourne</b> -5 Kingston Town Close Jakleigh VIC 3166 hone : +61 3 8564 5000 IATA # 1261 ite # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 4 NATA # 1261 Site # 23736
	ompany Name: Idress:	360 Environr 10 Bermonds West Leeder	sey St				Order No.: Report #: Phone:	568325 08 9388 8360		Received: Due: Priority:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day
	oject Name: oject ID:	WA 6007 AGRIMIN AS 2225	SS LAKE MAC	KAY			Fax:	08 9381 2360		Contact Name: ngt Analytical Service	Julie Palich s Manager : Robert Johnston
		Sa	mple Detail			Acid Sulfate Soils Field pH Test					
Melt	ourne Laborato	orv - NATA Site	# 1254 & 142	71							
	ney Laboratory										
	bane Laborator										
Pert	h Laboratory - N	NATA Site # 237	736			х					
Exte	rnal Laboratory	1									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	T9_1.0	Sep 27, 2017		Soil	P17-Oc21153	х					
2	T9_2.0	Sep 27, 2017		Soil	P17-Oc21154	х					
3	 T9_2.5	Sep 27, 2017		Soil	P17-Oc21155	х					
4	T9_3.0	Sep 27, 2017		Soil	P17-Oc21156	х					
5	T9_3.5	Sep 27, 2017		Soil	P17-Oc21157	х					
6	T9_4.0	Sep 27, 2017		Soil	P17-Oc21158	х					
7	T9_4.6	Sep 27, 2017		Soil	P17-Oc21159	х					
8	T9_5.0	Sep 27, 2017		Soil	P17-Oc21160	х					
9	T9_6.0	Sep 27, 2017		Soil	P17-Oc21161	х					

e.mail : Er	005 085 521 viroSales@e v.eurofins.con	urofins.com	<b>Melbourne</b> 2-5 Kingston Town Close Jakleigh VIC 3166 Phone : +61 3 8564 5000 VATA # 1261 Site # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	<b>Perth</b> 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 4 NATA # 1261 Site # 23736
Company Name:       360 Environmental         Address:       10 Bermondsey St         West Leederville       WA 6007		Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Due: Priority:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
Project Name:AGRIMIN ASS LAKE MACKAYProject ID:2225						es Manager : Robert Johnston
Sample Detail	Acid Sulfate Soils Field pH Test					
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736	Х					
10         T9_0.5         Sep 27, 2017         Soil         P17-Oc2116						
11         T9_1.5         Sep 27, 2017         Soil         P17-Oc2116						
12 T11_1.5 Sep 27, 2017 Soil P17-Oc2116						
13         T11_2.0         Sep 27, 2017         Soil         P17-Oc2116						
14         T11_3.5         Sep 27, 2017         Soil         P17-Oc2116           45         T14_45         0         07         0.11         0.11         0.11						
15         T11_4.5         Sep 27, 2017         Soil         P17-Oc2116           40         T44         0						
16         T11_6.0         Sep 27, 2017         Soil         P17-Oc2116           17         T11_0.5         Sep 27, 2017         Soil         P17-Oc2116						
17         111_0.5         Sep 27, 2017         Soil         P17-Oc2116           18         T11_1.0         Sep 27, 2017         Soil         P17-Oc2117						
18         111_1.0         Sep 27, 2017         Soil         P17-0c2117           19         T11_4.0         Sep 27, 2017         Soil         P17-0c2117	-					
19         111_4.0         Sep 27, 2017         Soil         P17-0c2117           20         T11_5.0         Sep 27, 2017         Soil         P17-0c2117	-					
21 T12_0.01 Sep 27, 2017 Soil P17-0c2117						
	<u> </u>					

	🔅 eur	ofins	mgt	ABN– 50 005 e.mail : Enviro web : www.eur	Sales@e	2 C P eurofins.com N	lelbourne -5 Kingston Town Close takleigh VIC 3166 hone : +61 3 8564 5000 ATA # 1261 ite # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	<b>Brisbane</b> 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 460 NATA # 1261 Site # 207	Perth 2/91 Leach Highway Kewdale WA 6105 0 Phone : +61 8 9251 9600 94 NATA # 1261 Site # 23736
	mpany Name: dress:	360 Environm 10 Bermonds West Leederv WA 6007	ey St			Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
	oject Name: oject ID:	AGRIMIN AS 2225	S LAKE MACKAY					Eurofins   r	ngt Analytical Servic	es Manager : Robert Johnston
Sample Detail					Acid Sulfate Soils Field pH Test					
Melb	ourne Laborato	ory - NATA Site	# 1254 & 14271							
		- NATA Site # 18								
Bris	oane Laborator	y - NATA Site # 2	20794							
Pert		NATA Site # 237			х					
22	T12_0.45	Sep 27, 2017	Soil	P17-Oc21174	Х					
23	T12_0.6	Sep 27, 2017	Soil	P17-Oc21175	X					
24	T12_10.0	Sep 27, 2017	Soil	P17-Oc21177	X					
25	T12_2.5	Sep 27, 2017	Soil	P17-Oc21178	X					
26 27	T12_4.0 T12_4.5	Sep 27, 2017 Sep 27, 2017	Soil Soil	P17-Oc21179 P17-Oc21180	X X					
27	T12_4.5 T12_5.0	Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21180 P17-Oc21181	X					
	T12_5.0 T12_0.5	Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21181	X					
120	112_0.5	Sep 27, 2017 Sep 27, 2017	Soil	P17-Oc21183	X					
29 30	T12 1 0		0001	1111 0021100						
30	T12_1.0 T12_2.0		Soil	P17-Oc21184	Х					
	T12_1.0 T12_2.0 T12_3.0	Sep 27, 2017 Sep 27, 2017 Sep 27, 2017	Soil Soil	P17-Oc21184 P17-Oc21185	X X					

🔅 eur	ofins	mgt		ABN- 50 005 ( e.mail : Enviro web : www.eur	Sales@e	urofins.com n.au	Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone: -+61 3 8564 5000 NATA # 1261 Site # 1254 & 14271	<b>Sydney</b> Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1261 Site # 18217	Brisbane 1/21 Smallwood Place Murarie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 2079	Perth 2/91 Leach Highway Kewdale WA 6105 0 Phone : +61 8 9251 9600 94 NATA # 1261 Site # 23736
Company Name: Address:	360 Environm 10 Bermonds West Leederv WA 6007	ey St ville				Order No.: Report #: Phone: Fax:	568325 08 9388 8360 08 9381 2360		Received: Due: Priority: Contact Name:	Oct 18, 2017 5:32 PM Oct 26, 2017 5 Day Julie Palich
Project Name: Project ID:	AGRIMIN AS 2225	S LAKE MACK	(AY					Eurofine	mat Analytical Servic	es Manager : Robert Johnston
		nple Detail			Acid Sulfate Soils Field pH Test					
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794 Perth Laboratory - NATA Site # 23736										
			Coil	D17 0c01407	X X					
34 T12_6.0 35 QC1	Sep 27, 2017		Soil Soil	P17-Oc21187	X X					
	Sep 27, 2017 Sep 27, 2017		Soil	P17-Oc21188 P17-Oc21189	X					
	Sep 27, 2017 Sep 27, 2017		Soil	P17-0c21189 P17-0c21278	X					
37 T12_1.5	37         112_1.5         Sep 21, 2017         Soli         P17-0621278           Test Counts         Soli         P17-0621278         Soli         P17-0621278									



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271

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

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

web : www.eurofins.com.au

Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736

ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com

# Sample Receipt Advice

Company name:	360 Environmental
Contact name:	Julie Palich
Project name:	AGRIMIN ASS LAKE MACKAY
Project ID:	2225
COC number:	2315-01
Turn around time:	5 Day
Date/Time received:	Oct 18, 2017 5:32 PM
Eurofins   mgt reference:	568325

## Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

## **Contact notes**

If you have any questions with respect to these samples please contact:

Robert Johnston on Phone : or by e.mail: RobertJohnston@eurofins.com

Results will be delivered electronically via e.mail to Julie Palich - juliepalich@360environmental.com.au.





38 Years of Environmental Analysis & Experience



# **MINERALS TEST REPORT**

~	ICNIT	
~		

CLIENT	AGRIMIN LIMITED						
	PO Box Z5108						
	St Georges Terrace						
	PERTH, W.A. 6831						
	AUSTRALIA						
JOB INFORMATION	JOB CODE	: 1978.0/1716829					
	NO. SAMPLES	: 8					
	NO. ELEMENTS	: 10					
	CLIENT ORDER NO.	: Q160317V2 (Job 1 of 1)					
	SAMPLE SUBMISSION NO.	:					
	PROJECT	: MACKAY PROJECT					
	SAMPLE TYPE	: Solutions					

: 10/11/2017

: 27/11/2017

: 27/11/2017

#### **REPORT NOTES**

#### **TESTED BY**

Intertek 15 Davison Street, Maddington 6109, Western Australia PO Box 144, Gosnells 6990, Western Australia Tel: +61 8 9251 8100 Email: min.aus.per@intertek.com

DATE RECEIVED

DATE REPORTED

DATE PRINTED

This report relates specifically to the sample(s) tested that were drawn and/or provided by the client or their nominated third party to Intertek. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report. The results provided are not intended for commercial settlement purposes.

Except where explicitly agreed in writing, all work and services performed by Intertek is subject to our standard Terms and Conditions which can be obtained at our website: intertek.com/terms/



#### SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

#### SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at \$150.00 per m3.

Samples received as liquids, waters or solutions will be held for 60 days free of charge then disposed of, unless written advice for return or collection is received.

LEGEND	Х	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	*	= Result Checked	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis		

ELEMENTS	Ca	Cl	EC	к	Mg	Na	S	SO4	SG	TDSEva
UNITS	mg/l	g/l	mS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	NONE	g/Kg
DETECTION LIMIT	1	0.02	0.01	2	1	2	1	3	0.001	0.02
DIGEST	T	0.02	0.01	2	T	2	T	J	SGL/	0.02
ANALYTICAL FINISH	/OE	/COL	/MTR	/OE	/OE	/OE	/OE	/CALC	GR	/GR
SAMPLE NUMBERS	70L	7001		70L	70L	70L	70L	/CALC	GN	/GR
0001 TRENCH 14 (23.11.17)	381	170.16	>200.00	3626	3468	109143	7637	22878	1.198	265.18
. ,	352									
0002 TRENCH 14 (31.10.17)		174.59	>200.00	3634	3456	109436	7869	23575	1.203	271.65
0003 TRENCH 14 (06.11.17)	401	173.71	>200.00	3782	3609	112618	7726	23146	1.216	267.61
0004 TRENCH 22 (23.11.17)	661	120.53	>200.00	2907	1884	76592	6197	18564	1.153	198.25
0005 TRENCH 22 (31.10.17)	693	116.10	>200.00	2970	1932	78947	6088	18237	1.157	199.17
0006 TRENCH 22 (06.11.17)	686	120.53	>200.00	3103	2008	82167	6259	18750	1.151	202.46
0007 TRENCH 05 (31.10.17)	403	171.93	>200.00	3922	3570	113511	7825	23441	1.204	265.62
0008 TRENCH 05 (06.11.17)	395	166.62	>200.00	3805	3469	110441	7935	23772	1.200	262.39
CHECKS										
0001 TRENCH 22 (23.11.17)									1.149	196.90
0002 TRENCH 22 (23.11.17)	692	118.76	>200.00	2794	1925	74718	6094	18256		
STANDARDS										
0001 GLS-Brine1		116.10								
0002 GLS-Brine1										202.05
0003 UNI 1	24			28	25	28	26	76		
BLANKS										
0001 Control Blank										Х
0002 Control Blank	х			х	5	х	х	х		



Method Code	Analysing Laboratory
/CALC	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.
/COL	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.
/GR	Intertek Genalysis Perth
	Analysed by Gravimetric Technique.
/MTR	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Analysed with Electronic Meter Measurement
/OE	Intertek Genalysis Perth
	Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
SGL/GR	Intertek Genalysis Perth
	Specific Gravity Liquid Samples. Gravimetric Technique



CLIENT	AGRIMIN LIMITED	
	PO Box Z5108	
	St Georges Terrace	
	PERTH, W.A. 6831	
	AUSTRALIA	
JOB INFORMATION	JOB CODE	: 1978.0/1715406
	NO. SAMPLES	: 7
	NO. ELEMENTS	: 9
	CLIENT ORDER NO.	: N. MILES (Job 1 of 0)
	SAMPLE SUBMISSION NO.	:
	PROJECT	: MACKAY PROJECT
	SAMPLE TYPE	: Solutions
	DATE RECEIVED	: 18/10/2017

: 31/10/2017

: 31/10/2017

#### **REPORT NOTES**

#### **TESTED BY**

Intertek 15 Davison Street, Maddington 6109, Western Australia PO Box 144, Gosnells 6990, Western Australia Tel: +61 8 9251 8100 Email: min.aus.per@intertek.com

DATE REPORTED

DATE PRINTED

This report relates specifically to the sample(s) tested that were drawn and/or provided by the client or their nominated third party to Intertek. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report. The results provided are not intended for commercial settlement purposes.



It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

#### SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at \$150.00 per m3.

LEGEND	Х	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	*	= Result Checked	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis		



ELEMENTS	Ca	Cl	К	Mg	Na	S
UNITS	mg/l	g/l	mg/l	mg/l	mg/l	mg/l
DETECTION LIMIT	1	0.01	2	1	2	5
DIGEST						
ANALYTICAL FINISH	/OE	/COL	/OE	/OE	/OE	/OE
SAMPLE NUMBERS						
0001 TRENCH T16 05/09/17	467	166.51	3631	2848	109802	4806
0002 TRENCH T16 30/09/17	458	169.19	3624	2883	111226	5922
0003 TRENCH T14 30/09/17	465	165.61	3646	3688	110859	7333
0004 TRENCH T14 07/10/17	466	168.30	3635	3678	111131	6906
0005 PILOT POND PP#1 02/10/17	413	150.39	3434	5411	97631	7275
0006 PILOT POND PP#2 02/10/17	271	141.44	2725	9045	84169	6114
0007 PILOT POND PP#3 02/10/17	281	143.23	2808	7594	87700	6000
CHECKS						
0001 PILOT POND PP#1 02/10/17						
0002 TRENCH T14 30/09/17	484	166.51	3775	3762	114240	7466
STANDARDS						
0001 SQD-1		116.38				
0002 SQD-1						
BLANKS						
0001 Control Blank	Х	Х	Х	Х	Х	Х

ELEMENTS	SO4	SG	TDSEva	
-				
UNITS	mg/l	NONE	g/Kg	
DETECTION LIMIT	15	0.001	0.02	
DIGEST		SGL/		
ANALYTICAL FINISH	/CALC	GR	/GR	
SAMPLE NUMBERS				
0001 TRENCH T16 05/09/17	14399	1.196	251.18	
0002 TRENCH T16 30/09/17	17742	1.195	257.19	
0003 TRENCH T14 30/09/17	21967	1.201	256.47	
0004 TRENCH T14 07/10/17	20688	1.198	257.05	
0005 PILOT POND PP#1 02/10/17	21793	1.185	235.15	
0006 PILOT POND PP#2 02/10/17	18316	1.168	229.02	
0007 PILOT POND PP#3 02/10/17	17973	1.177	228.54	
CHECKS				
0001 PILOT POND PP#1 02/10/17		1.186	235.09	
0002 TRENCH T14 30/09/17	22367			
STANDARDS				
0001 SQD-1				
0002 SQD-1			208.22	
BLANKS				
0001 Control Blank	Х			



Method Code	Analysing Laboratory
/CALC	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.
/COL	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.
/GR	Intertek Genalysis Perth
	Analysed by Gravimetric Technique.
/OE	Intertek Genalysis Perth
	Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
SGL/GR	Intertek Genalysis Perth
	Specific Gravity Liquid Samples. Gravimetric Technique



CLIENT	AGRIMIN LIMITED	
	PO Box Z5108	
	St Georges Terrace	
	PERTH, W.A. 6831	
	AUSTRALIA	
JOB INFORMATION	JOB CODE	: 1978.0/1715406
	NO. SAMPLES	: 7
	NO. ELEMENTS	: 9
	CLIENT ORDER NO.	: N. MILES (Job 1 of 0)
	SAMPLE SUBMISSION NO.	:
	PROJECT	: MACKAY PROJECT
	SAMPLE TYPE	: Solutions
	DATE RECEIVED	: 18/10/2017

: 31/10/2017

: 31/10/2017

#### **REPORT NOTES**

#### **TESTED BY**

Intertek 15 Davison Street, Maddington 6109, Western Australia PO Box 144, Gosnells 6990, Western Australia Tel: +61 8 9251 8100 Email: min.aus.per@intertek.com

DATE REPORTED

DATE PRINTED

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#### SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at \$150.00 per m3.

LEGEND	Х	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	*	= Result Checked	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis		



ELEMENTS	Ca	Cl	К	Mg	Na	S
UNITS	mg/l	g/l	mg/l	mg/l	mg/l	mg/l
DETECTION LIMIT	1	0.01	2	1	2	5
DIGEST						
ANALYTICAL FINISH	/OE	/COL	/OE	/OE	/OE	/OE
SAMPLE NUMBERS						
0001 TRENCH T16 05/09/17	467	166.51	3631	2848	109802	4806
0002 TRENCH T16 30/09/17	458	169.19	3624	2883	111226	5922
0003 TRENCH T14 30/09/17	465	165.61	3646	3688	110859	7333
0004 TRENCH T14 07/10/17	466	168.30	3635	3678	111131	6906
0005 PILOT POND PP#1 02/10/17	413	150.39	3434	5411	97631	7275
0006 PILOT POND PP#2 02/10/17	271	141.44	2725	9045	84169	6114
0007 PILOT POND PP#3 02/10/17	281	143.23	2808	7594	87700	6000
CHECKS						
0001 PILOT POND PP#1 02/10/17						
0002 TRENCH T14 30/09/17	484	166.51	3775	3762	114240	7466
STANDARDS						
0001 SQD-1		116.38				
0002 SQD-1						
BLANKS						
0001 Control Blank	Х	Х	Х	Х	Х	Х

ELEMENTS	SO4	SG	TDSEva	
-				
UNITS	mg/l	NONE	g/Kg	
DETECTION LIMIT	15	0.001	0.02	
DIGEST		SGL/		
ANALYTICAL FINISH	/CALC	GR	/GR	
SAMPLE NUMBERS				
0001 TRENCH T16 05/09/17	14399	1.196	251.18	
0002 TRENCH T16 30/09/17	17742	1.195	257.19	
0003 TRENCH T14 30/09/17	21967	1.201	256.47	
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0006 PILOT POND PP#2 02/10/17	18316	1.168	229.02	
0007 PILOT POND PP#3 02/10/17	17973	1.177	228.54	
CHECKS				
0001 PILOT POND PP#1 02/10/17		1.186	235.09	
0002 TRENCH T14 30/09/17	22367			
STANDARDS				
0001 SQD-1				
0002 SQD-1			208.22	
BLANKS				
0001 Control Blank	Х			



Method Code	Analysing Laboratory
/CALC	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.
/COL	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.
/GR	Intertek Genalysis Perth
	Analysed by Gravimetric Technique.
/OE	Intertek Genalysis Perth
	Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
SGL/GR	Intertek Genalysis Perth
	Specific Gravity Liquid Samples. Gravimetric Technique



CLIENT

AGRIMIN LIMITED PO Box Z5108 St Georges Terrace PERTH, W.A. 6831 AUSTRALIA

#### JOB IN

NFORMATION	JOB CODE	: 1978.0/1713989
	NO. SAMPLES	: 11
	NO. ELEMENTS	: 9
	CLIENT ORDER NO.	: T. LYONS (Job 1 of 0)
	SAMPLE SUBMISSION NO.	:
	PROJECT	: MACKAY PROJECT
	DATE RECEIVED	: 22/09/2017
	DATE REPORTED	: 16/10/2017
	DATE PRINTED	: 16/10/2017

#### **REPORT NOTES**

#### **TESTED BY**

Intertek 15 Davison Street, Maddington 6109, Western Australia PO Box 144, Gosnells 6990, Western Australia Tel: +61 8 9251 8100 Email: min.aus.per@intertek.com

This report relates specifically to the sample(s) tested that were drawn and/or provided by the client or their nominated third party to Intertek. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report. The results provided are not intended for commercial settlement purposes.



It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

#### SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will be charged at cost. Current disposal cost is charged at \$150.00 per m3.

LEGEND	Х	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	*	= Result Checked	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis		

ELEMENTSCaClKMgUNITSmg/lg/lmg/lmg/lmg/lDETECTION LIMIT10.221DIGEST/OE/COL/OE/OEANALYTICAL FINISH/OE/COL/OE/OESAMPLE NUMBERS0001 MWP1 27/08/177155.81522320002 MWP2 27/08/17502.81271420003 MWP3 44M AIRLIFT 27/08/1746456.68666620004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.9399834080008 TRENCH14 16/08/17462162.338093358		
DETECTION LIMIT       1       0.2       2       1         DIGEST       /OE       /COL       /OE       /OE         ANALYTICAL FINISH       /OE       /COL       /OE       /OE         SAMPLE NUMBERS       715       5.8       152       232         0001 MWP1 27/08/17       715       5.8       152       232         0002 MWP2 27/08/17       50       2.8       127       142         0003 MWP3 44M AIRLIFT 27/08/17       464       56.6       866       662         0004 MWP5 1/09/17       941       23.9       397       442         0005 MWP6 4/09/17       325       9.2       266       260         0006 TRENCH2 4/09/17       358       174.8       3920       3496         0007 TRENCH5 4/09/17       444       164.9       3988       3408	mg/l	mg/l
ANALYTICAL FINISH       /OE       /COL       /OE       /OE         SAMPLE NUMBERS       715       5.8       152       232         0001 MWP1 27/08/17       50       2.8       127       142         0003 MWP3 44M AIRLIFT 27/08/17       464       56.6       866       662         0004 MWP5 1/09/17       941       23.9       397       442         0005 MWP6 4/09/17       325       9.2       266       260         0006 TRENCH2 4/09/17       358       174.8       3920       3496         0007 TRENCH5 4/09/17       444       164.9       3998       3408	2	5
SAMPLE NUMBERS0001 MWP1 27/08/177155.81522320002 MWP2 27/08/17502.81271420003 MWP3 44M AIRLIFT 27/08/1746456.68666620004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939883408		
0001 MWP1 27/08/177155.81522320002 MWP2 27/08/17502.81271420003 MWP3 44M AIRLIFT 27/08/1746456.68666620004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408	/OE	/OE
0002 MWP2 27/08/17502.81271420003 MWP3 44M AIRLIFT 27/08/1746456.68666620004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408		
0003 MWP3 44M AIRLIFT 27/08/1746456.68666620004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408	4601	1116
0004 MWP5 1/09/1794123.93974420005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408	2697	520
0005 MWP6 4/09/173259.22662600006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408	42068	2626
0006 TRENCH2 4/09/17358174.8392034960007 TRENCH5 4/09/17444164.939983408	17443	2059
0007 TRENCH5 4/09/17 444 164.9 3998 3408	6821	640
	120048	8028
0008 TRENCH14 16/08/17         462         162.3         3809         3358	114494	7612
	113246	7218
0009 TRENCH14 2/09/17         463         164.1         3815         3408	113415	7345
0010 TRENCH16 16/08/17 455 163.2 3763 2578	113354	7433
0011 TRENCH16 2/09/17 412 169.4 3793 2618	116455	7646
CHECKS		
0001 MWP3 44M AIRLIFT 27/08/17		
0002 MWP6 4/09/17 328 8.7 270 257	6454	649
STANDARDS		
0001 SQD-1 117.7		
BLANKS		
0001 Control Blank		
0002 Control Blank X X 13 X	5	х

ELEMENTS	SO4	SG	TDSEva	
UNITS	mg/l	NONE	mg/Kg	
DETECTION LIMIT	15	0.001	20	
DIGEST		SGL/		
ANALYTICAL FINISH	/CALC	GR	/GR	
SAMPLE NUMBERS				
0001 MWP1 27/08/17	3345	1.012	14896	
0002 MWP2 27/08/17	1559	1.004	7289	
0003 MWP3 44M AIRLIFT 27/08/17	7866	1.073	97766	
0004 MWP5 1/09/17	6169	1.035	46518	
0005 MWP6 4/09/17	1916	1.014	15599	
0006 TRENCH2 4/09/17	24051	1.215	271759	
0007 TRENCH5 4/09/17	22804	1.202	256639	
0008 TRENCH14 16/08/17	21623	1.199	254936	
0009 TRENCH14 2/09/17	22003	1.199	255063	
0010 TRENCH16 16/08/17	22269	1.195	254661	
0011 TRENCH16 2/09/17	22907	1.206	264820	
CHECKS				
0001 MWP3 44M AIRLIFT 27/08/17		1.069	97778	
0002 MWP6 4/09/17	1944			
STANDARDS				
0001 SQD-1				
BLANKS				
0001 Control Blank		0.999	27	
0002 Control Blank	х			



Method Code	Analysing Laboratory				
/CALC	Intertek Genalysis Perth				
	No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.				
/COL	Intertek Genalysis Perth				
	No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.				
/GR	Intertek Genalysis Perth				
	Analysed by Gravimetric Technique.				
/OE	Intertek Genalysis Perth				
	Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.				
SGL/GR	Intertek Genalysis Perth				
	Specific Gravity Liquid Samples. Gravimetric Technique				



CLIENT

AGRIMIN LIMITED PO Box Z5108 St Georges Terrace PERTH, W.A. 6831 AUSTRALIA

### JOB INF

FORMATION	JOB CODE	: 1978.0/1711886
	NO. SAMPLES	: 2
	NO. ELEMENTS	: 10
	CLIENT ORDER NO.	: Q160317 V2 (Job 1 of 0)
	SAMPLE SUBMISSION NO.	:
	PROJECT	: MACKAY PROJECT
	DATE RECEIVED	: 21/08/2017
	DATE REPORTED	: 07/09/2017
	DATE PRINTED	: 07/09/2017

#### **REPORT NOTES**

#### **TESTED BY**

Intertek 15 Davison Street, Maddington 6109, Western Australia PO Box 144, Gosnells 6990, Western Australia Tel: +61 8 9251 8100 Email: min.aus.per@intertek.com

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#### SAMPLE STORAGE

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	*	= Result Checked	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	IS	= Insufficient Sample for Analysis		



ELEMENTS	Ca	Cl	IonBal	К	Mg	Na	S	SO4	SG	TDSEva
UNITS	mg/l	g/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	NONE	mg/Kg
DETECTION LIMIT	1	0.2	0.01	2	1	2	5	15	0.001	20
DIGEST									SGL/	
ANALYTICAL FINISH	/OE	/VOL	/CALC	/OE	/OE	/OE	/OE	/CALC	GR	/GR
SAMPLE NUMBERS										
0001 TRENCH14	447	164.4	-0.52	3410	3874	106133	7380	22108	1.197	257874
0002 TRENCH16	445	161.1	-0.44	3342	2892	106071	7359	22046	1.194	252374
CHECKS										
0001 TRENCH16	444	160.0	-0.06	3338	2906	106271	7416	22218		
0002 TRENCH16			0.00						1.191	253263
STANDARDS										
0001 3M KCl			0.00							198719
0002 Na5K5			0.00							
0003 TMDW			0.00							
BLANKS										
0001 Control Blank			0.00							Х
0002 Control Blank	Х	Х	595.13	Х	Х	Х	Х	Х		



Method Code	Analysing Laboratory
/CALC	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.
/GR	Intertek Genalysis Perth
	Analysed by Gravimetric Technique.
/OE	Intertek Genalysis Perth
	Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
/VOL	Intertek Genalysis Perth
	No digestion or other pre-treatment undertaken. Analysed by Volumetric Technique.
SGL/GR	Intertek Genalysis Perth
	Specific Gravity Liquid Samples. Gravimetric Technique



# APPENDIX F

**Calibration Certificates** 

# CERTIFICATE OF CALIBRATION

Page 1 of 1

Thermo Scientific, Environmental Instruments, Water Analysis Instruments certifies that DO Probe Models, 15-500-034, C-35640-50, ECDOHANDYNEW S/N 2410791 Lot Code 295 has been calibrated, tested, and meets all Thermo Scientific, Water Analysis Instruments performance specifications. Thermo Scientific Water Analysis Instruments test equipment is traceable to NIST. Thermo Scientific Water Analysis Instruments is certified to be in compliance with the requirements of ISO 9001 and is registered under QMI-SAI Global File # 1608689. Calibration vendors for our test equipment are chosen for their expertise in different aspects of metrology, and possess certifications which include (but are not limited to) ISO 9001 and ISO/IEC 17025.

	Test1: 100 %	6 Sat, 25 °C	Test2: 100 %	6 Sat, 40 °C	Test3: Nitrogen		
Test Parameter	Acceptable Range	Measured Value	Acceptable Range	Measured Value	Acceptable Range	Measured Value	
Voltage (mV)	28 - 55	40.55	N/A	37.02	0.00 - 0.12	0.00	
TRef (°C)	N/A	25.00	N/A	39.17	N/A	N/A	
Temp (°C)	TRef +/- 0.5	24.90	TRef +/- 1.5	38.71	N/A	N/A	



Chan Cheow Kwang Manager-QA/Regulatory Date: Jul 15, 2015

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