AECOM

AECOM Australia Pty Ltd
21 Stokes Street
PO Box 5423
Townsville QLD 4810
Australia
www.aecom.com

+61 7 4729 5500 tel
+61 7 4729 5599 fax

23 July 2010

PLANS AND DOCUMENTS
referred to in the PDA APPROVAL
18 JUL 2013
MEDQ

Phillip Kohn
Urban Land Development Authority
GPO Box 2202
BRISBANE QLD 4001

Dear Phillip

Acid Sulfate Soil Investigation for the Proposed Oonoonba Urban Land Development Site

1.0 Introduction

1.1 Background

AECOM was engaged by the Urban Land Development Authority (ULDA) to undertake an acid sulfate soil investigation of the proposed Oonoonba Land Development Area, on Lot 51 on K103928 at Oonoonba, Townsville. ULDA are proposing to develop the site in two stages for residential housing (see Figure 1).

The property is currently owned by the Department of Employment Economic Development and Innovation (DEEDI) and consists of offices, laboratories and research facilities (formerly called Department of Primary Industries and Fisheries - DPI&F - research station). ULDA are liaising with DEEDI on the sale of this property and this report will assist with explaining development constraints related to the presence of potential and actual acid sulfate soils on site.

The proposed development area sits generally at or below RL 5 m Australian Height Datum (AHD), with parts of the site being periodically inundated with runoff during large wet season events. Given the low lying nature of the site, the proposed development will require the import of fill material to raise the finished surface level of any developed lot to a minimum of 3.9m AHD for subdivision development. As per *State Planning Policy 2/02 Guideline for Acid Sulfate Soils* (SPP 2/02), the elevation at which the site occurs and the proposed fill volumes which would be needed are greater than >500m^3 in total and may be >0.5m on average in thickness, triggering the need for an acid sulfate soil investigation to be undertaken.

1.2 Potential Development Activities

As part of a staged development there will be a number of activities associated with preparation of the site for possible residential development. These will include regrading, possible borrowing of material and import of fill material. This acid sulfate soil investigation provides information on development constraints, focussed around:

- the nature and extent of potential and acid sulfate soils that may be affected by future earthworks;
- potential risk to changes in water quality and ecosystem health; and
- recommendations on liming rates of disturbance of acid sulfate soils (ASS) to assist with environmental management of the site should ASS material require disturbance.

Civil works include the installation of sewers, stormwater, roads and other utilities. These include, but are not limited to the following:

- clearing vegetation, weeds, rubbish removal and ground surface treatment;
- demolition of existing decommissioned buildings and structures, including an underground storage tank and cattle dip;
- soil remediation and preparation, including topsoil stripping, preloading and compaction works and possible acid neutralisation;
- import of soils to provide further site utility for temporary and permanent access roads;
- borrowing of material on site;
- excavation of site associated with landscaping;
- compaction and levelling of soils; and
- services installation.

ACID SULPHATE SOIL INVESTIGATION FOR OONOONBA LAND DEVELOPMENT

Acid Sulphate Soil Sites and Boundaries

Figure 1

Sample Location

Study Sites

0 25 50 100 150

Metres

Scale: 1:4,000 (when printed at A3)

PROJECT ID 6010xxxx

LAST MODIFIED CFS 12-Jul-2010

FILE NAME 6010XXXX_ENV_011

AECOM

© 2009 Google - Image © 2010 GeoEye
Roads, Rivers etc - © 2009 MapDataSciences
Acid Sulphate Soils Sample Sites provided by AECOM Townsville

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk
AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information

2.0 Scope of works

Acid sulfate soil sampling was undertaken from the 14-15 April 2010, in Areas 1 and 2 of the proposed Oonoonba Urban Land Development Area on Lot 51 on K103928. Test pits were excavated across the property with a backhoe to a depth of 3m below ground level (or shallower if test pits collapsed due to unstable sides). A total of 39 were used to identify subsurface stratigraphy, undertake field screening tests for PASS, and collect soil samples for laboratory analysis of ASS.

The locations of the pit sites are marked on Figure 1. Sampling density across the site was generally lower than recommended in SPP2/02, given that previous PASS work conducted in the area showed uniform and continuous strata. In Area 1, test pits were sited between 50 to150m while in Area 2, test pit locations were between 100 and 200m apart.

Acid sulfate soil screening with pH_F and peroxide pH_{FOX} testing was undertaken at 0.25m intervals in the test pits in accordance with QASSIT Guidelines. Results of the field screening tests are provided in Attachment A.

Soil samples were collected at 0.25m intervals and a selection of samples submitted for either SPOCAS or chromium suite analysis. The number of laboratory samples submitted was generally based on the following according to SPP2/02 Guidelines:

- samples with the most positive field test screening results were submitted; and
- all soil horizons encountered were adequately represented.

95 samples were sent for either SPOCAS or chromium suite analysis as per the QASSIT Guidelines. Analytical laboratory results for the samples are found in Attachment B. Acid base accounting was undertaken on all samples analysed to assist in the identification of potential risks to the environment (see Attachment C).

2.1 Limitations

This report presents the results of an acid sulfate soil assessment prepared for the purposes of this commission. The data and advice provided herein relate only to project information as provided at this stage of the development.

There are always some variations in subsurface conditions across a site which cannot be fully defined by investigation. An understanding of site conditions depends on the integration of many pieces of information; some regional, some site specific, some structure-specific and some experienced-based.

It is unlikely that the measurements and values obtained by sampling and testing during the investigation will represent extremes of conditions which exist at actual construction sites. Hence it is recommended that if any ground conditions other than those described herein are encountered during construction, further advice should be sought from AECOM. AECOM does not accept responsibility for the consequences of significant variances in the site conditions resulting from such uncertainties, or any conditions arising as a result of activities at the site that occurred following site inspections and/or investigations reported herein.

This report should not be altered, amended or abbreviated, issued in part or issued incomplete in any way without prior checking and approval by AECOM. AECOM accepts no responsibility for any circumstances that arise from the issue of the report that has been modified in any way as outlined above.

3.0 Site Description

3.1 Geomorphology and Geology

The proposed development is adjacent to the estuarine reaches of Ross River, and is largely comprised of sandy alluvial material. Along the northern boundary of the site, tidal deposits including mangroves ecosystems are present in the estuarine reach of Ross River. Immediately to the east of the property, a substantial Holocene coastal dune system fronts Cleveland Bay and extends around to Cape Cleveland.

The property contains two long depression features that run approximately north-south across the Lot. One is located immediately to the west of the aquaculture ponds and DPI buildings and is likely a relict channel feature of the Ross River system, which traverses both Area 1 and 2, sitting at approximately RL 1-2m AHD. The second depression is located in Area 2 in the north eastern part of the property and sits at approximately RL 2-3 m AHD.

The site stratigraphy can be generally described as comprising of Holocene sandy units overlain by sandy mud at the surface, of which the latter increases in thickness to the east of the site. At some locations in close proximity to the two depression features, the stratigraphy is dominated by finer mud /clay units such as found in test pit 16,

20 and 39. Substantial clay / mud units possibly of marine origin were also found at depth in test pit 32, 34 and 36 in the north-east corner of the property. The western-most part of the property comprises generally of very coarse sands that frequently contain a small percentage of gravel, typically indicative of fluvial channel deposits.

3.2 Groundwater

The ingress of groundwater into test pits was observed to occur between 1.5 and 3.0m below the ground level across the property.

3.3 Acid Sulfate Soils

Screen field results

Of the 416 field screen tests undertaken, most pH_F values were slightly acidic to neutral which is typical of coastal sediments (see Attachment A). Differences in value between pH_F and pH_{FOX} varied significantly with approximately 30% of samples having a pH change >2 indicating the potential for acid sulfate soils. There were no pH_{FOX} values <3 which strongly indicated the presence of PASS.

Acid Sulfate Soil Analysis

As per SPP02/2 Guidelines, a texture-based acid sulfate soil action criteria value of 0.03%S for net acidity was used to assess the analytical results. This value is recommended for material which is coarse textured encompassing sands to loamy sands. Given that the lithologies recorded in test pits across site were dominated by sandy material, and that a large volume of acid sulfate soil material could be disturbed for this project, this value is the most appropriate. Of those samples where actual and potential acid sulfate soils were identified, the acid base accounting undertaken is summarised in Table 1.

Distribution

Both actual and potential acid sulfate soils were sampled at a number of locations and depths across the property as shown in Figure 2.

Acid sulfate soils where sampled were mostly potential acid sulfate soils (PASS) with actual acid sulfate soils (AASS) sampled in only 7 test pits (see figure 3) corresponding to the following areas:

- **at depth** in the north east corner of the Lot in test pits 32, 34 and 35;
- **at depth** in test pit 16B, which is located in the southern part of the site adjacent to the relict channel feature;
- **at the surface** in test pits 30 and 21 in close proximity to the relict channel feature, with the latter at marginal trigger limits; and
- **at the surface** in test pits 2 and 10 near the existing DPI buildings.

From a stratigraphy perspective, the distribution of acid sulfate soils does not appear to be confined to specific lithological units having been sampled in clays, sandy clays, sandy muds and muddy sands across the property.

For the purposes of developing the site, the distribution of acid sulfate soils can be grouped into the following four categories.

1. Isolated sites which contain acid sulfate soils **throughout most of the profile,** located adjacent to the western relict channel feature.
2. Areas where acid sulfate soils occur **at depth in the profile from 1.75m** below ground level, located in the southern part of the property in close proximity to the relict channel feature and in the north east corner of the site adjacent to the other major depression feature.
3. Areas containing ASS **within surface sediments up to a maximum of 1.5m depth** sited generally around the DPI buildings and in the north western part of the property.
4. Areas that **did not contain ASS** located generally in the area between the two depression features and a number of sites in the very western part of the property.

It should be noted that net acidity values (in %S) for surface acid sulfate soil locations, are commonly at the threshold of the action trigger level (ie. 0.03) or relatively close to the trigger threshold level as opposed to those at depth which vary more greatly (ie. 0.03 to 0.37%S at site 20 in the clay unit). The level of treatment for the disturbance of PASS and AASS is likely to be in the range of medium to high because of the probable volume of ASS material that may be disturbed (even though ALS liming rates for the material are low and mostly well below 10kg $CaCO_3$/t, with a couple of exceptions at <20kg $CaCO_3$/t(see Table 1)). Table 1 also indicates that muddy sands across the site do in general have an acid neutralising capacity which in some areas is sufficient to neutralise the acidity present.

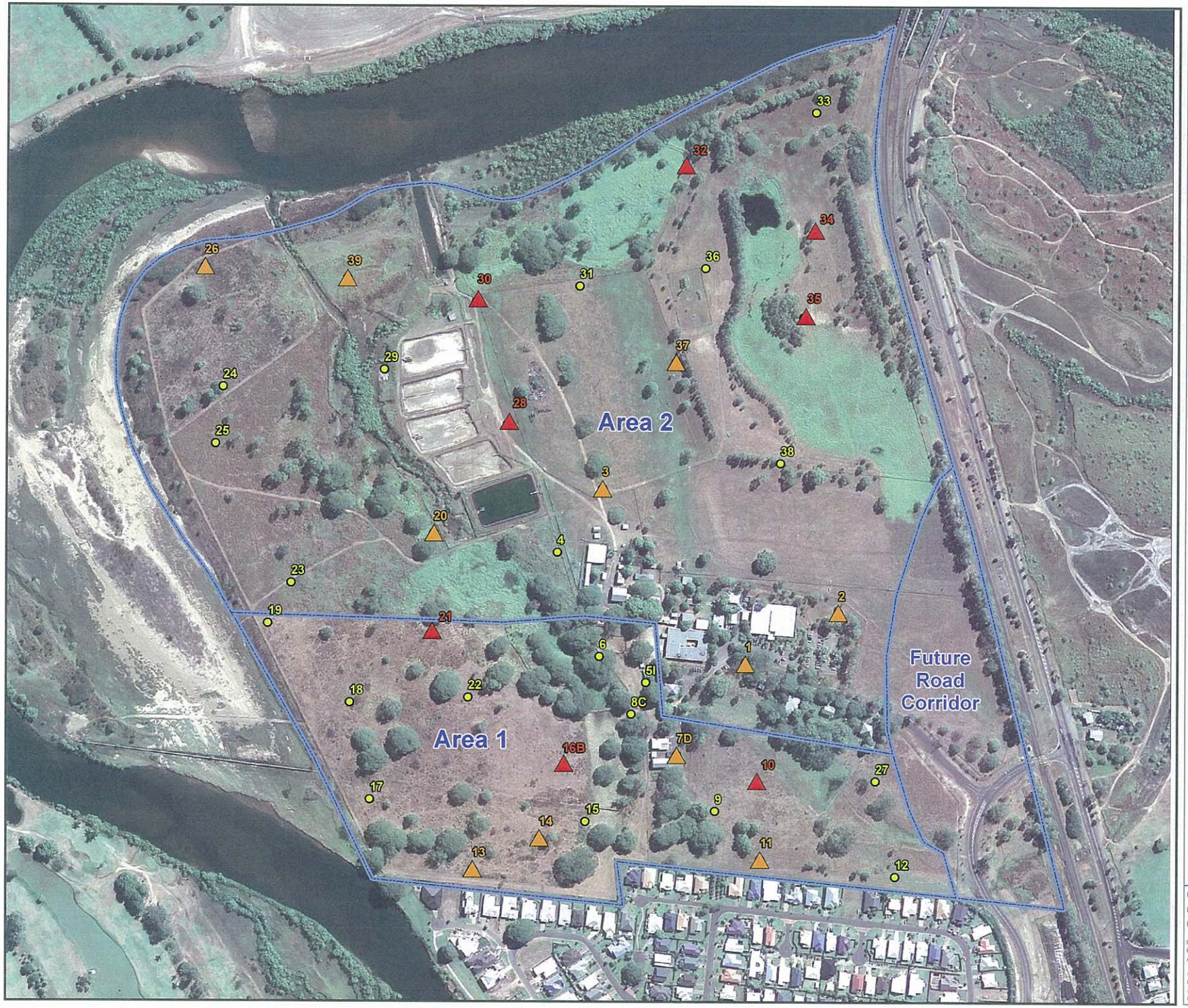
AECOM

Table 1: Summary of acid base accounting of SPOCAS and Chromium suite results

***Using Fineness Figure of 1.5**

****NALR =no additional lime required**

Key ASS analysis				Lithology	pH_{KCL}	Sulfidic Titratable Actual Acidity (sTAA)	Potential Acidity – Chromium Reduceable Sulfur(S_{CR})	Potential Acidity - Peroxide Oxidisable Sulfur (S_{POS})	Acid Neutralising Capacity (ANC)	ALS Net Acidity (sulfur units)*	Net Acidity (acidity units)	Is this ASS?	Is this PASS?	ALS liming rate for net acidity (PASS+ASS)
Units				(Folk Classification)		% pyrite S	%S	%S	% $CaCO_3$	%S	mole H+ / t			kg $CaCO_3$/t
LOR						0.02	0.02	0.02	0.01 or 0.02	0.02	10			1
Pit ID	Depth (m)	Sample No.	Analysis							Trigger value =0.03	Trigger value =18			-
1	1	AS 1/1.0	Cr suite	Mud	5.7	<0.02	0.02	-	-	0.03	20	No	Yes	2
2	0.25	AS2/0.25	Cr suite	sandy mud	5.1	0.02	<0.02	-	-	0.04	24	Yes	No	2
2	1.25	AS 2/1.25	Cr suite	muddy sand	6	<0.02	<0.02	-	-	0.03	18	No	Yes	1
3	2	AS 3/2.0	SPOCAS	muddy sand	5.9	<0.02	-	0.02	-	0.03	21	No	Yes	2
6A	0.25	AS 6A/0.25	SPOCAS	muddy sand	5.4	<0.02	-	<0.02	-	0.03	17	No	Marginal	1
7D	1.25	AS 7D/1.25	SPOCAS	muddy clay	6	<0.02	-	0.06	-	0.07	45	No	Yes	3
7D	2.75	AS 7D/2.75	SPOCAS	Sand	6.1	<0.02	-	0.11	-	0.12	73	No	Yes	5
7D	3	AS 7D/3.0	SPOCAS	Sand	6	<0.02	-	0.1	-	0.11	69	No	Yes	5
9	1.75	AS 9/1.75	SPOCAS	muddy sand	6.8	<0.02	-	0.1	0.03	0.03	17	No	Yes	1
9	2.25	AS 9D/2.25	SPOCAS	Clay	6.7	<0.02	-	0.15	0.18	<0.02	<10	No	Yes	NALR
9	2.5	AS 9D/2.5	SPOCAS	Clay	6.6	<0.02	-	0.13	0.17	<0.02	<10	No	Yes	NALR
9	2.75	AS 9D/2.75	SPOCAS	Clay	6.5	<0.02	-	0.05	-	<0.02	10	No	Yes	NALR
10	0.5	AS 10/0.5	SPOCAS	sandy mud	5.1	0.03	-	<0.02	-	0.03	19	Yes	No	1
11	0.75	AS 11/0.75	Cr suite	sandy mud	5.7	<0.02	<0.02	-	-	0.03	18	No	Yes	1
11	2	AS 11/2.0	SPOCAS	sandy mud	5.8	<0.02	-	0.16	<0.02	0.17	105	No	Yes	8
11	2.25	AS 11/2.25	SPOCAS	Sand	5.9	<0.02	-	0.12	<0.02	0.13	80	No	Yes	6
11	2.75	AS 11/2.75	Cr suite	Mud	5.8	<0.02	<0.02	-	-	0.03	20	No	Yes	1
13	1.5	AS 13/1.5	SPOCAS	gravelly sand	6.3	<0.02	-	0.04	-	0.04	28	No	Yes	2
14	2.25	AS 14/2.25	SPOCAS	Mud	5.8	<0.02	-	0.16	0.23	0.17	109	No	Yes	8
14	3	AS 14/3.0	Cr suite	gravelly sand	6	<0.02	0.05	-	-	0.06	35	No	Yes	3
16B	1.75	AS 16B/1.75	SPOCAS	sandy mud	5.2	0.03	-	<0.02	-	0.03	19	Yes	No	1
16B	2.25	AS 16B/2.25	Cr suite	sandy mud	5.1	0.03	<0.02		-	0.03	20	Yes	No	2
19	0.5	AS 19/0.5	Cr suite	sandy mud	5.8	<0.02	<0.02	-	-	0.03	18	No	Yes	1
20	0.5	AS 20/0.5	SPOCAS	sandy mud	5.7	<0.02	-	0.1	-	0.11	66	No	Yes	5
20	1.25	AS 20/1.25	SPOCAS	sandy mud	6.1	<0.02	-	0.08	<0.02	0.08	50	No	Yes	4
20	2	AS 20/2.0	SPOCAS	Clay	6.7	<0.02	-	0.1	0.34	<0.02	<10	No	Yes	NALR
20	2.25	AS 20/2.25	SPOCAS	Clay	6.7	<0.02	-	0.09	0.34	<0.02	<10	No	Yes	NALR
20	2.5	AS 20/2.5	SPOCAS	Clay	7.2	<0.02	-	0.06	-	0.02	13	No	Yes	NALR
20	2.75	AS 20/2.75	SPOCAS	Clay	6.9	<0.02	-	0.08	-	0.23	141	No	Yes	10
20	3	AS 20/3.0	Cr suite	Clay	6.9	<0.02	0.49	-	0.59	0.37	230	No	Yes	17
20	3.25	AS 20/3.25	Cr suite	Sand	6.5	<0.02	0.04	-	-	0.04	24	No	Yes	2
21	0.5	AS 21/0.5	Cr suite	sandy mud	5.6	0.03	<0.02	-	-	0.03	17	Marginal	No	1
21	0.75	AS 21/0.75	Cr suite	Mud	5.5	0.03	<0.02	-	-	0.03	16	Marginal	No	1
21	1.25	AS 21/1.25	Cr suite	sandy mud	5.9	<0.02	<0.02	-	-	0.03	18	Yes	No	1
24	1.25	AS 24/1.25	SPOCAS	gravelly sand	7.5	<0.02	-	0.03	<0.02	<0.02	<10	No	Yes	NALR
26	0.25	AS 26/0.25	SPOCAS	Sand	6.1	<0.02	-	0.03	-	0.04	24	No	Yes	2
26	0.5	AS 26/0.5	SPOCAS	Sand	6.1	<0.02	-	0.04	-	0.04	27	No	Yes	2
27	2.75	AS 27/2.75	SPOCAS	Sand	6.6	<0.02	-	0.03	<0.02	<0.02	<10	No	Yes	NALR
28	1	AS 28/1.0	SPOCAS	Mud	6.7	<0.02	-	0.05	-	0.03	17	No	Yes	1
28	2	AS 28/2.0	Cr suite	muddy sand	4.6	0.03	<0.02	-	-	0.03	22	Yes	No	2
28	2.25	AS 28/2.25	Cr suite	muddy sand	4.6	0.03	<0.02	-	-	0.05	32	Yes	No	2
28	2.5	AS 28/2.5	SPOCAS	muddy sand	4.7	<0.02	-	0.02	-	0.04	25	No	Yes	2
30	0.75	AS 30/0.75	Cr suite	sandy clay	5.7	<0.02	<0.02	-	-	0.03	19	No	Yes	1
30	2.25	AS 30/2.25	SPOCAS	Sand	4.8	0.03	-	0.02	-	0.05	31	Yes	No	2
32	1.75	AS 32/1.75 (dup)	SPOCAS	sandy mud	6.5	<0.02	-	0.08	0.22	<0.02	<10	No	Yes	NALR
32	2.25	AS 32/2.25	SPOCAS	sandy mud	5.3	<0.02		0.05	-	0.06	40	No	Yes	3
32	2.5	AS 32/2.5	Cr suite	sandy mud	4.7	0.04	<0.02	-	-	0.04	26	Yes	No	2
32	2.75	AS 32/2.75	SPOCAS	sandy mud	4.6	0.03	-	<0.02	-	0.04	28	Yes	No	3
32	3.25	AS 32/3.25	SPOCAS	sandy mud	5.9	<0.02	-	0.06	-	0.07	44	No	Yes	3
34	2	AS 34/2.0	Cr suite	sandy mud	4.6	0.04	<0.02	-	-	0.04	28	Yes	No	2
34	2.25	AS 34/2.25	SPOCAS	sandy clay	4.6	0.05	-	<0.02	-	0.05	33	Yes	No	2
34	2.5	AS 34/2.50	Cr suite	sandy clay	4.5	0.06	<0.02	-	-	0.06	34	Yes	No	2
34	2.75	AS 34/2.75	SPOCAS	sandy clay	4.5	0.05	-	0.02	-	0.08	49	Yes	No	4
34	3	AS 34/3.0	SPOCAS	sandy clay	4.5	0.06	-	<0.02	-	0.07	45	Yes	No	3
35	1.75	AS 35/1.75	SPOCAS	sandy clay	4.7	0.04	-	<0.02	-	0.05	34	Yes	No	2
35	2	AS 35/2.0	Cr suite	sandy clay	4.7	0.04	<0.02	-	-	0.04	24	Yes	No	2
35	2.5	AS 35/2.5	SPOCAS	sandy clay	4.5	0.05	-	<0.02	-	0.07	44	Yes	No	3
35	2.75	AS 35/2.75	SPOCAS	sandy clay	4.6	0.05	-	<0.02	-	0.07	41	Yes	No	3
35	3	AS 35/3.0	Cr suite	sandy clay	4.9	0.04	0.05	-	-	0.09	57	Yes	No	4
39	0.25	AS 39/0.25	SPOCAS	sandy mud	6.2	<0.02	-	0.03	-	0.03	21	No	Yes	2
39	0.75	AS 39/0.75	SPOCAS	sandy clay	6.2	<0.02	-	0.07	0.13	0.08	47	No	Yes	4
39	1.25	AS 39/1.25	Cr suite	sandy clay	6.2	<0.02	0.02	-	-	0.03	21	No	Yes	2
39	1.5	AS 39/1.5	Cr suite	sandy clay	6.3	<0.02	0.42	-	-	0.42	266	No	Yes	20



ACID SULPHATE SOIL INVESTIGATION FOR OONOONBA LAND DEVELOPMENT

Acid Sulphate Soil Detected

Figure 2

Legend

- Sample Location
- PASS
- AASS
- Study Sites

0 25 50 100 150
Metres

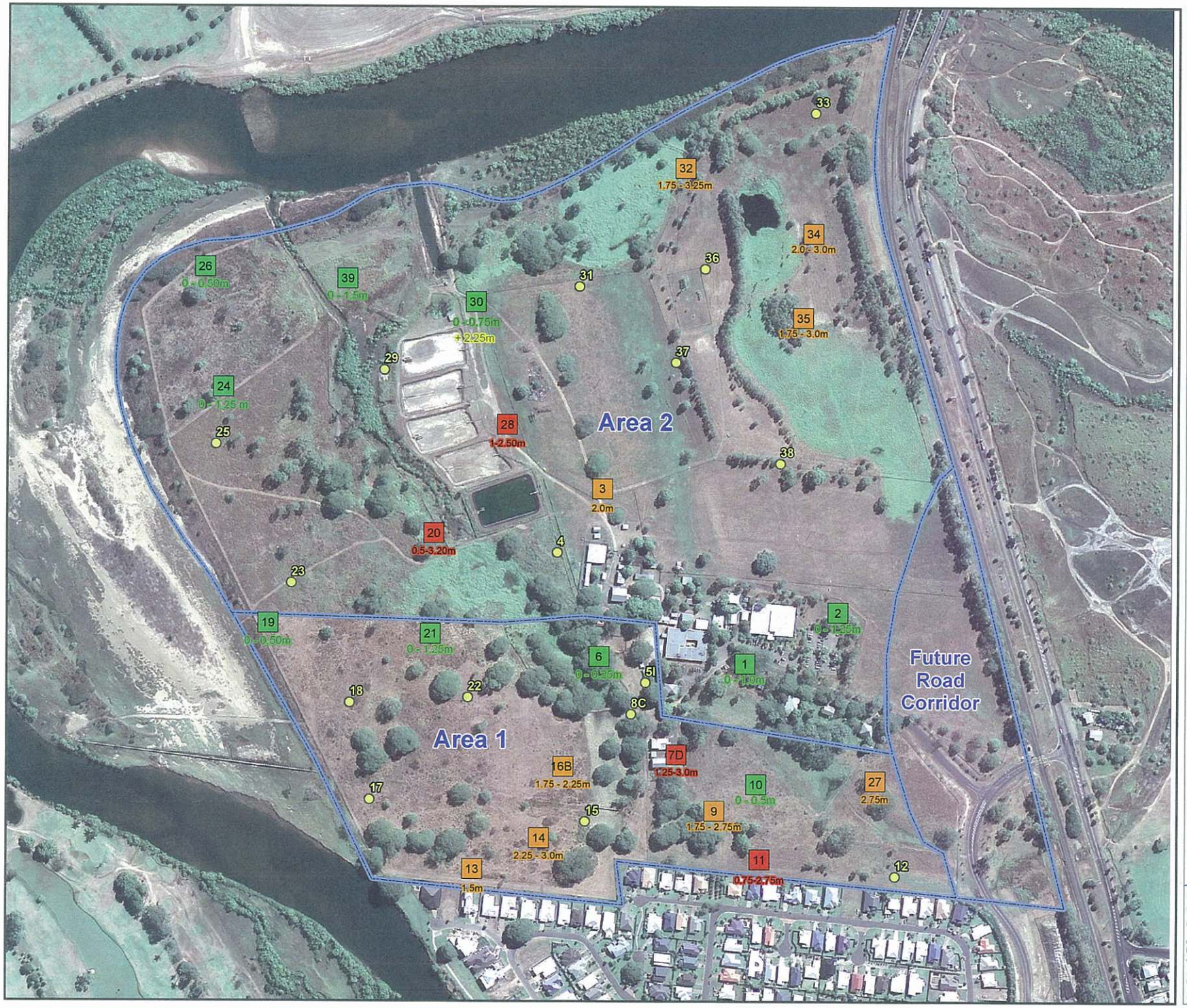
Scale: 1:4,000 (when printed at A3)

PROJECT ID 601Qxxx
LAST MODIFIED CFS 12-Jul-2010
FILE NAME 601XXXX_ENV_011

AECOM

© 2009 Google - Imagery © 2010 GeoEye
Roads, Rivers etc - © 2009 MapDataSciences
Acid Sulphate Soils Sample Sites provided by AECOM Townsville

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk
AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information



ACID SULPHATE SOIL INVESTIGATION FOR OONOONBA LAND DEVELOPMENT

Depth range of ASS below ground level

Figure 3

- Sample Location
- ASS at Surface
- ASS At Depth
- ASS Whole Profile
- Study Sites

0 25 50 100 150
Metres

Scale: 1:4,000 (when printed at A3)

PROJECT ID 6010xxxx
LAST MODIFIED CFS 12-Jul-2010
FILE NAME 6010XXX_ENV_013

AECOM

© 2009 Google - Image © 2010 GeoEye
Roads, Rivers etc - © 2009 MapDataSciences
Acid Sulphate Soils Sample Sites provided by AECOM Townsville

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

4.0 Discussion of Results

Potential project constraints in relation to the distribution of acid sulfate soils are described below.

Borrowing of material for fill

There are a number of sites in the western part of the property that may be suitable for the borrowing of sand where PASS does not occur. For those pockets where PASS does occur e.g. TP 19, 21, 24, 26, these are located at relatively shallow depths and are at the action criteria threshold so could be readily treated. Where PASS occurs in coarse sands, these are likely to oxidise very quickly (sometimes within hours) in comparison to finer material and that management strategies will need to accommodate this through for example, ensuring exposed material is removed and treated straight away within a stockpile setup. For material located in the point bar feature to the west of the property boundary, it is not likely that PASS would be present given that it is an active channel feature that is on occasion mobilised and therefore readily oxidised.

Emplacement of fill on site

Any proposed infilling of the relict western channel structure or the eastern depression would require dewatering of those areas followed by the drying of surrounding material prior to infilling of the voids to an appropriate level with fill (as described in the geotechnical assessment reporting). Substantial thicknesses of acid sulfate soils have been identified at the surface and at depth in areas adjacent to these ponds (Figure 3, Table 1). Dewatering activities will temporarily alter local groundwater levels and may expose PASS to oxidation processes and AASS to further oxidation. It is therefore likely that acid sulfate soils will need to be treated in these areas. It is also probable that water from the ponds and dewatering process may need to be treated prior to removal /discharge from site. Given the scale at which the dewatering would need to occur, this activity will require a specific dewatering management plan to ensure environmental risk to the nearby ecosystems of Ross River and any future open space /residential land use are minimised as a consequence of acid sulfate soil disturbance and temporary /permanent changes to the water table.

A number of settlement issue areas have been identified in the Geotechnical Assessment of Land Suitability for residential development associated with a soft clay layer at depth in the north eastern part of the property, and at a number of sites across the property where loose sands commonly occur near the surface. In the north east corner of the site, changes to the seasonal movement of the water table in the acid sulfate clay unit (as a result of fill loading) may result in the additional mobilisation of acidity by groundwater. Although acidity values are relatively low in this clay unit, actual acid sulfate soils were present in three test pits showing some continuity of the layer. Further investigation of changes to groundwater levels in this area would be best assessed in conjunction with next step geotechnical investigations once the master plan has been finalised. For areas containing acid sulfate soils in the surface profile, it is likely that preparations of the site to meet geotechnical requirements will also need to consider the management of PASS before the fill is emplaced. Recommended liming results for surface acid sulfate areas of 6kg $CaCO_3$ /t are suitable with a 10 kg $CaCO_3$ /t at the surface of TP 20 (ie. using twice the ALS liming rate which all ready encompasses a 1.5 safety factor).

It is anticipated that potential risks to the environment and future land uses associated with dewatering activities as described above, are greater than those posed by changes to water tables as a consequence of fill loading.

Infrastructure considerations

It is not likely that the distribution of acid sulfate soils will constrain the placement of services in general, but the following considerations are presented. The final configuration of the development site will require the elevation of lots to be at least a minimum of 3.9m AHD. Thus fill in some of the lower lying areas around the western relict channel feature and in the northern part of the site may be between 0.5 and 1.5m in depth.

The construction of the potable water system for the development would involve burial of water pipes at depths of up to 1m below ground level so that potential impacts associated with ground disturbance of acid sulfate soils are considered to be relatively minor and manageable given the depths involved and low acidity values of surface acid sulfate soils. The pipes if comprised of PVC material, will not suffer corrosion as a consequence of the presence of acid sulfate soils.

For the sewerage system, greater burial depths of up to 4m below ground level may be required in the area. A choice of suitable materials for the pipe should be considered if traversing acid sulfate soils at depth, with PVC materials not susceptible to acid sulfate soil corrosion. For other infrastructure considerations such as for example the construction of a sewerage pumping station, removal of any acid sulfate soils that are present beneath the building footprint if present is recommended and the void backfilled with more suitable material to

limit any potential for structural building /system damage. Should dewatering activities be required to bury the sewage mains then a specific management plan will be required as previously discussed for dewatering activities.

When designing the urban stormwater system, consideration must be given to those areas where large structures requiring substantial excavation may be needed such as that associated with detention basins or long drains and for specific structures which may have a small footprint but deep excavation.

General earthwork activities

As described previously, the distribution of acid sulfate soils is grouped into four types. Both Areas 1 and 2 contain all four groups with acid sulfate soils present at the surface, at depth, throughout the whole profile, and areas where ASS was not sampled.

In the DPI buildings area, where buildings will be demolished, sampling indicated that acid sulfate soils may only be present in the surface profile (ie. down to 1.5m below ground level).

5.0 Recommendations

In accordance with SPP 2/02 and under a general duty of care, a detailed acid sulfate soil management plan will be required given the distribution of acid sulfate soils across the site and identified potential impacts associated with the likely disturbance of acid sulfate soils by the development activities discussed above.

Potential impacts associated with the disturbance of acid sulfate soil in shallow areas (<1.5m below ground level) are considered to be low risk to the environment while the major risk is associated with dewatering activities in areas containing acid sulfate soils throughout the whole profile and at depth.

Management of site runoff and infiltration will be important given the proximity to Ross River and shallow nature of the water table. During the construction phase, stockpiling of acid sulfate soils for treatment without containment and consideration for infiltration into the ground beneath for example, will not be acceptable. Stormwater runoff during construction will need to be managed on site in a way that diverts clean water away from stockpile areas and prevents the transport of untreated runoff from stockpiles. For the final water sensitive urban design, consideration of the layout in terms of channelization of flow over certain parts of the site will need to be considered and the infiltration to the underlying water table and ASS at depth. Neutralisation of acidity in ASS by marine waters in nearby Ross River should not be relied upon as the primary means for dilution or neutralisation processes.

As the distribution of acid sulfate soils does not appear to be continuous in its distribution with specific lithologies across the site, a comprehensive field testing procedure would be included as part of the acid sulfate soil management plan for excavation work.

Yours faithfully
for AECOM AUSTRALIA PTY LTD

Sonya Bryce
Principal Scientist
sonya.bryce@aecom.com

encl: Attachment A: Field Screen Test Results
Attachment B: ASS Analytical Results
Attachment C: Acid Base Accounting

AECOM

Attachment A – Field Tests Table

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
TP01	0.25	N	6.68	4.59	H
	0.50	N	7.54	5.91	M
	0.75	N	7.68	4.37	H
	1.00	L	6.10	6.11	H
	1.25	N	7.21	5.50	M
	1.50	N	6.54	5.37	H
	1.75	N	6.80	5.00	M
	2.00	L	6.33	5.86	H
	2.25	N	7.73	6.51	M
	2.50	L	6.24	4.76	E
	2.75	N	6.53	4.61	E
	3.00	N	7.36	6.57	L
TP02	0.25	N	7.08	6.51	L
	0.50	N	6.54	5.26	M
	0.75	N	7.82	4.40	H
	1.00	N	6.50	4.55	E
	1.25	N	7.93	5.72	E
	1.50	N	6.85	4.51	L
	1.75	N	6.81	4.99	L
	2.00	L	6.26	4.86	M
	2.25	N	6.97	7.00	L
	2.50	L	6.41	6.06	H
	2.75	N	7.44	6.16	M
	3.00	N	7.14	5.74	E
TP03	0.25	N	7.87	4.57	E
	0.50	L	6.03	5.56	L
	0.75	N	7.26	6.57	M
	1.00	N	6.71	5.95	L
	1.25	N	7.67	5.56	M
	1.50	N	7.18	4.47	M
	1.75	N	7.87	5.22	H
	2.00	N	6.81	5.86	E
TP04	0.25	N	7.46	5.98	M
	0.50	N	7.09	6.31	M
	0.75	N	7.41	5.38	H
	1.00	N	7.22	6.26	E
	1.25	L	6.12	5.26	E
	1.50	N	7.49	4.46	M
	1.75	N	7.63	6.16	L
TP05I	0.25	N	6.70	5.28	E
	0.50	N	7.82	5.37	E
	0.75	N	6.70	4.46	L
	1.00	N	7.59	5.28	L
	1.25	N	6.85	3.70	M
	1.50	N	7.03	5.05	M
	1.75	N	7.53	5.32	H
	2.00	N	7.91	4.75	E
	2.25	N	6.50	5.91	E
TP06A	0.25	N	6.75	6.37	M
	0.50	N	6.90	4.60	H
	0.75	N	6.82	5.56	M

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	1.00	N	7.97	4.02	E
	1.25	N	7.40	5.20	L
	1.50	N	7.50	4.50	M
	1.75	N	6.72	6.44	M
	2.00	N	7.55	4.46	L
	2.25	N	7.62	5.94	E
	2.50	N	6.53	5.56	L
	2.75	N	6.78	4.22	H
	3.00	N	6.91	5.27	M
TP07A	0.25	N	7.99	6.57	H
	0.50	N	7.55	5.99	E
	0.75	N	7.02	5.95	E
	1.00	L	6.43	5.11	M
	1.25	L	6.38	4.57	H
	1.50	N	6.88	6.65	M
	1.75	L	6.04	5.31	L
	2.00	N	7.92	4.65	M
	2.25	N	7.55	5.61	L
	2.50	N	7.68	4.83	H
	2.75	N	7.57	5.03	M
	3.00	N	7.48	4.43	H
TP08C	0.25	N	7.77	6.21	E
	0.50	L	6.04	4.51	E
	0.75	N	6.86	6.76	L
	1.00	N	7.57	6.45	H
	1.25	L	6.39	4.95	M
	1.50	L	6.03	5.81	L
	1.75	L	6.01	5.94	L
	2.00	N	6.64	4.45	M
	2.25	N	7.88	6.77	L
	2.50	L	6.49	4.95	L
	2.75	N	6.93	6.15	M
	3.00	N	7.48	4.04	H
TP09	0.25	N	7.34	5.53	E
	0.50	N	7.04	4.79	E
	0.75	L	6.32	6.45	H
	1.00	N	7.76	6.75	L
	1.25	N	6.94	5.93	M
	1.50	N	6.58	6.84	L
	1.75	N	7.40	4.62	M
	2.00	N	6.61	4.68	M
	2.25	L	6.41	6.63	H
	2.50	N	6.58	4.69	E
	2.75	N	6.88	5.38	E
	3.00	L	6.27	4.43	H
TP10	0.25	L	6.24	4.89	L
	0.50	N	6.54	4.99	M
	0.75	N	6.57	5.87	L
	1.00	N	7.48	5.52	M
	1.25	L	6.01	4.52	M
	1.50	N	6.91	6.46	H
	1.75	N	6.99	6.64	E
TP11	0.25	N	6.86	5.67	H
	0.50	N	7.54	5.34	E
	0.75	N	6.64	5.90	E

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	1.00	N	7.67	6.93	L
	1.25	N	7.40	5.85	L
	1.50	N	7.41	6.03	L
	1.75	L	6.37	5.20	M
	2.00	N	6.60	5.82	H
	2.25	N	7.24	6.03	E
	2.50	N	7.30	5.11	E
	2.75	N	7.79	6.25	L
	3.00	N	7.04	6.97	L
TP12	0.25	N	6.58	5.52	M
	0.50	N	6.72	5.78	L
	0.75	N	6.74	4.01	H
	1.00	L	6.48	6.64	M
	1.25	N	7.17	6.17	E
	1.50	N	7.37	6.25	E
	1.75	L	6.19	4.77	M
	2.00	N	7.21	4.22	E
	2.25	N	6.66	6.83	M
	2.50	N	7.90	6.25	H
	2.75	N	6.53	4.55	E
	3.00	N	6.91	4.97	E
TP13	0.25	N	6.83	6.35	L
	0.50	L	6.12	5.22	H
	0.75	N	7.26	5.17	E
	1.00	N	7.80	6.70	E
	1.25	N	6.70	6.30	L
	1.50	N	6.84	4.25	E
	1.75	N	7.29	4.86	M
	2.00	N	6.58	5.62	H
	2.25	L	6.45	5.61	H
	2.50	L	6.12	5.23	H
	2.75	L	6.21	4.22	E
	3.00	N	6.74	6.19	M
TP14	0.25	N	7.71	6.10	M
	0.50	L	6.41	5.53	H
	0.75	N	7.98	5.00	H
	1.00	N	7.15	5.79	H
	1.25	N	7.08	6.88	L
	1.50	N	7.80	5.09	L
	1.75	L	6.33	4.54	M
	2.00	N	6.67	5.72	H
	2.25	L	6.21	5.43	E
	2.50	N	7.35	4.35	E
	2.75	L	6.44	4.58	L
	3.00	L	6.17	6.46	L
TP15	0.25	N	7.83	6.60	M
	0.50	N	7.92	4.02	L
	0.75	N	7.29	4.86	L
	1.00	L	6.40	6.48	M
	1.25	L	6.28	4.95	M
	1.50	N	7.75	6.50	H
	1.75	N	7.44	5.02	E
	2.00	L	6.33	4.84	E
TP16B	0.25	N	7.28	5.96	L
	0.50	N	7.64	4.65	L

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	0.75	N	7.01	5.60	M
	1.00	N	7.20	5.20	H
	1.25	N	6.40	4.50	E
	1.50	N	7.44	4.71	E
	1.75	N	7.07	5.17	L
	2.00	N	7.90	4.36	L
	2.25	L	6.70	4.90	M
	2.50	L	6.40	5.75	L
	2.75	N	7.61	4.67	L
	3.00	L	6.14	6.02	M
TP17	0.25	N	7.73	4.05	L
	0.50	N	6.72	4.08	M
	0.75	N	7.23	5.50	H
	1.00	N	6.67	4.27	E
	1.25	L	6.16	6.64	E
	1.50	N	7.56	4.25	L
	1.75	N	7.10	6.42	M
	2.00	N	6.81	4.24	M
	2.25	N	7.76	4.03	E
	2.50	N	7.83	4.13	M
	2.75	N	6.97	5.73	H
	3.00	N	6.77	5.88	E
TP18	0.25	N	6.57	4.37	H
	0.50	N	8.00	4.65	L
	0.75	N	7.67	6.13	L
	1.00	N	7.06	4.98	M
	1.25	N	7.19	5.45	H
	1.50	L	6.38	5.43	E
	1.75	N	7.26	6.68	E
	2.00	L	6.18	5.81	L
	2.25	N	7.78	4.74	L
	2.50	N	7.33	4.86	M
	2.75	N	7.18	5.15	L
	3.00	L	6.01	6.22	L
TP19	0.25	N	6.79	4.93	M
	0.50	N	7.73	4.11	H
	0.75	L	6.40	6.15	E
	1.00	N	6.74	4.81	E
	1.25	L	6.30	5.03	L
	1.50	N	6.97	6.76	L
TP20	0.25	N	7.76	6.75	M
	0.50	N	7.34	6.25	L
	0.75	N	6.62	5.72	M
	1.00	L	6.15	4.81	M
	1.25	N	6.97	4.70	L
	1.50	L	6.05	5.57	M
	1.75	N	6.79	6.68	H
	2.00	N	6.55	6.78	E
	2.25	N	6.58	6.36	E
	2.50	N	7.09	5.75	L
	2.75	N	7.03	5.11	L
	3.00	N	7.56	4.75	M
	3.25	N	6.82	4.56	M
TP21	0.25	L	6.46	6.86	L
	0.50	L	6.19	5.04	L

AECOM

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	0.75	N	7.20	4.72	M
	1.00	N	7.74	5.84	H
	1.25	N	7.85	5.69	L
	1.50	N	6.51	5.28	E
	1.75	N	6.73	6.71	M
	2.00	L	6.22	6.53	H
	2.25	N	7.55	4.44	L
	2.50	N	6.69	4.44	L
	2.75	L	6.10	4.07	M
	3.00	N	7.56	5.00	H
TP22	0.25	N	6.69	4.24	E
	0.50	N	7.46	6.73	E
	0.75	N	7.89	6.17	L
	1.00	N	7.90	6.02	L
	1.25	N	7.12	5.96	M
	1.50	N	6.50	5.00	M
	1.75	N	6.84	5.54	H
TP23	0.25	L	6.43	4.55	H
	0.50	N	7.10	4.02	E
	0.75	N	6.83	5.46	E
	1.00	N	6.92	4.68	L
	1.25	N	6.96	5.33	M
	1.50	L	6.09	4.60	M
	1.75	L	6.32	5.53	H
	2.00	N	8.00	4.12	E
TP24	0.25	N	7.04	6.70	L
	0.50	N	6.52	6.63	L
	0.75	N	6.74	4.32	M
	1.00	N	7.81	4.02	E
	1.25	N	7.09	5.35	L
TP25	0.25	N	6.99	5.09	L
	0.50	N	7.07	5.40	L
	0.75	N	7.63	6.81	M
	1.00	N	7.32	6.77	H
	1.25	N	7.54	6.99	E
	1.50	N	7.58	4.30	E
	1.75	N	7.65	4.46	L
	2.00	N	6.54	4.95	L
TP26	0.25	L	6.45	5.31	E
	0.50	N	6.61	5.54	L
	0.75	L	6.03	5.82	L
	1.00	N	6.64	4.04	L
	1.25	N	7.51	6.30	M
	1.50	L	6.09	4.22	H
	1.75	N	6.61	5.65	E
	2.00	N	7.65	4.67	E
TP27	0.25	L	6.44	4.65	L
	0.50	N	6.67	6.20	M
	0.75	L	6.43	4.76	H
	1.00	N	7.35	5.98	E
	1.25	N	7.69	5.69	E
	1.50	N	7.57	6.42	L
	1.75	L	6.19	5.36	L
	2.00	N	6.79	6.67	L
	2.25	L	6.13	5.60	M

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	2.50	N	6.54	6.40	H
	2.75	N	7.36	4.40	E
	3.00	N	6.92	5.19	E
TP28	0.25	N	7.06	6.59	L
	0.50	N	7.56	6.31	L
	0.75	N	6.90	6.34	M
	1.00	N	6.66	4.46	L
	1.25	N	7.70	4.64	L
	1.50	N	7.24	6.05	M
	1.75	L	6.46	6.95	E
	2.00	N	7.79	4.92	L
	2.25	N	7.79	6.68	L
	2.50	N	6.67	6.35	M
	2.75	L	6.18	6.02	L
	3.00	N	7.77	6.31	M
TP29	0.25	N	7.99	5.11	H
	0.50	N	7.40	6.44	E
	0.75	N	7.56	6.24	E
	1.00	L	6.13	6.72	L
	1.25	N	6.77	6.38	M
	1.50	N	7.58	5.38	M
	1.75	L	6.24	6.34	H
	2.00	N	7.88	6.63	E
	2.25	L	6.23	4.92	H
	2.50	L	6.01	4.90	L
	2.75	L	6.24	5.60	L
	3.00	N	7.93	4.46	M
TP30	0.25	N	7.24	5.52	L
	0.50	N	7.02	6.85	L
	0.75	N	7.11	4.03	M
	1.00	N	7.42	4.73	H
	1.25	N	6.98	4.36	E
	1.50	N	6.76	6.28	E
	1.75	N	6.75	4.79	L
	2.00	L	6.20	5.90	L
	2.25	N	7.04	6.50	E
TP31	0.25	N	6.54	6.42	H
	0.50	N	7.43	6.74	H
	0.75	L	6.05	5.07	E
	1.00	N	6.50	5.74	L
	1.25	N	7.20	6.80	L
	1.50	N	7.94	6.85	M
	1.75	N	7.86	6.61	H
	2.00	N	7.39	5.67	E
	2.25	N	7.34	6.15	E
	2.50	L	6.03	4.54	L
	2.75	L	6.26	5.54	M
	3.00	N	7.13	5.05	M
TP32	0.25	N	7.74	5.60	E
	0.50	N	6.64	5.37	E
	0.75	L	6.06	4.71	L
	1.00	N	7.07	4.04	L
	1.25	N	7.69	6.25	M
	1.50	L	6.44	4.95	L
	1.75	N	7.77	5.29	M

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	2.00	N	6.53	6.38	H
	2.25	N	7.06	4.39	E
	2.50	N	7.73	4.85	H
	2.75	L	6.40	5.21	L
	3.00	N	7.97	6.50	L
	3.25	N	6.74	4.78	M
TP33	0.25	N	6.76	6.19	M
	0.50	N	7.64	6.93	L
	0.75	N	7.03	6.52	L
	1.00	N	7.40	4.21	M
	1.25	N	7.48	5.25	M
	1.50	N	6.66	4.24	H
	1.75	N	7.93	5.70	E
	2.00	N	7.45	5.14	H
	2.25	L	6.36	5.56	L
	2.50	N	6.97	4.10	M
	2.75	N	7.30	4.01	M
	3.00	N	6.90	5.43	H
TP34	0.25	N	7.89	6.91	E
	0.50	N	7.97	5.54	E
	0.75	N	7.56	4.41	L
	1.00	N	6.97	5.76	L
	1.25	L	6.04	5.65	E
	1.50	L	6.16	5.94	H
	1.75	N	7.81	5.73	L
	2.00	N	7.15	5.83	L
	2.25	N	7.44	5.07	H
	2.50	N	7.30	5.24	M
	2.75	N	7.21	6.33	H
	3.00	N	6.60	5.77	E
TP35	0.25	N	6.56	5.69	E
	0.50	N	7.56	5.23	L
	0.75	N	7.21	6.96	M
	1.00	N	6.87	5.08	M
	1.25	L	6.43	5.41	H
	1.50	N	6.84	4.23	H
	1.75	N	6.56	4.54	E
	2.00	N	7.70	5.97	L
	2.25	N	7.38	5.62	L
	2.50	L	6.47	4.35	M
	2.75	N	6.56	5.64	H
	3.00	N	7.50	6.50	H
TP36	0.25	N	6.90	6.25	E
	0.50	N	7.67	4.11	L
	0.75	L	6.19	4.27	M
	1.00	N	7.69	5.30	M
	1.25	N	7.07	6.00	H
	1.50	N	6.97	6.06	E
	1.75	L	6.06	4.23	E
	2.00	N	6.83	6.83	L
	2.25	N	7.98	6.71	L
	2.50	N	6.88	6.10	E
	2.75	L	6.22	6.85	H
	3.00	N	7.49	4.08	L
TP37	0.25	N	7.74	5.52	L

Test Pit ID	Depth (m)	*Reaction$_F$	pH$_F$	pH$_{FOX}$	*Reaction$_{FOX}$
	0.50	N	7.43	4.85	M
	0.75	N	7.31	4.03	H
	1.00	N	7.84	4.12	E
	1.25	L	6.22	4.05	E
	1.50	N	6.68	4.19	L
	1.75	N	6.77	4.11	L
	2.00	N	6.98	6.51	M
	2.25	L	6.06	5.34	M
	2.50	N	7.15	5.10	H
	2.75	N	7.57	6.08	E
	3.00	L	6.30	4.75	E
TP38	0.25	N	7.14	5.16	L
	0.50	N	6.96	6.33	M
	0.75	N	7.38	4.27	M
	1.00	N	7.69	4.94	E
	1.25	N	6.82	6.18	L
	1.50	N	7.59	5.32	L
	1.75	N	7.71	6.32	M
	2.00	N	6.81	6.60	H
	2.25	N	7.82	6.87	E
	2.50	L	6.32	6.01	E
	2.75	N	7.93	6.76	L
	3.00	N	7.63	5.12	M
TP39	0.25	N	7.82	4.52	M
	0.50	N	7.76	6.48	E
	0.75	N	7.28	6.67	L
	1.00	L	6.10	5.74	L
	1.25	N	7.18	4.53	M
	1.50	N	7.66	4.88	M
	1.75	L	6.31	5.99	H
	2.00	N	7.58	6.21	E

*Reaction Codes: N =None, L=Low, M=Medium, H=High, E=Extreme

AECOM

Analyte	Units	LOR	Sample	AS01/1.0	AS01/1.5	AS01/2.0	AS01/2.25	AS01/2.5	AS01/3.0	5	AS02/0.75	AS02/1.25	AS02/1.5	AS02/1.75	AS02/2.25	AS02/2.75	5	AS02/3.0	AS03/1.5	AS03/2.0	AS04/0.25	AS04/0.5	AS04/0.75	AS04/1.25	AS04/1.5	5
			Date Sampled	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	15/04/2010	16/04/2010	16/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010
			Analysis	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	Cr Suite	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite
			Criteria																							
EA029-A: pH Measurements																										
pH KCl (23A)	pH Unit	0.1		-	6.1	-	6.2	-	-	-	-	-	6	-	6.2	6.3	-	6.4	-	5.9	-	6.5	-	6.4	-	-
pH OX (23B)	pH Unit	0.1		-	5.9	-	7.7	-	-	-	-	-	7.1	-	7.4	7.8	-	7.1	-	4.8	-	7	-	6.4	-	-
EA029-B: Acidity Trail																										
Titratable Actual Acidity (23F)	mole H+ / t	2		-	3	-	<2	-	-	-	-	-	5	-	4	<2	-	<2	-	6	-	<2	-	3	-	-
Titratable Peroxide Acidity (23G)	mole H+ / t	2		-	4	-	<2	-	-	-	-	-	<2	-	<2	<2	-	<2	-	9	-	<2	-	6	-	-
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		-	<2	-	<2	-	-	-	-	-	<2	-	<2	<2	-	<2	-	3	-	<2	-	<2	-	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
EA029-C: Sulfur Trail																										
KCl Extractable Sulfur (23Ce)	% S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
Peroxide Sulfur (23De)	% S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	0.02	-	<0.02	-	0.02	-	<0.02	-	<0.02	-	-
Peroxide Oxidisable Sulfur (23E)	% S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	0.02	-	<0.02	-	0.02	-	<0.02	-	<0.02	-	-
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		-	<10	-	<10	-	-	-	-	-	<10	-	<10	15	-	<10	-	15	-	<10	-	<10	-	-
EA029-D: Calcium Values																										
KCl Extractable Calcium (23Vh)	% Ca	0.02		-	<0.02	-	0.02	-	-	-	-	-	0.11	-	0.12	0.02	-	0.05	-	0.02	-	0.19	-	0.05	-	-
Peroxide Calcium (23Wh)	% Ca	0.02		-	<0.02	-	0.02	-	-	-	-	-	0.12	-	0.12	0.03	-	0.06	-	0.02	-	0.21	-	0.06	-	-
Acid Reacted Calcium (23X)	% Ca	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		-	<10	-	<10	-	-	-	-	-	<10	-	<10	<10	-	<10	-	<10	-	<10	-	<10	-	-
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
EA029-E: Magnesium Values																										
KCl Extractable Magnesium (23Sm)	% Mg	0.02		-	<0.02	-	0.03	-	-	-	-	-	0.05	-	0.05	0.03	-	0.04	-	<0.02	-	0.11	-	0.04	-	-
Peroxide Magnesium (23Tm)	% Mg	0.02		-	<0.02	-	0.02	-	-	-	-	-	0.05	-	0.06	0.03	-	0.05	-	<0.02	-	0.12	-	0.04	-	-
Acid Reacted Magnesium (23U)	% Mg	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		-	<10	-	<10	-	-	-	-	-	<10	-	<10	<10	-	<10	-	<10	-	<10	-	<10	-	-
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
EA029-F: Excess Acid Neutralising Capacity																										
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	-	0.07	-	-	-	-	-	0.09	-	0.08	0.06	-	<0.02	-	-	-	0.33	-	-	-	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	-	13	-	-	-	-	-	18	-	16	13	-	<10	-	-	-	65	-	-	-	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	-	0.02	-	-	-	-	-	0.03	-	0.02	0.02	-	<0.02	-	-	-	0.1	-	-	-	-
EA029-H: Acid Base Accounting																										
ANC Fineness Factor	-	0.5		-	1.5	-	1.5	-	-	-	-	-	1.5	-	1.5	1.5	-	1.5	-	1.5	-	1.5	-	1.5	-	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	-	<0.02	-	-	-	-	-	<0.02	-	<0.02	0.02	-	<0.02	-	0.03	-	<0.02	-	<0.02	-	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	<10	-	<10	-	-	-	-	-	<10	-	<10	15	-	<10	-	21	-	<10	-	<10	-	-
Liming Rate	kg	1		-	<1	-	<1	-	-	-	-	-	<1	-	<1	1	-	<1	-	2	-	<1	-	<1	-	-
EA033-A: Actual Acidity																										
pH KCl (23A)	pH Unit	0.1		5.7	-	6.1	-	5.9	6.2	5.1	5.3	6	-	5.7	-	-	6.5	-	5.9	-	5.7	-	7.7	-	5.9	6.2
Titratable Actual Acidity (23F)	mole H+ / t	2		7	-	5	-	6	3	15	12	6	-	8	-	-	<2	-	6	-	10	-	<2	-	5	2
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	<0.02	-	<0.02	<0.02	0.02	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02
EA033-B: Potential Acidity																										
Chromium Reducible Sulfur (22B)	% S	0.02		0.02	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		13	-	11	-	<10	<10	<10	<10	12	-	<10	-	-	<10	-	<10	-	<10	-	<10	-	<10	<10
EA033-C: Acid Neutralising Capacity																										
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.55	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	-	-	-
EA033-E: Acid Base Accounting																										
ANC Fineness Factor	-	0.5		1.5	-	1.5	-	1.5	1.5	1.5	1.5	1.5	-	1.5	-	-	1.5	-	1.5	-	1.5	-	1.5	-	1.5	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	0.03	-	0.02	-	<0.02	<0.02	0.04	<0.02	0.03	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	20	-	16	-	<10	<10	24	12	18	-	<10	-	-	<10	-	<10	-	10	-	<10	-	<10	<10
Liming Rate	kg	1		2	-	1	-	<1	<1	2	<1	1	-	<1	-	-	<1	-	<1	-	<1	-	<1	-	<1	<1

AECOM

			Sample	AS05/1.25	5	5	25	AS06A/0.5	5	AS06A/2.0	AS06A/3.0	AS07D/0.5	5	5	5	5	AS07D/3.0	5	AS08C/0.5	0	5	5	5	5	0	5
			Date Sampled	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	15/04/2010
Analyte	Units	LOR	Analysis	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite
			Criteria																							
EA029-A: pH Measurements																										
pH KCl (23A)	pH Unit	0.1		6.8	-	5.8	5.4	-	-	6.9	-	-	6	-	-	6.1	6	-	5.7	-	-	6	-	5.9	6.1	-
pH OX (23B)	pH Unit	0.1		7.6	-	5.5	5.8	-	-	6.9	-	-	5.8	-	-	6.4	6.2	-	6.1	-	-	5.8	-	5.8	5.6	-
EA029-B: Acidity Trail																										
Titratable Actual Acidity (23F)	mole H+ / t	2		<2	-	7	17	-	-	<2	-	-	5	-	-	6	6	-	9	-	-	5	-	5	4	-
Titratable Peroxide Acidity (23G)	mole H+ / t	2		6	-	14	<2	-	-	8	-	-	3	-	-	6	7	-	4	-	-	9	-	12	7	-
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		6	-	7	<2	-	-	8	-	-	<2	-	-	<2	<2	-	<2	-	-	4	-	7	<2	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	<0.02	0.03	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		<0.02	-	0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
EA029-C: Sulfur Trail																										
KCl Extractable Sulfur (23Ce)	% S	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
Peroxide Sulfur (23De)	% S	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	0.06	-	-	0.11	0.1	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
Peroxide Oxidisable Sulfur (23E)	% S	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	0.06	-	-	0.11	0.1	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		<10	-	<10	<10	-	-	<10	-	-	40	-	-	68	63	-	<10	-	-	<10	-	<10	<10	-
EA029-D: Calcium Values																										
KCl Extractable Calcium (23Vh)	% Ca	0.02		0.07	-	0.03	0.13	-	-	0.05	-	-	0.06	-	-	0.13	0.11	-	0.07	-	-	0.02	-	<0.02	<0.02	-
Peroxide Calcium (23Wh)	% Ca	0.02		0.07	-	0.03	0.14	-	-	0.05	-	-	0.06	-	-	0.11	0.1	-	0.07	-	-	0.02	-	<0.02	<0.02	-
Acid Reacted Calcium (23X)	% Ca	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		<10	-	<10	<10	-	-	<10	-	-	<10	-	-	<10	<10	-	<10	-	-	<10	-	<10	<10	-
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
EA029-E: Magnesium Values																										
KCl Extractable Magnesium (23Sm)	% Mg	0.02		<0.02	-	<0.02	<0.02	-	-	<0.02	-	-	<0.02	-	-	0.15	0.14	-	0.02	-	-	<0.02	-	<0.02	<0.02	-
Peroxide Magnesium (23Tm)	% Mg	0.02		<0.02	-	<0.02	<0.02	-	-	0.02	-	-	<0.02	-	-	0.13	0.13	-	0.02	-	-	<0.02	-	<0.02	<0.02	-
Acid Reacted Magnesium (23U)	% Mg	0.02		<0.02	-	<0.02	<0.02	-	-	0.02	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		<10	-	<10	<10	-	-	16	-	-	12	-	-	<10	<10	-	<10	-	-	<10	-	<10	<10	-
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		<0.02	-	<0.02	<0.02	-	-	0.03	-	-	<0.02	-	-	<0.02	<0.02	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
EA029-F: Excess Acid Neutralising Capacity																										
Excess Acid Neutralising Capacity	% CaCO3	0.02		<0.02	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		<10	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		<0.02	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EA029-H: Acid Base Accounting																										
ANC Fineness Factor	-	0.5		1.5	-	1.5	1.5	-	-	1.5	-	-	1.5	-	-	1.5	1.5	-	1.5	-	-	1.5	-	1.5	1.5	-
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	-	<0.02	0.03	-	-	<0.02	-	-	0.07	-	-	0.12	0.11	-	<0.02	-	-	<0.02	-	<0.02	<0.02	-
Net Acidity (acidity units)	mole H+ / t	10	18	<10	-	<10	17	-	-	<10	-	-	45	-	-	73	69	-	<10	-	-	<10	-	<10	<10	-
Liming Rate	kg	1		<1	-	<1	1	-	-	<1	-	-	3	-	-	5	5	-	<1	-	-	<1	-	<1	<1	-
EA033-A: Actual Acidity																										
pH KCl (23A)	pH Unit	0.1		-	5.8	-	-	6.1	8.5	-	7.5	6.4	-	6.1	6.2	-	-	6	-	6.5	5.8	-	5.9	-	-	6.1
Titratable Actual Acidity (23F)	mole H+ / t	2		-	7	-	-	7	<2	-	<2	2	-	4	4	-	-	8	-	<2	7	-	6	-	-	5
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	-	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	-	<0.02
EA033-B: Potential Acidity																										
Chromium Reducible Sulfur (22B)	% S	0.02		-	<0.02	-	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	<0.02	-	<0.02	-	-	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		-	<10	-	-	<10	<10	-	11	<10	-	<10	11	-	-	<10	-	<10	<10	-	<10	-	-	<10
EA033-C: Acid Neutralising Capacity																										
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	0.38	-	0.46	-	-	-	-	-	-	-	-	0.25	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	76	-	92	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	0.12	-	0.15	-	-	-	-	-	-	-	-	0.08	-	-	-	-	-	-
EA033-E: Acid Base Accounting																										
ANC Fineness Factor	-	0.5		-	1.5	-	-	1.5	1.5	-	1.5	1.5	-	1.5	1.5	-	-	1.5	-	1.5	1.5	-	1.5	-	-	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	-	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	0.02	-	-	<0.02	-	<0.02	<0.02	-	0.02	-	-	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	-	<10	-	-	<10	<10	-	<10	<10	-	<10	15	-	-	<10	-	<10	<10	-	15	-	-	<10
Liming Rate	kg	1		-	<1	-	-	<1	<1	-	<1	<1	-	<1	1	-	-	<1	-	<1	<1	-	1	-	-	<1

AECOM

			Sample	AS09/1.5	5	AS09/2.0	AS09/2.25	AS09/2.5	5	AS09/3.0	AS10/0.5	AS10/1.0	AS10/1.5	5	5	AS11/2.0	5	5	5	AS12/2.0	5	AS13/1.5	5	0	5	AS13/3.0	AS14/0.5	5
			Date Sampled	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010
Analyte	Units	LOR	Analysis	SPOCAS	SPOCAS	Cr Suite	SPOCAS	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS
			Criteria																									
EA029-A: pH Measurements																												
pH KCl (23A)	pH Unit	0.1		6	6.8	-	6.7	6.6	6.5	-	5.1	-	6.3	-	-	5.8	5.9	-	-	6	-	6.3	-	-	5.5	-	-	6.3
pH OX (23B)	pH Unit	0.1		7.5	8.2	-	9.2	9.1	6.4	-	4.6	-	6.1	-	-	7.5	6.8	-	-	6.9	-	6.2	-	-	6	-	-	5.8
EA029-B: Acidity Trail																												
Titratable Actual Acidity (23F)	mole H+ / t	2		6	<2	-	<2	<2	4	-	19	-	<2	-	-	4	3	-	-	6	-	2	-	-	11	-	-	<2
Titratable Peroxide Acidity (23G)	mole H+ / t	2		<2	<2	-	<2	<2	4	-	27	-	6	-	-	<2	<2	-	-	<2	-	<2	-	-	3	-	-	4
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		<2	<2	-	<2	<2	<2	-	7	-	6	-	-	<2	<2	-	-	<2	-	<2	-	-	<2	-	-	4
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	0.03	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	0.04	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
EA029-C: Sulfur Trail																												
KCl Extractable Sulfur (23Ce)	% S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
Peroxide Sulfur (23De)	% S	0.02		<0.02	0.1	-	0.15	0.13	0.05	-	<0.02	-	<0.02	-	-	0.16	0.12	-	-	<0.02	-	0.04	-	-	<0.02	-	-	<0.02
Peroxide Oxidisable Sulfur (23E)	% S	0.02		<0.02	0.1	-	0.15	0.13	0.05	-	<0.02	-	<0.02	-	-	0.16	0.12	-	-	<0.02	-	0.04	-	-	<0.02	-	-	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		<10	64	-	94	83	32	-	<10	-	<10	-	-	101	77	-	-	<10	-	26	-	-	<10	-	-	<10
EA029-D: Calcium Values																												
KCl Extractable Calcium (23Vh)	% Ca	0.02		0.08	0.1	-	0.16	0.14	0.05	-	0.15	-	<0.02	-	-	0.2	0.12	-	-	0.09	-	0.04	-	-	0.11	-	-	0.03
Peroxide Calcium (23Wh)	% Ca	0.02		0.07	0.11	-	0.15	0.14	0.05	-	0.14	-	0.02	-	-	0.16	0.13	-	-	0.09	-	0.04	-	-	0.1	-	-	0.02
Acid Reacted Calcium (23X)	% Ca	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		<10	<10	-	<10	<10	<10	-	<10	-	10	-	-	<10	<10	-	-	<10	-	<10	-	-	<10	-	-	<10
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
EA029-E: Magnesium Values																												
KCl Extractable Magnesium (23Sm)	% Mg	0.02		0.04	0.07	-	0.11	0.11	0.04	-	0.06	-	<0.02	-	-	0.08	0.05	-	-	0.1	-	<0.02	-	-	0.05	-	-	<0.02
Peroxide Magnesium (23Tm)	% Mg	0.02		0.04	0.07	-	0.11	0.1	0.04	-	0.06	-	<0.02	-	-	0.07	0.06	-	-	0.1	-	<0.02	-	-	0.04	-	-	<0.02
Acid Reacted Magnesium (23U)	% Mg	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		<10	<10	-	<10	<10	<10	-	<10	-	<10	-	-	<10	<10	-	-	<10	-	<10	-	-	<10	-	-	<10
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02
EA029-F: Excess Acid Neutralising Capacity																												
Excess Acid Neutralising Capacity	% CaCO3	0.02		0.04	0.03	-	0.18	0.17	-	-	-	-	-	-	-	<0.02	<0.02	-	-	0.04	-	-	-	-	-	-	-	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		<10	<10	-	36	35	-	-	-	-	-	-	-	<10	<10	-	-	<10	-	-	-	-	-	-	-	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		<0.02	<0.02	-	0.06	0.06	-	-	-	-	-	-	-	<0.02	<0.02	-	-	<0.02	-	-	-	-	-	-	-	-
EA029-H: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		1.5	1.5	-	1.5	1.5	1.5	-	1.5	-	1.5	-	-	1.5	1.5	-	-	1.5	-	1.5	-	-	1.5	-	-	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	0.03	-	<0.02	<0.02	<0.02	-	0.03	-	<0.02	-	-	0.17	0.13	-	-	<0.02	-	0.04	-	-	<0.02	-	-	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	<10	17	-	<10	<10	10	-	19	-	<10	-	-	105	80	-	-	<10	-	28	-	-	11	-	-	<10
Liming Rate	kg	1		<1	1	-	<1	<1	<1	-	1	-	<1	-	-	8	6	-	-	<1	-	2	-	-	<1	-	-	<1
EA033-A: Actual Acidity																												
pH KCl (23A)	pH Unit	0.1		-	-	6.4	-	-	-	6.4	-	6.2	-	5.7	5.3	-	-	5.8	6.3	-	6.1	-	6.2	5.8	-	5.8	6	-
Titratable Actual Acidity (23F)	mole H+ / t	2		-	-	<2	-	-	-	<2	-	4	-	7	9	-	-	9	5	-	5	-	3	7	-	5	4	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	-	<0.02	-	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
EA033-B: Potential Acidity																												
Chromium Reducible Sulfur (22B)	% S	0.02		-	-	<0.02	-	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		-	-	<10	-	-	-	11	-	<10	-	11	<10	-	-	11	<10	-	<10	-	<10	<10	-	<10	<10	-
EA033-C: Acid Neutralising Capacity																												
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EA033-E: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		-	-	1.5	-	-	-	1.5	-	1.5	-	1.5	1.5	-	-	1.5	1.5	-	1.5	-	1.5	1.5	-	1.5	1.5	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	-	<0.02	-	-	-	<0.02	-	<0.02	-	0.03	<0.02	-	-	0.03	<0.02	-	0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	-	<10	-	-	-	11	-	<10	-	18	<10	-	-	20	<10	-	15	-	<10	<10	-	<10	<10	-
Liming Rate	kg	1		-	-	<1	-	-	-	<1	-	<1	-	1	<1	-	-	1	<1	-	1	-	<1	<1	-	<1	<1	-

AECOM

			Sample	AS14/1.5	AS14/2.0	5	AS14/2.75	AS14/3.0	AS15/0.5	5	AS15/1.5	AS15/2.0	5	AS16B/1.0	5	5	5	5	5	5	0	AS17/0.5	AS17/1.0	AS17/1.5	AS17/2.0	5	AS18/0.25
			Date Sampled	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	14/04/2010
Analyte	Units	LOR	Analysis	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	Cr Suite	SPOCAS	SPOCAS	SPOCAS	SPOCAS	SPOCAS	SPOCAS	SPOCAS	SPOCAS	Cr Suite	SPOCAS	SPOCAS	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS
			Criteria																								
EA029-A: pH Measurements																											
pH KCl (23A)	pH Unit	0.1		-	-	5.8	-	-	-	6.5	5.7	5.9	6.1	5.4	5.5	5.4	5.2	-	5.8	6.1	6.3	6.5	-	5.6	-	5.8	6
pH OX (23B)	pH Unit	0.1		-	-	7.5	-	-	-	6.4	7.3	7.2	6.1	5.4	5.8	5.8	5.1	-	7.4	7.4	6	6.7	-	7.1	-	7	5.1
EA029-B: Acidity Trail																											
Titratable Actual Acidity (23F)	mole H+ / t	2		-	-	9	-	-	-	<2	8	8	4	10	14	14	19	-	8	4	2	<2	-	11	-	8	5
Titratable Peroxide Acidity (23G)	mole H+ / t	2		-	-	<2	-	-	-	3	<2	<2	3	3	<2	<2	<2	-	<2	10	<2	<2	-	<2	-	<2	<2
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		-	-	<2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	-	<2	6	<2	<2	-	<2	-	<2	<2
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.03	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
EA029-C: Sulfur Trail																											
KCl Extractable Sulfur (23Ce)	% S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
Peroxide Sulfur (23De)	% S	0.02		-	-	0.16	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
Peroxide Oxidisable Sulfur (23E)	% S	0.02		-	-	0.16	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		-	-	99	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	-	<10	-	<10	<10
EA029-D: Calcium Values																											
KCl Extractable Calcium (23Vh)	% Ca	0.02		-	-	0.16	-	-	-	0.09	0.1	0.13	0.07	0.09	0.15	0.13	0.16	-	0.07	0.06	0.04	0.04	-	0.22	-	0.12	0.05
Peroxide Calcium (23Wh)	% Ca	0.02		-	-	0.16	-	-	-	0.07	0.11	0.14	0.07	0.11	0.18	0.19	0.17	-	0.08	0.07	0.05	0.05	-	0.23	-	0.13	0.06
Acid Reacted Calcium (23X)	% Ca	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.06	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		-	-	<10	-	-	-	<10	<10	<10	<10	<10	14	30	<10	-	<10	<10	<10	<10	-	<10	-	<10	<10
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.05	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
EA029-E: Magnesium Values																											
KCl Extractable Magnesium (23Sm)	% Mg	0.02		-	-	0.14	-	-	-	0.02	0.06	0.13	<0.02	0.02	0.04	0.04	0.06	-	0.05	0.05	0.03	<0.02	-	0.06	-	0.05	<0.02
Peroxide Magnesium (23Tm)	% Mg	0.02		-	-	0.12	-	-	-	0.02	0.06	0.14	0.02	0.03	0.05	0.06	0.06	-	0.06	0.06	0.03	<0.02	-	0.06	-	0.05	<0.02
Acid Reacted Magnesium (23U)	% Mg	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		-	-	<10	-	-	-	<10	<10	<10	17	<10	<10	15	<10	-	<10	<10	<10	<10	-	<10	-	<10	<10
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		-	-	<0.02	-	-	-	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
EA029-F: Excess Acid Neutralising Capacity																											
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	0.23	-	-	-	-	0.15	0.15	-	-	-	-	-	-	0.07	<0.02	-	0.12	-	0.24	-	0.02	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	45	-	-	-	-	30	30	-	-	-	-	-	-	14	<10	-	24	-	49	-	<10	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	0.07	-	-	-	-	0.05	0.05	-	-	-	-	-	-	0.02	<0.02	-	0.04	-	0.08	-	<0.02	-
EA029-H: Acid Base Accounting																											
ANC Fineness Factor	-	0.5		-	-	1.5	-	-	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-	1.5	1.5	1.5	1.5	-	1.5	-	1.5	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	-	-	0.17	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.03	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	-	-	109	-	-	-	<10	<10	<10	<10	10	14	14	19	-	<10	<10	<10	<10	-	11	-	<10	<10
Liming Rate	kg	1		-	-	8	-	-	-	<1	<1	<1	<1	<1	1	1	1	-	<1	<1	<1	<1	-	<1	-	<1	<1
EA033-A: Actual Acidity																											
pH KCl (23A)	pH Unit	0.1		6.3	5.7	-	5.8	6	6.2	-	-	-	-	-	-	-	-	5.1	-	-	-	-	6.3	-	5.6	-	-
Titratable Actual Acidity (23F)	mole H+ / t	2		2	8	-	7	3	4	-	-	-	-	-	-	-	-	20	-	-	-	-	3	-	10	-	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	<0.02	-	<0.02	<0.02	<0.02	-	-	-	-	-	-	-	-	0.03	-	-	-	-	<0.02	-	<0.02	-	-
EA033-B: Potential Acidity																											
Chromium Reducible Sulfur (22B)	% S	0.02		<0.02	<0.02	-	<0.02	0.05	<0.02	-	-	-	-	-	-	-	-	<0.02	-	-	-	-	<0.02	-	<0.02	-	-
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		<10	<10	-	<10	32	<10	-	-	-	-	-	-	-	-	<10	-	-	-	-	<10	-	<10	-	-
EA033-C: Acid Neutralising Capacity																											
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EA033-E: Acid Base Accounting																											
ANC Fineness Factor	-	0.5		1.5	1.5	-	1.5	1.5	1.5	-	-	-	-	-	-	-	-	1.5	-	-	-	-	1.5	-	1.5	-	-
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	<0.02	-	<0.02	0.06	<0.02	-	-	-	-	-	-	-	-	0.03	-	-	-	-	<0.02	-	<0.02	-	-
Net Acidity (acidity units)	mole H+ / t	10	18	<10	<10	-	<10	35	<10	-	-	-	-	-	-	-	-	20	-	-	-	-	<10	-	<10	-	-
Liming Rate	kg	1		<1	<1	-	<1	3	<1	-	-	-	-	-	-	-	-	2	-	-	-	-	<1	-	<1	-	-

AECOM

Analyte	Units	LOR	Sample	AS18/1.0	AS18/1.5	5	5	AS19/0.5	AS19/1.5	AS20/0.5	AS20/1.0	AS20/1.25	AS20/2.0	5	AS20/2.5	5	AS20/3.0	5	AS21/0.5	5	5	AS21/1.5	5	5	AS22/1.0	AS23/1.0	AS23/2.0	5
			Date Sampled	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	15/04/2010	15/04/2010	15/04/2010
			Analysis	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	SPOCAS	SPOCAS	SPOCAS	Cr Suite	Cr Suite	Cr Suite	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	Cr Suite	Cr Suite	Cr Suite	SPOCAS
			Criteria																									
EA029-A: pH Measurements																												
pH KCl (23A)	pH Unit	0.1		5.9	-	6.3	-	-	-	5.7	-	6.1	6.7	6.7	7.2	6.9	-	-	-	-	-	5.6	-	-	-	-	-	7.5
pH OX (23B)	pH Unit	0.1		5.5	-	6.3	-	-	-	5.6	-	7	8	7.5	4.8	2.9	-	-	-	-	-	6.2	-	-	-	-	-	6.9
EA029-B: Acidity Trail																												
Titratable Actual Acidity (23F)	mole H+ / t	2		6	-	3	-	-	-	4	-	2	<2	<2	<2	<2	-	-	-	-	-	9	-	-	-	-	-	<2
Titratable Peroxide Acidity (23G)	mole H+ / t	2		<2	-	3	-	-	-	2	-	<2	<2	<2	<2	188	-	-	-	-	-	3	-	-	-	-	-	<2
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		<2	-	<2	-	-	-	<2	-	<2	<2	<2	<2	188	-	-	-	-	-	<2	-	-	-	-	-	<2
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.3	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.3	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
EA029-C: Sulfur Trail																												
KCl Extractable Sulfur (23Ce)	% S	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	0.02	0.03	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
Peroxide Sulfur (23De)	% S	0.02		<0.02	-	<0.02	-	-	-	0.1	-	0.08	0.1	0.09	0.08	0.11	-	-	-	-	-	<0.02	-	-	-	-	-	0.03
Peroxide Oxidisable Sulfur (23E)	% S	0.02		<0.02	-	<0.02	-	-	-	0.1	-	0.08	0.1	0.09	0.06	0.08	-	-	-	-	-	<0.02	-	-	-	-	-	0.03
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		<10	-	<10	-	-	-	62	-	47	66	56	40	48	-	-	-	-	-	<10	-	-	-	-	-	20
EA029-D: Calcium Values																												
KCl Extractable Calcium (23Vh)	% Ca	0.02		0.07	-	0.04	-	-	-	0.09	-	0.07	0.09	0.09	0.08	0.09	-	-	-	-	-	0.12	-	-	-	-	-	0.03
Peroxide Calcium (23Wh)	% Ca	0.02		0.08	-	0.04	-	-	-	0.1	-	0.08	0.1	0.09	0.09	0.11	-	-	-	-	-	0.14	-	-	-	-	-	0.04
Acid Reacted Calcium (23X)	% Ca	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.02	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		<10	-	<10	-	-	-	<10	-	<10	<10	<10	<10	12	-	-	-	-	-	<10	-	-	-	-	-	<10
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		<0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
EA029-E: Magnesium Values																												
KCl Extractable Magnesium (23Sm)	% Mg	0.02		<0.02	-	<0.02	-	-	-	0.03	-	0.05	0.11	0.13	0.12	0.14	-	-	-	-	-	0.04	-	-	-	-	-	<0.02
Peroxide Magnesium (23Tm)	% Mg	0.02		0.02	-	<0.02	-	-	-	0.03	-	0.05	0.12	0.11	0.12	0.16	-	-	-	-	-	0.04	-	-	-	-	-	<0.02
Acid Reacted Magnesium (23U)	% Mg	0.02		0.02	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		16	-	<10	-	-	-	<10	-	<10	<10	<10	<10	16	-	-	-	-	-	<10	-	-	-	-	-	<10
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		0.03	-	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.03	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
EA029-F: Excess Acid Neutralising Capacity																												
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	-	-	-	-	-	-	<0.02	0.34	0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	-	-	-	-	-	-	<10	68	68	-	-	-	-	-	-	-	-	-	-	-	-	-	<10
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	-	-	-	-	-	-	<0.02	0.11	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02
EA029-H: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		1.5	-	1.5	-	-	-	1.5	-	1.5	1.5	1.5	1.5	1.5	-	-	-	-	-	1.5	-	-	-	-	-	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	-	<0.02	-	-	-	0.11	-	0.08	<0.02	<0.02	0.02	0.23	-	-	-	-	-	<0.02	-	-	-	-	-	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	<10	-	<10	-	-	-	66	-	50	<10	<10	13	141	-	-	-	-	-	<10	-	-	-	-	-	<10
Liming Rate	kg	1		<1	-	<1	-	-	-	5	-	4	<1	<1	<1	10	-	-	-	-	-	<1	-	-	-	-	-	<1
EA033-A: Actual Acidity																												
pH KCl (23A)	pH Unit	0.1		-	6.4	-	6.2	5.8	6.1	-	5.5	-	-	-	-	-	6.9	6.5	5.6	5.5	5.9	-	5.6	5.6	6.2	6	5.6	-
Titratable Actual Acidity (23F)	mole H+ / t	2		-	<2	-	6	8	3	-	9	-	-	-	-	-	<2	<2	17	16	8	-	12	11	3	3	11	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	-	-	-	-	<0.02	<0.02	0.03	0.03	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-
EA033-B: Potential Acidity																												
Chromium Reducible Sulfur (22B)	% S	0.02		-	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	-	-	-	-	-	0.49	0.04	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	-
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		-	11	-	<10	11	<10	-	<10	-	-	-	-	-	308	24	<10	<10	11	-	<10	<10	<10	<10	<10	-
EA033-C: Acid Neutralising Capacity																												
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	0.59	-	-	-	-	-	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	-	-	-	118	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	-	-	-	-	-	-	-	-	-	-	-
EA033-E: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		-	1.5	-	1.5	1.5	1.5	-	1.5	-	-	-	-	-	1.5	1.5	1.5	1.5	1.5	-	1.5	1.5	1.5	1.5	1.5	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	-	<0.02	0.03	<0.02	-	<0.02	-	-	-	-	-	0.37	0.04	0.03	0.03	0.03	-	<0.02	<0.02	<0.02	<0.02	<0.02	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	11	-	<10	18	<10	-	<10	-	-	-	-	-	230	24	17	16	18	-	12	11	<10	<10	11	-
Liming Rate	kg	1		-	<1	-	<1	1	<1	-	<1	-	-	-	-	-	17	2	1	1	1	-	<1	<1	<1	<1	<1	-

AECOM

Analyte	Units	LOR	Sample	AS25/0.5	5	0	5	AS26/0.5	5	5	0	AS27/2.0	5	AS27/3.0	AS28/1.0	5	AS28/2.0	5	AS28/2.5	5	AS28/3.0	AS29/0.5	5	5	AS30/1.0	5	5	5
			Date Sampled	15/04/2010	16/04/2010	16/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010
			Analysis	SPOCAS	Cr Suite	SPOCAS	SPOCAS	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	Cr Suite	SPOCAS	SPOCAS	Cr Suite	Cr Suite	Cr Suite	Cr Suite	Cr Suite	Cr Suite	SPOCAS	SPOCAS
			Criteria																									
EA029-A: pH Measurements																												
pH KCl (23A)	pH Unit	0.1		5.9	-	6.6	6.1	6.1	-	-	6.3	-	6.6	-	6.7	-	-	-	4.7	5.1	-	-	-	-	-	-	6.1	4.8
pH OX (23B)	pH Unit	0.1		6.4	-	8.1	4.7	4.7	-	-	6.8	-	7.8	-	4.5	-	-	-	4.7	4.8	-	-	-	-	-	-	3.4	4.2
EA029-B: Acidity Trail																												
Titratable Actual Acidity (23F)	mole H+ / t	2		<2	-	<2	3	3	-	-	7	-	<2	-	<2	-	-	-	10	4	-	-	-	-	-	-	3	17
Titratable Peroxide Acidity (23G)	mole H+ / t	2		2	-	<2	3	2	-	-	<2	-	<2	-	10	-	-	-	24	14	-	-	-	-	-	-	7	16
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		<2	-	<2	<2	<2	-	-	<2	-	<2	-	10	-	-	-	13	9	-	-	-	-	-	-	3	<2
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	-	-	-	<0.02	0.03
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	0.04	0.02	-	-	-	-	-	-	<0.02	0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	0.02	<0.02	-	-	-	-	-	-	<0.02	<0.02
EA029-C: Sulfur Trail																												
KCl Extractable Sulfur (23Ce)	% S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	0.02	-	-	-	0.02	<0.02	-	-	-	-	-	-	<0.02	0.02
Peroxide Sulfur (23De)	% S	0.02		<0.02	-	<0.02	0.03	0.04	-	-	<0.02	-	0.03	-	0.07	-	-	-	0.05	<0.02	-	-	-	-	-	-	<0.02	0.04
Peroxide Oxidisable Sulfur (23E)	% S	0.02		<0.02	-	<0.02	0.03	0.04	-	-	<0.02	-	0.03	-	0.05	-	-	-	0.02	<0.02	-	-	-	-	-	-	<0.02	0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		<10	-	<10	21	24	-	-	<10	-	20	-	31	-	-	-	14	<10	-	-	-	-	-	-	<10	14
EA029-D: Calcium Values																												
KCl Extractable Calcium (23Vh)	% Ca	0.02		<0.02	-	0.03	0.03	0.03	-	-	<0.02	-	0.03	-	0.09	-	-	-	0.04	<0.02	-	-	-	-	-	-	<0.02	0.05
Peroxide Calcium (23Wh)	% Ca	0.02		0.02	-	0.03	0.03	0.04	-	-	<0.02	-	0.03	-	0.07	-	-	-	0.05	<0.02	-	-	-	-	-	-	<0.02	0.04
Acid Reacted Calcium (23X)	% Ca	0.02		0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	-	-	-	<0.02	<0.02
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		11	-	<10	<10	<10	-	-	<10	-	<10	-	<10	-	-	-	<10	<10	-	-	-	-	-	-	<10	<10
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	-	-	-	<0.02	<0.02
EA029-E: Magnesium Values																												
KCl Extractable Magnesium (23Sm)	% Mg	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	0.04	-	0.09	-	-	-	0.06	0.03	-	-	-	-	-	-	<0.02	0.06
Peroxide Magnesium (23Tm)	% Mg	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	0.04	-	0.07	-	-	-	0.07	0.02	-	-	-	-	-	-	<0.02	0.06
Acid Reacted Magnesium (23U)	% Mg	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	-	-	-	<0.02	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		<10	-	<10	<10	<10	-	-	<10	-	<10	-	<10	-	-	-	<10	<10	-	-	-	-	-	-	<10	<10
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	-	-	-	<0.02	<0.02
EA029-F: Excess Acid Neutralising Capacity																												
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	0.14	-	-	-	-	0.02	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	29	-	-	-	-	<10	-	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	0.05	-	-	-	-	<0.02	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EA029-H: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		1.5	-	1.5	1.5	1.5	-	-	1.5	-	1.5	-	1.5	-	-	-	1.5	1.5	-	-	-	-	-	-	1.5	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	-	<0.02	0.04	0.04	-	-	<0.02	-	<0.02	-	0.03	-	-	-	0.04	<0.02	-	-	-	-	-	-	<0.02	0.05
Net Acidity (acidity units)	mole H+ / t	10	18	<10	-	<10	24	27	-	-	<10	-	<10	-	17	-	-	-	25	<10	-	-	-	-	-	-	<10	31
Liming Rate	kg	1		<1	-	<1	2	2	-	-	<1	-	<1	-	1	-	-	-	2	<1	-	-	-	-	-	-	<1	2
EA033-A: Actual Acidity																												
pH KCl (23A)	pH Unit	0.1		-	6.3	-	-	-	6.2	5.8	-	6.3	-	6.6	-	6	4.6	4.6	-	-	4.9	6.4	6.6	5.7	6.1	6	-	-
Titratable Actual Acidity (23F)	mole H+ / t	2		-	3	-	-	-	2	5	-	4	-	<2	-	4	22	21	-	-	14	2	<2	9	4	4	-	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	-	-	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	0.03	0.03	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-
EA033-B: Potential Acidity																												
Chromium Reducible Sulfur (22B)	% S	0.02		-	<0.02	-	-	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		-	<10	-	-	-	<10	<10	-	<10	-	<10	-	11	<10	11	-	-	<10	<10	<10	11	<10	11	-	-
EA033-C: Acid Neutralising Capacity																												
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	0.36	-	-	-	-	-	-	-	-	0.41	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	72	-	-	-	-	-	-	-	-	82	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	0.13	-	-	-	-	-
EA033-E: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		-	1.5	-	-	-	1.5	1.5	-	1.5	-	1.5	-	1.5	1.5	1.5	-	-	1.5	1.5	1.5	1.5	1.5	1.5	-	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	-	-	-	<0.02	<0.02	-	<0.02	-	<0.02	-	0.02	0.03	0.05	-	-	0.02	<0.02	<0.02	0.03	<0.02	0.02	-	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	<10	-	-	-	<10	<10	-	<10	-	<10	-	14	22	32	-	-	14	<10	<10	19	<10	15	-	-
Liming Rate	kg	1		-	<1	-	-	-	<1	<1	-	<1	-	<1	-	1	2	2	-	-	1	<1	<1	1	<1	1	-	-

AECOM

Analyte	Units	LOR	Sample	5	5	5	AS31/2.5	5	AS31/3.0	5	5	5	AS32/2.5	5	AS32/3.0	5	AS33/0.5	AS33/1.5	5	AS33/2.5	AS33/3.0	5	AS34/2.0	5	0	AS34/2.75	AS34/2.75	AS34/3.0
			Date Sampled	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	14/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	15/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010
			Analysis	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS
			Criteria																									
EA029-A: pH Measurements																												
pH KCl (23A)	pH Unit	0.1		5.5	-	-	5.4	-	5.4	6	6.5	5.3	-	4.6	-	5.9	-	5.8	-	-	6.4	-	-	4.6	-	4.5	-	4.5
pH OX (23B)	pH Unit	0.1		5.1	-	-	5.3	-	5.3	6.4	8.9	5.4	-	4.8	-	5.7	-	6.9	-	-	7.2	-	-	4.6	-	4.3	-	4.3
EA029-B: Acidity Trail																												
Titratable Actual Acidity (23F)	mole H+ / t	2		10	-	-	9	-	9	4	<2	7	-	20	-	8	-	7	-	-	<2	-	-	31	-	35	-	38
Titratable Peroxide Acidity (23G)	mole H+ / t	2		13	-	-	10	-	15	2	<2	16	-	28	-	10	-	<2	-	-	<2	-	-	51	-	75	-	77
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		<2	-	-	<2	-	6	<2	<2	9	-	8	-	<2	-	<2	-	-	<2	-	-	20	-	40	-	38
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	0.03	-	<0.02	-	<0.02	-	-	<0.02	-	-	0.05	-	0.05	-	0.06
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		0.02	-	-	<0.02	-	0.02	<0.02	<0.02	0.02	-	0.04	-	<0.02	-	<0.02	-	-	<0.02	-	-	0.08	-	0.12	-	0.12
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	-	0.03	-	0.06	-	0.06
EA029-C: Sulfur Trail																												
KCl Extractable Sulfur (23Ce)	% S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	0.03	-	0.02	-	0.02	-	<0.02	-	-	<0.02	-	-	0.2	-	0.18	-	0.13
Peroxide Sulfur (23De)	% S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	0.08	0.08	-	0.04	-	0.08	-	<0.02	-	-	<0.02	-	-	0.21	-	0.16	-	0.14
Peroxide Oxidisable Sulfur (23E)	% S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	0.08	0.05	-	<0.02	-	0.06	-	<0.02	-	-	<0.02	-	-	<0.02	-	0.02	-	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		<10	-	-	<10	-	<10	<10	50	34	-	<10	-	36	-	<10	-	-	<10	-	-	<10	-	14	-	<10
EA029-D: Calcium Values																												
KCl Extractable Calcium (23Vh)	% Ca	0.02		0.03	-	-	0.02	-	0.02	0.03	0.07	0.09	-	0.03	-	0.08	-	0.1	-	-	0.02	-	-	0.19	-	0.16	-	0.08
Peroxide Calcium (23Wh)	% Ca	0.02		0.03	-	-	0.02	-	0.02	0.03	0.08	0.08	-	0.04	-	0.08	-	0.11	-	-	<0.02	-	-	0.19	-	0.16	-	0.08
Acid Reacted Calcium (23X)	% Ca	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		<10	-	-	<10	-	<10	<10	<10	<10	-	<10	-	<10	-	<10	-	-	<10	-	-	<10	-	<10	-	<10
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02
EA029-E: Magnesium Values																												
KCl Extractable Magnesium (23Sm)	% Mg	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	0.07	0.11	-	0.04	-	0.09	-	0.04	-	-	<0.02	-	-	0.11	-	0.12	-	0.11
Peroxide Magnesium (23Tm)	% Mg	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	0.09	0.1	-	0.04	-	0.09	-	0.05	-	-	<0.02	-	-	0.12	-	0.12	-	0.11
Acid Reacted Magnesium (23U)	% Mg	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		<10	-	-	<10	-	<10	<10	11	<10	-	<10	-	<10	-	<10	-	-	<10	-	-	<10	-	<10	-	<10
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02
EA029-F: Excess Acid Neutralising Capacity																												
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	-	-	-	-	-	0.22	-	-	-	-	-	-	0.04	-	-	0.02	-	-	-	-	-	-	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	-	-	-	-	-	44	-	-	-	-	-	-	<10	-	-	<10	-	-	-	-	-	-	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	-	-	-	-	-	0.07	-	-	-	-	-	-	<0.02	-	-	<0.02	-	-	-	-	-	-	-
EA029-H: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		1.5	-	-	1.5	-	1.5	1.5	1.5	1.5	-	1.5	-	1.5	-	1.5	-	-	1.5	-	-	1.5	-	1.5	-	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	-	-	<0.02	-	<0.02	<0.02	<0.02	0.06	-	0.04	-	0.07	-	<0.02	-	-	<0.02	-	-	0.05	-	0.08	-	0.07
Net Acidity (acidity units)	mole H+ / t	10	18	10	-	-	<10	-	<10	<10	<10	40	-	28	-	44	-	<10	-	-	<10	-	-	33	-	49	-	45
Liming Rate	kg	1		<1	-	-	<1	-	<1	<1	<1	3	-	2	-	3	-	<1	-	-	<1	-	-	2	-	3	-	3
EA033-A: Actual Acidity																												
pH KCl (23A)	pH Unit	0.1		-	5.6	5.6	-	5.5	-	-	-	-	4.7	-	6.1	-	5.5	-	5.7	6	-	5.2	4.6	-	4.5	-	-	-
Titratable Actual Acidity (23F)	mole H+ / t	2		-	8	8	-	9	-	-	-	-	26	-	5	-	11	-	8	4	-	16	28	-	34	-	-	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	<0.02	-	<0.02	-	-	-	-	0.04	-	<0.02	-	<0.02	-	<0.02	<0.02	-	0.02	0.04	-	0.06	-	-	-
EA033-B: Potential Acidity																												
Chromium Reducible Sulfur (22B)	% S	0.02		-	<0.02	<0.02	-	<0.02	-	-	-	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	-	-	-
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		-	<10	<10	-	<10	-	-	-	-	<10	-	<10	-	<10	-	<10	<10	-	<10	<10	-	<10	-	-	-
EA033-C: Acid Neutralising Capacity																												
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EA033-E: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		-	1.5	1.5	-	1.5	-	-	-	-	1.5	-	1.5	-	1.5	-	1.5	1.5	-	1.5	1.5	-	1.5	-	-	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	<0.02	-	<0.02	-	-	-	-	0.04	-	<0.02	-	<0.02	-	<0.02	<0.02	-	0.02	0.04	-	0.06	-	-	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	<10	<10	-	<10	-	-	-	-	26	-	<10	-	11	-	<10	<10	-	16	28	-	34	-	-	-
Liming Rate	kg	1		-	<1	<1	-	<1	-	-	-	-	2	-	<1	-	<1	-	<1	<1	-	1	2	-	2	-	-	-

AECOM

Analyte	Units	LOR	Sample	AS35/1.0	5	5	AS35/2.0	AS35/2.5	5	AS35/3.0	AS36/0.5	AS36/1.5	5	AS36/2.0	5	AS36/2.5	5	5	AS37/1.0	AS37/1.5	5	AS37/2.5	AS37/3.0	AS38/1.0	0	5	5	5
			Date Sampled	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010	16/04/2010
			Analysis	Cr Suite	SPOCAS	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	Cr Suite	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite	SPOCAS	Cr Suite	SPOCAS	SPOCAS	Cr Suite
			Criteria																									
EA029-A: pH Measurements																												
pH KCl (23A)	pH Unit	0.1		-	5.9	4.7	-	4.5	4.6	-	-	6.8	-	6.5	-	-	6.2	-	6.4	-	5.8	5.7	-	6.3	-	6.5	6.5	-
pH OX (23B)	pH Unit	0.1		-	6.3	4.5	-	4.6	4.4	-	-	7.8	-	7.5	-	-	6.5	-	8.9	-	7.7	6.9	-	7.3	-	7.6	8	-
EA029-B: Acidity Trail																												
Titratable Actual Acidity (23F)	mole H+ / t	2		-	8	26	-	34	34	-	-	<2	-	<2	-	-	3	-	<2	-	7	8	-	4	-	<2	<2	-
Titratable Peroxide Acidity (23G)	mole H+ / t	2		-	8	46	-	53	59	-	-	<2	-	<2	-	-	4	-	<2	-	<2	<2	-	<2	-	<2	<2	-
Titratable Sulfidic Acidity (23H)	mole H+ / t	2		-	<2	20	-	19	25	-	-	<2	-	<2	-	-	<2	-	<2	-	<2	<2	-	<2	-	<2	<2	-
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		-	<0.02	0.04	-	0.05	0.05	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
sulfidic - Titratable Peroxide Acidity (s-23G)	% pyrite S	0.02		-	<0.02	0.07	-	0.08	0.09	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
sulfidic - Titratable Sulfidic Acidity (s-23H)	% pyrite S	0.02		-	<0.02	0.03	-	0.03	0.04	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
EA029-C: Sulfur Trail																												
KCl Extractable Sulfur (23Ce)	% S	0.02		-	0.48	0.27	-	0.1	0.22	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
Peroxide Sulfur (23De)	% S	0.02		-	0.48	0.28	-	0.12	0.23	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
Peroxide Oxidisable Sulfur (23E)	% S	0.02		-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
acidity - Peroxide Oxidisable Sulfur (a-23E)	mole H+ / t	10		-	<10	<10	-	<10	<10	-	-	<10	-	<10	-	-	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-
EA029-D: Calcium Values																												
KCl Extractable Calcium (23Vh)	% Ca	0.02		-	0.54	0.27	-	0.08	0.21	-	-	0.05	-	0.05	-	-	<0.02	-	0.02	-	<0.02	<0.02	-	0.09	-	<0.02	<0.02	-
Peroxide Calcium (23Wh)	% Ca	0.02		-	0.54	0.27	-	0.08	0.21	-	-	0.06	-	0.06	-	-	<0.02	-	0.02	-	<0.02	<0.02	-	0.09	-	0.02	<0.02	-
Acid Reacted Calcium (23X)	% Ca	0.02		-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	0.02	<0.02	-
acidity - Acid Reacted Calcium (a-23X)	mole H+ / t	10		-	<10	<10	-	<10	<10	-	-	<10	-	<10	-	-	<10	-	<10	-	<10	<10	-	<10	-	10	<10	-
sulfidic - Acid Reacted Calcium (s-23X)	% S	0.02		-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
EA029-E: Magnesium Values																												
KCl Extractable Magnesium (23Sm)	% Mg	0.02		-	0.15	0.14	-	0.1	0.11	-	-	0.09	-	0.1	-	-	<0.02	-	0.04	-	0.03	0.05	-	0.1	-	0.03	0.02	-
Peroxide Magnesium (23Tm)	% Mg	0.02		-	0.16	0.14	-	0.11	0.11	-	-	0.1	-	0.11	-	-	<0.02	-	0.05	-	0.03	0.06	-	0.1	-	0.03	0.02	-
Acid Reacted Magnesium (23U)	% Mg	0.02		-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
Acidity - Acid Reacted Magnesium (a-23U)	mole H+ / t	10		-	<10	<10	-	<10	<10	-	-	<10	-	10	-	-	12	-	<10	-	<10	<10	-	<10	-	<10	<10	-
sulfidic - Acid Reacted Magnesium (s-23U)	% S	0.02		-	<0.02	<0.02	-	<0.02	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
EA029-F: Excess Acid Neutralising Capacity																												
Excess Acid Neutralising Capacity	% CaCO3	0.02		-	-	-	-	-	-	-	-	0.15	-	0.1	-	-	-	-	0.16	-	0.06	<0.02	-	0.19	-	0.05	0.09	-
acidity - Excess Acid Neutralising Capacity (a-23Q)	mole H+ / t	10		-	-	-	-	-	-	-	-	29	-	20	-	-	-	-	32	-	12	<10	-	38	-	<10	18	-
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	% S	0.02		-	-	-	-	-	-	-	-	0.05	-	0.03	-	-	-	-	0.05	-	<0.02	<0.02	-	0.06	-	<0.02	0.03	-
EA029-H: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		-	1.5	1.5	-	1.5	1.5	-	-	1.5	-	1.5	-	-	1.5	-	1.5	-	1.5	1.5	-	1.5	-	1.5	1.5	-
Net Acidity (sulfur units)	% S	0.02	0.03	-	<0.02	0.05	-	0.07	0.07	-	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	<0.02	-
Net Acidity (acidity units)	mole H+ / t	10	18	-	<10	34	-	44	41	-	-	<10	-	<10	-	-	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-
Liming Rate	kg	1		-	<1	2	-	3	3	-	-	<1	-	<1	-	-	<1	-	<1	-	<1	<1	-	<1	-	<1	<1	-
EA033-A: Actual Acidity																												
pH KCl (23A)	pH Unit	0.1		6.1	-	-	4.7	-	-	4.9	5.4	-	6.6	-	6.4	6.1	-	8	-	6.2	-	-	5.5	-	6.3	-	-	6.1
Titratable Actual Acidity (23F)	mole H+ / t	2		5	-	-	24	-	-	28	12	-	<2	-	<2	4	-	<2	-	4	-	-	10	-	4	-	-	4
sulfidic - Titratable Actual Acidity (s-	% pyrite S	0.02		<0.02	-	-	0.04	-	-	0.04	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02
EA033-B: Potential Acidity																												
Chromium Reducible Sulfur (22B)	% S	0.02		<0.02	-	-	<0.02	-	-	0.05	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	mole H+ / t	10		<10	-	-	<10	-	-	30	<10	-	<10	-	<10	<10	-	<10	-	<10	-	-	<10	-	<10	-	-	<10
EA033-C: Acid Neutralising Capacity																												
Acid Neutralising Capacity (19A2)	% CaCO3	0.01		-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-
acidity - Acid Neutralising Capacity (a-19A2)	mole H+ / t	10		-	-	-	-	-	-	-	-	-	100	-	-	-	-	140	-	-	-	-	-	-	-	-	-	-
sulfidic - Acid Neutralising Capacity (s-19A2)	% pyrite S	0.01		-	-	-	-	-	-	-	-	-	0.16	-	-	-	-	0.22	-	-	-	-	-	-	-	-	-	-
EA033-E: Acid Base Accounting																												
ANC Fineness Factor	-	0.5		1.5	-	-	1.5	-	-	1.5	1.5	-	1.5	-	1.5	1.5	-	1.5	-	1.5	-	-	1.5	-	1.5	-	-	1.5
Net Acidity (sulfur units)	% S	0.02	0.03	<0.02	-	-	0.04	-	-	0.09	<0.02	-	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	-	<0.02
Net Acidity (acidity units)	mole H+ / t	10	18	<10	-	-	24	-	-	57	12	-	<10	-	<10	<10	-	<10	-	<10	-	-	<10	-	<10	-	-	<10
Liming Rate	kg	1		<1	-	-	2	-	-	4	<1	-	<1	-	<1	<1	-	<1	-	<1	-	-	<1	-	<1	-	-	<1