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Preliminary Acid Sulfate Soil Investigation
Proposed Sand Extractive Industry

Mr Paul Waardyk

Nine Mile Road, Fairy Bower

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1.0 INTRODUCTION

1.1 BACKGROUND

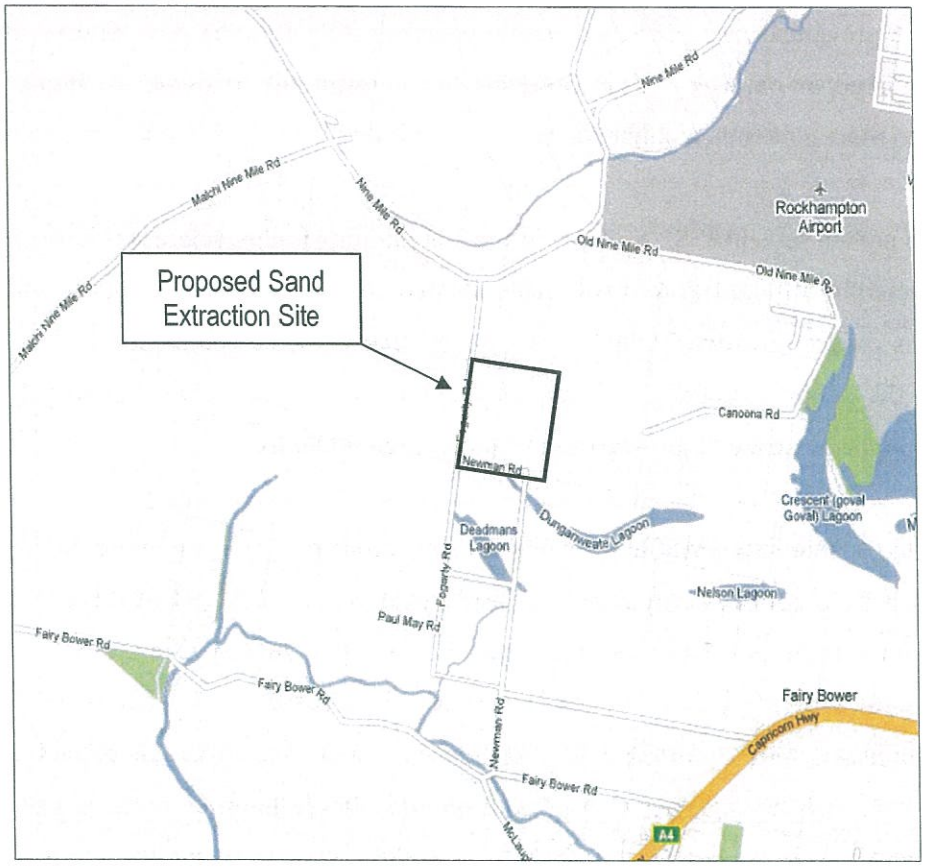
A preliminary Acid Sulfate Soil Investigation has been undertaken on behalf of Paul Waardyk as part of a proposed extractive industry site. This report aims to determine the potential for Acid Sulfate Soils (ASS) to be disturbed as a result of the proposed staged sand extraction to a depth of approximately 10m below current existing surface levels. The site is described as Lot 431 and Lot 432 on LIV401245, Nine Mile Road, Fairy Bower.

The development is estimated to involve the excavation of approximately 20,000 tonnes of soil per development Stage (likely to be in two (2) Stages) to a maximum depth of 10m (depending on the recovery of suitable sands).

Developments in Queensland are subject to investigations of ASS in accordance with the *State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils (SPP2/02),* when excavation of more than $100m^3$ of soil or sediment '*at or below 5 metres Australian Height Datum (AHD) where natural ground level is less than 20 metres AHD*' is proposed. This investigation is considered a preliminary field based assessment and therefore the sampling densities and intensities are less than those identified in the Guidelines. Additional sampling would be necessary in order to fully comply with the Guidelines.

A Site Locality Plan is included as Figure 1 and a Site Layout Plan as Figure 2. A Borehole Location Sampling Plan has been included as Figure 3.

Figure 1: **Site Locality Plan**



Source: Google Maps 2010

1.2 ACID SULFATE SOILS

Acid Sulphate Soil's (ASS) are soils which contain iron pyrites. The pyrites oxidise when exposed to oxygen, and when combined with water form sulphuric acid. This normally occurs when soils experience a change in ambient conditions from anaerobic to aerobic states. The sulphuric acid has the potential at this time to leach out of the soil and lower the pH of receiving waters. In addition to this, the contaminated water may increase the heavy metal concentration of the receiving waters (increasing toxicity levels by allowing iron and aluminium to 'fall out') and reduce the neutralising and buffering capacity of the receiving waters. The result of this is the degradation of environmental conditions. The lowering of pH can also have social and economic costs such as seriously affecting building materials and structures, and the reduction of public amenity and safety.

ASS can either be defined as actual or potential. Actual ASS (AASS) are those soils which have previously been oxidised, while potential ASS (PASS) pose limited threat unless disturbed or oxidised. The following are descriptions of these, as defined by Queensland State government authorities:

Actual acid sulfate soils (AASS): Soil or sediment containing highly acidic soil horizons or layers affected by the oxidation of soil materials that are rich in iron sulphides, primarily pyrite. This oxidation produces hydrogen ions in excess of the sediment's capacity to neutralize the acidity, resulting in soils of pH 4 or less. These soils can usually be identified by the presence of jarosite (a yellow coloured mineral).

Potential acid sulfate soils (PASS): Soils or sediments containing iron sulphides or sulfidic material that have not been exposed to air and oxidised. The field pH of these soils in their undisturbed state is pH 4 or more, and may be neutral or slightly alkaline.

Projects involving the disturbance of ASS must assess the risks associated with disturbance through the consideration of both on and off-site impacts. A thorough ASS investigation (in compliance with the *Sampling Guidelines*) is an essential component of risk assessment. Such an investigation is needed to provide information on the environmental setting, location of and depth to ASS, existing and potential acidity present in the soil, and soil characteristics. The results from the investigation determine the most appropriate management strategy for the site.

1.3 ACID SULFATE SOIL INVESTIGATIONS

The investigation must aim to include the following information and techniques where possible;

- The approximate location of each borehole;
- Description of the vertical dimensions of the borehole relative to surface AHD (where possible);
- A brief description of the equipment and/or methods used to retrieve the samples;
- A field description for each soil profile including soil texture, colour, mottling and other diagnostic features (e.g. jarosite, shell);

- Results from field soil tests (field pH (pH_F), pH after oxidation with hydrogen peroxide (pH_{FOX}) and reaction with peroxide at 0.25m vertical intervals to the base of the soil profile; and
- Collect samples at 0.25m intervals down the soil profile e.g. surface, 0–0.25m, 0.25–0.5m etc, ensuring each horizon is sampled. Samples collected to extend 1m past the deepest excavation point (where possible).

1.4 REPORT OBJECTIVES

This report seeks to address issues relating to ASS in general accordance with the *State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils* and associated Guideline, and to demonstrate that the proposed development generally complies with these requirements. The report includes the following information:

- The outcomes of a desk-top study to determine the likelihood of ASS occurring on the subject land;
- A sampling methodology designed based on preliminary investigation to confirm the presence or absence of actual acid sulfate soils (AASS) and/or potential acid sulfate soils (PASS) on the subject land, including soil investigations and field testing.
- A summary and evaluation of the results of the sampling program, including recommendations for further testing; and
- Specific management requirements to be undertaken during construction.

The assessment has been conducted in general accordance with *State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils* and associated Guideline, and the Department of Natural Resources & Mines' *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 (QASSIT, 1998)*. It must be noted that more detailed soil profiling and sampling will be required to fully comply with the above guidelines.

This assessment was a preliminary investigation only and no laboratory testing has been included.

2.0 SITE DESCRIPTION

2.1 GENERAL

The proposed staged sand extractive industry site is located approximately 6.5km west of the township of Rockhampton on the eastern side of Fogarty Road and south of Nine Mile Road. Based on information provided by others, the proposed sand extractive site footprint for both Stage 1 and Stage 2 of the development is understood to be located in the northern portions of both Lot 431 and Lot 432. Rural properties lie to the north, east and south of the site while Fogarty Road lies adjacent the western boundary.

The site can be accessed via Fogarty Road, Fairy Bower through its western boundary.

All site based information has been supplied by the third parties as no site investigation was undertaken by FPE.

2.2 TOPOGRAPHY

The topography of the site is described as predominantly open and flat with slopes of less than 5% covering the entirety of the area to be developed.

Surface Hydrology

Any excess water is expected to migrate generally to the south toward the watercourse and associated dams located in the adjoining property to the south.

Groundwater

Groundwater was encountered onsite during soil investigation conducted by CQ Soil Testing. Groundwater was encountered at 7.8m and 7.7m at BH1 and BH2 respectively within a sand bearing layer which begins at 4m depth below surface.

2.3 VEGETATION

The majority of the proposed Stage 1 and Stage 2 development area has been previously cleared and the northern portion of the site generally consists of mixed grasses. The southern portion of the site also consists of mixed grasses but has a higher percentage of scattered trees and regrowth vegetation.

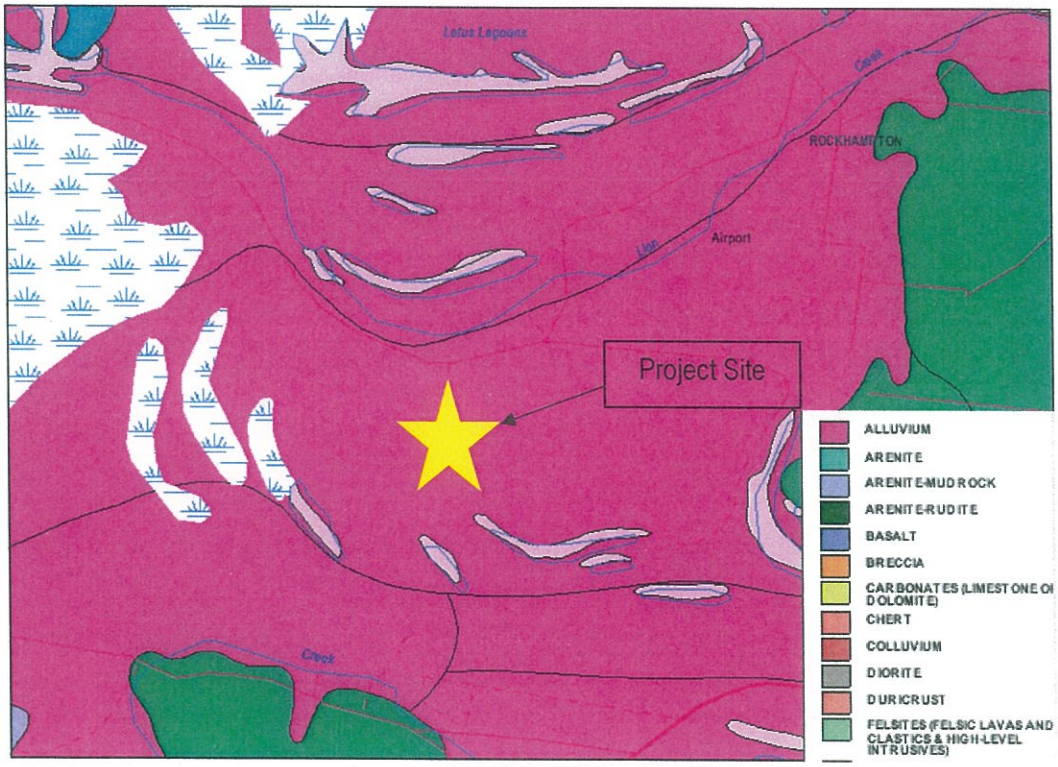
2.4 GEOLOGY

The geology for the general location has been identified as consisting of Alluvium. The descriptions of these geological units are described below in Table 1, with a mapping extract following Table 1:

Table 1: Department of Natural Resources & Water – *Interactive Resource and Tenure Maps Version 1.4*

Unit Name	Unit Type	Unit Age	Lithology Summary	Dominant Rock Type
Qa/1-Yarrol/Scag	Strata	QUATERNARY	Clay, silt, sand, gravel: intermediate terraces of Boyne and Fitzroy River flood plain alluvium	ALLUVIUM

Mapping Extract – Overview of Site and Surrounding Geology



2.5 SOILS

An investigation of the soil profile was conducted on site by CQ Soil Testing during works on the 29th July 2010. The soil profile logs were recorded at two (2) locations across the site. One (1) borehole was advanced in a central location of proposed Stage 1 (BH1) and one (1) borehole was advanced in a central location of proposed Stage 2 (BH2). A copy of the soil profile logs has been provided as Appendix A of this report.

BH1 was advanced to a depth of 8.1m while BH2 was advanced to a depth of 9.3m until refusal was met.

The results of the soil testing indicated that soils onsite generally comprise of high plasticity silty clay to 2.0m depth, overlying fine to coarse grained sandy clay to 3.0m depth, underlain by fine to coarse grained clayey sand to 4.0m depth. Soils below 4m consist of fine to coarse grained sand to borehole termination depth.

3.0 SAMPLING METHODOLOGY

3.1 GENERAL

At the location of BH1 and BH2 on the site, the drilling was attempted to 11m given that the likely maximum depth of disturbance at these points is estimated to be no more than 10m. Boreholes were however terminated at depths of 8.1m and 9.3m at BH1 and BH2 respectively due to refusal.

The total volume of proposed excavated material is understood to be in the order of ~20,000 tonnes/m^3 per Stage to a maximum depth of 10m (depending on the recovery of suitable sands). Given the scale of the development, a preliminary ASS investigation undertaken in general accordance with SPP 2/02 to determine whether the development will encounter or impact on any ASS. In accordance with the SPP 2/02 Guideline and the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* (*QASSIT, 1998*), the extent of the borehole depths is considered to be of sufficient depth to identify potential disturbance of AASS or PASS or potentially existing acidic material on site.

Based on the estimated volume of material requiring disturbance, and the deep excavations proposed, it was determined that the potential to impact on any AASS or PASS material is considered to be moderate.

A preliminary site investigation and soil testing were undertaken by CQ Soil Testing Pty Ltd to gain a general understanding of sub-surface conditions and to confirm the outcomes of the desk-top study and preliminary site investigations.

3.2 SAMPLING LOCATIONS & METHODOLOGY

One (1) borehole to a maximum depth of 8.1m and one (1) borehole to a maximum depth of 9.3m below existing surface levels were advanced to generally satisfy the relevant requirements of the preliminary investigation. A combination of push tubing and 75mm solid flight auger was used to advance boreholes at the approximate locations shown in the Plan included as Figure 3 of this Report.

Soil samples were collected at 0.25m intervals for the full extent in all boreholes. A composite sample from 8.1 – 8.7m depth and 8.7 – 9.3m at BH2 was collected due to difficult recovery of sand material below the watertable.

3.3 FIELD PH TESTING

Field pH testing was undertaken for all samples collected. Testing included initial field pH tests (pH_F), after the addition of distilled water, to determine the presence of AASS, followed by field peroxide pH testing (pH_{FOX}) conducted after the addition of 30% hydrogen peroxide solution to test for sulfides or PASS.

- pH_F: A result of pH <4 indicates oxidation has occurred in the past and that AASS is present.
- pH_{FOX}: A result of pH <3, plus a pH_{FOX} reading >2 pH units below the pH_F, plus a strong reaction with peroxide, strongly indicates the presence of PASS.

The results of field pH testing were then compared to the relevant criteria for interpreting field test results specified in the above mentioned Guidelines to determine the presence of ASS. These criteria generally relate to the reaction of soils to hydrogen peroxide, the pH of soils after oxidation and the difference between pH before and after oxidation.

3.4 LABORATORY ANALYSIS

This is a preliminary ASS investigation only and no laboratory analysis has been included.

4.0 FIELD ANALYSIS

4.1 GENERAL

The results of the acid sulfate field tests, including reaction responses to hydrogen peroxide, field pH and pH results following oxidation have been provided in Table 2.

The results of the preliminary field tests were used to help determine the potential for AASS or PASS. It is important to note that whilst a useful exploratory tool, soil field pH tests are indicative only and cannot be used as a substitute for laboratory analysis to determine the presence of ASS. Laboratory analysis is needed to quantify the amount of existing plus potential acidity.

Samples were submitted to Future-Plus Environmental for testing in general accordance with the QASSIT Guidelines for acid sulphate field tests. All samples taken were preserved and sent for analysis within the applicable holding times.

5.0 RESULTS

5.1 PH_{FIELD} AND PH_{FOX} RESULTS

The results of the field testing have been shown below in Table 2.

Table 2: Results of Field pH_F and pH_{FOX} Analysis Including Field Based Assumptions

					Field Testing Assumptions		
Location	pH F	pH_{FOX}	Change	Reaction	Is Material AASS? (<4pH)	Is Material considered PASS? (<3pH_{FOX})	Is Reaction >2pH?
BH1 0.00-0.25	4.91	3.05	1.86	XX	No	No	No
BH1 0.25-0.50	6.35	6.20	0.15	XXXX	No	No	No
BH1 0.50-0.75	7.22	7.37	-0.15	XXXX	No	No	No
BH1 0.75-1.00	7.20	7.41	-0.21	XX	No	No	No
BH1 1.00-1.25	7.05	7.34	-0.29	XXXX	No	No	No
BH1 1.25-1.50	7.22	7.83	-0.61	XX	No	No	No
BH1 1.50-1.75	7.31	8.11	-0.80	XXXX	No	No	No
BH1 1.75-2.00	7.52	7.77	-0.25	XXX	No	No	No
BH1 2.00-2.25	7.64	7.81	-0.17	XXX	No	No	No
BH1 2.25-2.50	7.55	7.26	0.29	XX	No	No	No
BH1 2.50-2.75	7.52	7.15	0.37	X	No	No	No
BH1 2.75-3.00	7.51	7.55	-0.04	XXX	No	No	No
BH1 3.00-3.25	7.78	6.45	1.33	X	No	No	No
BH1 3.25-3.50	7.69	5.85	1.84	X	No	No	No
BH1 3.50-3.75	7.55	7.22	0.33	-	No	No	No
BH1 3.75-4.00	7.64	7.66	-0.02	XX	No	No	No
BH1 4.00-4.25	7.76	7.83	-0.07	XXX	No	No	No
BH1 4.25-4.50	7.65	7.51	0.14	XX	No	No	No
BH1 4.50-4.75	7.62	7.65	-0.03	X	No	No	No
BH1 4.75-5.00	7.69	5.88	1.81	-	No	No	No
BH1 5.00-5.25	7.65	5.66	1.99	-	No	No	No
BH1 5.25-5.50	7.19	5.83	1.36	X	No	No	No
BH1 5.50-5.75	7.35	6.16	1.19	-	No	No	No
BH1 5.75-6.00	7.40	7.92	-0.52	XX	No	No	No
BH1 6.00-6.25	7.48	8.00	-0.52	XX	No	No	No
BH1 6.25-6.50	7.69	8.22	-0.53	XX	No	No	No
BH1 6.50-6.75	7.72	6.81	0.91	X	No	No	No
BH1 6.75-7.00	7.88	8.18	-0.30	XX	No	No	No
BH1 7.00-7.25	8.09	8.19	-0.10	XX	No	No	No
BH1 7.25-7.50	7.69	8.10	-0.41	XX	No	No	No
BH1 7.50-7.75	8.03	8.15	-0.12	XX	No	No	No
BH1 7.75-8.10	7.71	8.14	-0.43	XX	No	No	No
BH2 0.00-0.25	5.40	3.50	1.90	XX	No	No	No
BH2 0.25-0.50	7.25	6.75	0.50	XX	No	No	No
BH2 0.50-0.75	7.49	7.05	0.44	XX	No	No	No

Location	pH F	pH_{FOX}	Change	Reaction	Field Testing Assumptions: Is Material AASS? (<4pH)	Is Material considered PASS? (<3pH_{FOX})	Is Reaction >2pH?
BH2 0.75-1.00	7.46	7.77	-0.31	XX	No	No	No
BH2 1.00-1.25	7.43	7.37	0.06	X	No	No	No
BH2 1.25-1.50	7.39	7.58	-0.19	XX	No	No	No
BH2 1.50-1.75	7.45	7.72	-0.27	XXX	No	No	No
BH2 1.75-2.00	7.58	8.12	-0.54	XXX	No	No	No
BH2 2.00-2.25	7.71	7.06	0.65	-	No	No	No
BH2 2.25-2.50	7.69	7.39	0.30	X	No	No	No
BH2 2.50-2.75	7.67	7.50	0.17	X	No	No	No
BH2 2.75-3.00	7.77	7.05	0.72	X	No	No	No
BH2 3.00-3.25	7.87	8.06	-0.19	XX	No	No	No
BH2 3.25-3.50	7.91	7.92	-0.01	XX	No	No	No
BH2 3.50-3.75	8.15	8.24	-0.09	X	No	No	No
BH2 3.75-4.00	8.17	6.67	1.50	X	No	No	No
BH2 4.00-4.25	7.78	7.39	0.39	X	No	No	No
BH2 4.25-4.50	7.85	8.10	-0.25	X	No	No	No
BH2 4.50-4.75	7.98	6.91	1.07	X	No	No	No
BH2 4.75-5.00	7.94	6.37	1.57	X	No	No	No
BH2 5.00-5.25	7.93	6.10	1.83	X	No	No	No
BH2 5.25-5.50	7.79	6.40	1.39	X	No	No	No
BH2 5.50-5.75	7.95	6.89	1.06	X	No	No	No
BH2 5.75-6.00	7.52	6.81	0.71	X	No	No	No
BH2 6.00-6.25	7.79	8.10	-0.31	X	No	No	No
BH2 6.25-6.50	7.92	8.20	-0.28	X	No	No	No
BH2 6.50-6.75	7.98	8.34	-0.36	XX	No	No	No
BH2 6.75-7.00	7.77	7.41	0.36	X	No	No	No
BH2 7.00-7.25	7.99	7.56	0.43	X	No	No	No
BH2 7.25-7.50	7.60	8.03	-0.43	XX	No	No	No
BH2 7.50-7.75	7.95	8.38	-0.43	XX	No	No	No
BH2 7.75-8.10	7.72	8.28	-0.56	XX	No	No	No
BH2 8.10-8.70	7.30	7.47	-0.17	X	No	No	No
BH2 8.70-9.30	7.42	6.81	0.61	X	No	No	No

- No Reaction
x Slight Reaction
xx Moderate Reaction
xxx High Reaction
xxxx Very vigorous reaction, gas produced and heat generated commonly >80°C

The field test pH_F results were all above pH 4 (pH 4.91 – 8.17) indicating the absence of Actual Acid Sulfate Soil (AASS).

Within the site locations, a minimum pH_F value of 4.91 and maximum of 8.17 was detected. This gives a range of 3.26 pH units and an average pH_F of 7.56 over all 66 samples.

In relation to the field test pH_{FOX} results all of the 66 samples were found to have a pH above the pH 3 trigger value. The lowest pH_{FOX} result of 3.05 was noted to occur in BH1 (0.00- 0.25m) in surface soils. All samples displayed a drop of <2 pH units.

It was noted that the majority of samples were shown to experience a reaction during testing with high to very vigorous reactions experienced at upper depths of 0.0m – 4.50m at BH1 and moderate to high reactions at upper depths of 0.0m – 2.0m at BH2. In this situation it is likely that the high to very vigorous reactions noted in the upper soil profile are attributable to a combination of organic matter or other soil constituents such as manganese oxides rather than sulphide.

Of all the 66 samples tested within the scope of these works none were found to trigger either of the field based criteria for determination of likely presence of AASS or PASS.

Interpretation of the field test results suggest that the presence of AASS or PASS or soil types which may pose a risk of acid generation is unlikely. Further laboratory analysis for S_{CR} methodology (Reducible Chromium method) or SPOCAS would be required to more conclusively determine the presence of ASS.

Based on the investigation results it would be prudent to recommend that further testing will be necessary. Any future investigations must be conducted in strict accordance with the *State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils* and associated Guideline, the Department of Natural Resources & Mines' *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 (QASSIT, 1998)*, and *Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines (DNRM 2002).*

6.0 CONCLUSIONS

6.1 GENERAL

This report was commissioned in order to provide a preliminary assessment of the potential disturbance of ASS at the subject site. Given the preliminary nature of the investigations, the field based assessment was carried out at a sampling intensity less than that which is recommended in the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland* (QASSIT, 1998) and SPP 2/02 Guidelines.

Based on the results of the preliminary investigations discussed in this report the presence of ASS in vicinity of BH1 and BH2 is unlikely. However without more intensive field investigations and further laboratory analysis using S_{CR} or SPOCAS we are not able to conclusively determine the presence of AASS or PASS and whether treatment and management of these soils is necessary.

Depths of preliminary investigations were limited to a depth of 8.1m and 9.3m (BH1 and BH2 respectively due to auger refusal. Depths of proposed excavations are not expected to exceed beyond these depths due to potentially unsuitable material for extraction.

6.2 INVESTIGATIONS AND ANALYSIS RESULTS

Field tests were undertaken to determine the reactivity of soils and the presence of AASS and PASS. These were undertaken at 0.25m intervals to 8.1m depth (maximum) at BH1 and 9.3m depth (maximum) at BH2 with a total of sixty six (66) samples collected. The field test pH_F results were all above pH 4 therefore the soils were not considered to constitute AASS.

Peroxide pH_{FOX} results showed all of the sixty six (66) samples were found to have a pH above the pH 3 trigger value. The presence of high to very vigorous reactions experienced at upper depths of BH1 and moderate to high reactions at upper depths of BH2 is likely to be attributed to a combination of organic matter or other soil constituents such as manganese oxides rather than sulphide.

Of all the 66 samples tested within the scope of these works none were found to trigger either of the field based criteria for determination of likely presence of AASS or PASS.

Based on the preliminary field results, it was determined that the soils appeared to be non ASS, however further confirmatory laboratory tests would be required to conclusively verify the presence of any AASS or PASS.

To confirm or deny the presence of AASS or PASS a representative selection of samples at 0.5m intervals from the boreholes would be submitted for further laboratory testing (S_{CR} or SPOCAS testing). On the basis of these preliminary field based test results only the soil is not considered ASS.

FIGURE 1

SITE LOCALITY PLAN - REFER PAGE 5

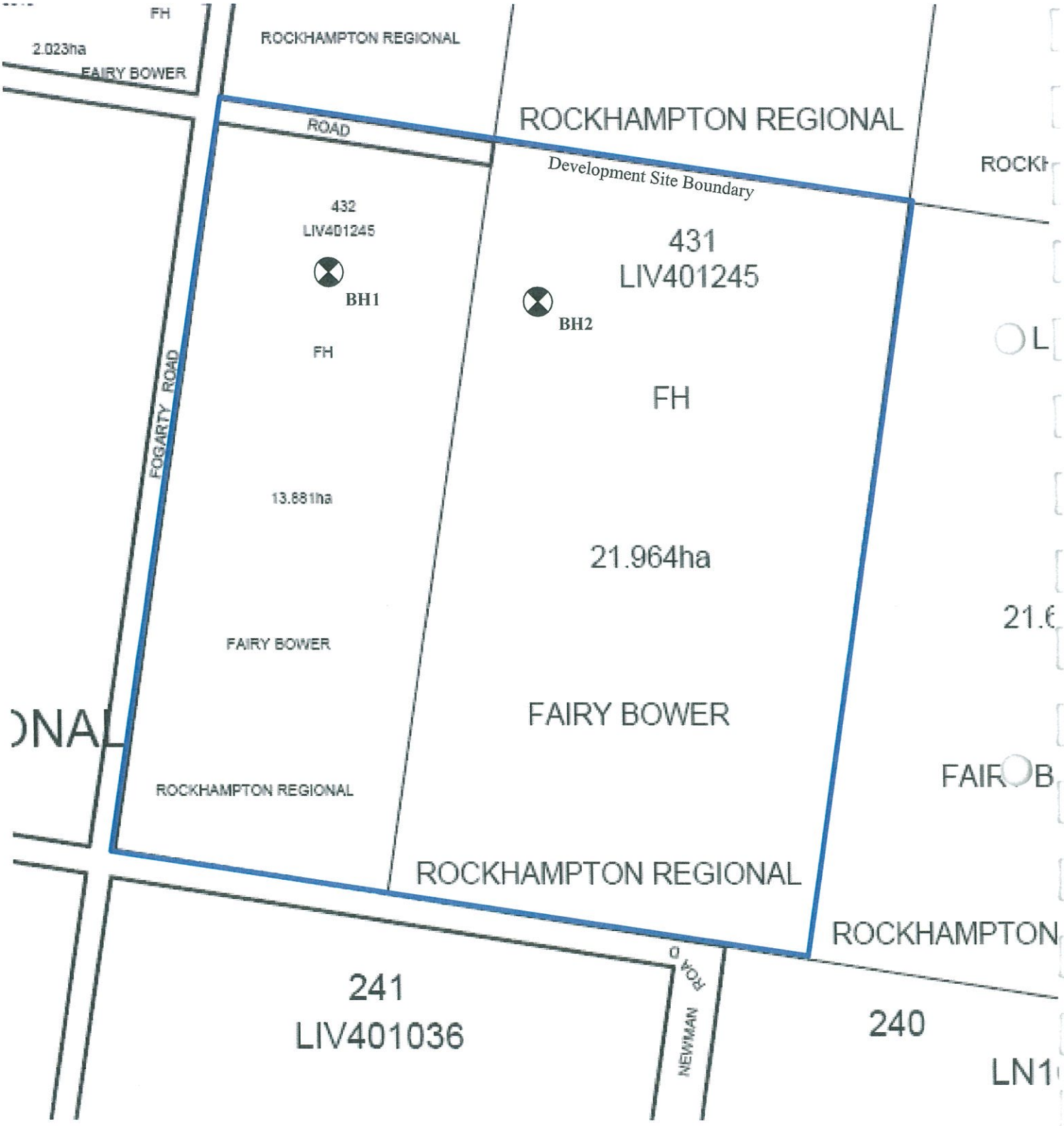
FIGURE 2

PROPOSED SITE LAYOUT PLAN

To be Inserted When Made Available

FIGURE 3

BOREHOLE AND SAMPLE LOCATIONS PLAN



fpe future-plus ENVIRONMENTAL	BOREHOLE LOCATION PLAN	Scales: Not To Scale
	Site: Lot 431 and 432 Nine Mile Rd, Fairy Bower	*Figure Measurements To Take Precedence Over Scale Measurements*
FPE Reference Number: 3798-100810-1.0	Client: Paul Waardyk	

APPENDIX A

SOIL PROFILE LOGS – CQ SOIL TESTING

CQ SOIL TESTING

SCAAMIA HOLDINGS P/L T/A CQ Soil Testing

Servicing all of Central Queensland

ABN - 47715943484 BSA License No - 1117681

Phone: (07) 49361163

Fax: (07) 49361162

info@cqsoiltesting.com.au

SOILS INVESTIGATION

CLIENT: P Waardyk

SITE ADDRESS: Lot 432 and Lot 431 (LIV401245)
Nine Mile Road, Fairy Bower

JOB NUMBER: CQ5431

ISSUE DATE: 4th August 2010

FIELD INVESTIGATION LOG

VISUAL SOIL CLASSIFICATION TO AS 1726 - 1993

SITE ADDRESS -Lot 250 Nine Mile Road, Fairy Bower

Job Number CQ3555 29/07/2010

CQ SOIL TESTING

BOREHOLE 1 (DIRECT PUSH BH1)
Lot 432 on LIV401245

Depth (m)	Visual Class'n Symbol	Visual Description of Material Name,particle characteristics,plasticity,secondary components,colour,structure	Estimated Moisture Condition	Estimated Consistency or Rel/Density
0.0 2.0	CH	Silty CLAY, high plasticity, trace of fine to coarse grained sand, dark grey.	M	VST
2.0 3.0	CI	Sandy CLAY, medium plasticity, fine to coarse grained, brown.	M	VST
3.0 4.0	SC	Clayey SAND, fine to coarse grained, low plasticity fines, yellowish brown.	M	D
4.0 8.1	SP	SAND, fine to coarse grained, yellowish brown to brown with depth. **Watertable encountered at 7.8m**	M	D
Borehole terminated at 8.1 m				

LEGEND

MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	Remark
D – Dry	VS – Very Soft	VL – Very Loose	
M – Moist	S – Soft	L – Loose	
W – Wet	F – Firm	MD – Med Dense	
	ST – Stiff	D – Dense	
	V/ST – Very Stiff	VD – Very Dense	
	H – Hard		

FIELD INVESTIGATION LOG

VISUAL SOIL CLASSIFICATION TO AS 1726 - 1993

SITE ADDRESS -Lot 250 Nine Mile Road, Fairy Bower

Job Number CQ3555 29/07/2010

CQ SOIL TESTING

BOREHOLE 2 (DIRECT PUSH BH2)
Lot 431 on LIV401245

Depth (m)	Visual Class'n Symbol	Visual Description of Material Name,particle characteristics,plasticity,secondary components,colour,structure	Estimated Moisture Condition	Estimated Consistency or Rel/Density
0.0 2.0	CH	Silty CLAY, high plasticity, trace of fine to coarse grained sand, dark grey.	M	VST
2.0 3.0	CI	Sandy CLAY, medium plasticity, fine to coarse grained, brown.	M	VST
3.0 4.0	SC	Clayey SAND, fine to coarse grained, low plasticity fines, yellowish brown.	M	D
4.0 9.3	SP	SAND, fine to coarse grained, yellowish brown to brown with depth. **Watertable encountered at 7.7m**	M	D
Borehole terminated at 9.3 m				

LEGEND

MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	Remark
D – Dry	VS – Very Soft	VL – Very Loose	
M – Moist	S – Soft	L – Loose	
W – Wet	F – Firm	MD – Med Dense	
	ST – Stiff	D – Dense	
	V/ST – Very Stiff	VD – Very Dense	
	H – Hard		