

CERTIFICATE OF ANALYSIS

Work Order : **EM1712011**
Client : **GHD PTY LTD**
Contact : **RICHA POTDAR**
Address : **LEVEL 8, 180 LONSDALE ST**
MELBOURNE VIC, AUSTRALIA 3001
Telephone : **+61 03 8687 8000**
Project : **3135006**
Order number : **----**
C-O-C number : **----**
Sampler : **RP**
Site : **----**
Quote number : **EN/005/15 VICTORIA (Primary work only)**
No. of samples received : **18**
No. of samples analysed : **18**

Page : 1 of 14
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 04-Sep-2017 15:36
Date Analysis Commenced : 08-Sep-2017
Issue Date : 12-Sep-2017 17:47



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Ben Felgendrejeris		Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH043 (5.95m)	NEL-BH043 (11.00m)	NEL-BH043 (11.57m)	NEL-BH043 (18.4m)	NEL-BH043 (34.6m)
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-001	EM1712011-002	EM1712011-003	EM1712011-004	EM1712011-005
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	0.2	0.3	0.2	0.2	0.2
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH033 (12.4m)	NEL-BH033 (21.4m)	NEL-BH033 (24.68m)	NEL-BH033 (26.33m)	NEL-BH033 (29.74m)
Client sampling date / time				11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-006	EM1712011-007	EM1712011-008	EM1712011-009	EM1712011-010
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	0.3	0.2	0.2	0.2	0.2
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH034 (7.9m)	NEL-BH034 (9.28m)	NEL-BH034 (12.05m)	NEL-BH034 (15.95m)	NEL-BH034 (22.9m)
Client sampling date / time				11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-011	EM1712011-012	EM1712011-013	EM1712011-014	EM1712011-015
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	0.2	0.1	0.2	0.6	0.2
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH058 (19.07m)	NEL-BH058 (18.22m)	NEL-BH058 (22.85m)	----	----
Client sampling date / time				24-Jul-2017 00:00	24-Jul-2017 00:00	24-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EM1712011-016	EM1712011-017	EM1712011-018	-----	-----
				Result	Result	Result	----	----
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	----	----
Zinc	7440-66-6	0.1	mg/L	0.2	0.2	0.2	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH043 (5.95m)	NEL-BH043 (11.00m)	NEL-BH043 (11.57m)	NEL-BH043 (18.4m)	NEL-BH043 (34.6m)
Client sampling date / time				12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-001	EM1712011-002	EM1712011-003	EM1712011-004	EM1712011-005
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.2	-6.2	-0.9	<0.5	<0.5
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.4	7.2	4.2	3.4	4.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.5	2.1	1.9
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	2.0	3.6	3.6
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.1	6.3	6.1	6.4	6.2
pH OX (23B)	----	0.1	pH Unit	7.0	8.2	3.2	2.8	3.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	54	87	92
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	54	87	92
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	<0.020	0.086	0.140	0.148
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	<0.020	0.086	0.140	0.148
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	0.022
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	<0.020	0.147	0.186	0.276
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	<0.020	0.147	0.186	0.253
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	92	116	158
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.025	0.026	<0.020	<0.020	<0.020
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.042	0.038	<0.020	<0.020	0.030
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	0.030
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	<10	15
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	0.024
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.046	0.061	0.032	0.023	0.047
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.058	0.070	0.044	0.034	0.073
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	<0.020	<0.020	0.026
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	<10	<10	21



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH043 (5.95m)	NEL-BH043 (11.00m)	NEL-BH043 (11.57m)	NEL-BH043 (18.4m)	NEL-BH043 (34.6m)
Client sampling date / time					12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	12-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EM1712011-001	EM1712011-002	EM1712011-003	EM1712011-004	EM1712011-005
					Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued									
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S		<0.020	<0.020	<0.020	<0.020	0.034
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3		0.090	0.272	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		18	54	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S		0.029	0.087	----	----	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	0.15	0.18	0.25
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	92	116	158
Liming Rate	----	1	kg CaCO3/t		<1	<1	7	9	12
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	<0.02	0.15	0.18	0.25
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	<10	92	116	158
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	<1	7	9	12
EN60: ASLP Leaching Procedure									
Initial pH	----	0.1	pH Unit		6.7	6.7	5.7	5.9	5.8
After HCl pH	----	0.1	pH Unit		1.8	1.8	1.8	1.8	1.7
Extraction Fluid pH	----	0.1	pH Unit		5.0	5.0	5.0	5.0	5.0
Final pH	----	0.1	pH Unit		5.6	5.4	5.6	5.4	5.6



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH033 (12.4m)	NEL-BH033 (21.4m)	NEL-BH033 (24.68m)	NEL-BH033 (26.33m)	NEL-BH033 (29.74m)
Client sampling date / time				11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-006	EM1712011-007	EM1712011-008	EM1712011-009	EM1712011-010
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-1.8	-2.0	-5.7	-5.2	-5.7
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.2	6.6	7.1	7.2	7.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	0.6	<0.1	<0.1	<0.1
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.8	6.1	6.3	6.1	6.0
pH OX (23B)	----	0.1	pH Unit	6.7	6.4	6.6	6.7	6.4
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	9	<2	<2	8
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	9	<2	<2	8
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Calcium (23Wh)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	<0.020
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	<0.020
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	<10	<10
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	<0.020	0.032	0.041	0.057	0.055
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.025	0.032	0.052	0.066	0.057
Acid Reacted Magnesium (23U)	----	0.020	% Mg	0.025	<0.020	<0.020	<0.020	<0.020
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	21	<10	<10	<10	<10



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH033 (12.4m)	NEL-BH033 (21.4m)	NEL-BH033 (24.68m)	NEL-BH033 (26.33m)	NEL-BH033 (29.74m)
Client sampling date / time					11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EM1712011-006	EM1712011-007	EM1712011-008	EM1712011-009	EM1712011-010
					Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued									
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S		0.034	<0.020	<0.020	<0.020	<0.020
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3		0.109	----	0.135	0.137	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		22	----	27	27	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S		0.035	----	0.043	0.044	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t		<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	<1	<1	<1	<1
EN60: ASLP Leaching Procedure									
Initial pH	----	0.1	pH Unit		6.7	6.5	6.9	6.8	6.7
After HCl pH	----	0.1	pH Unit		1.7	1.7	1.7	1.7	1.8
Extraction Fluid pH	----	0.1	pH Unit		5.0	5.0	5.0	5.0	5.0
Final pH	----	0.1	pH Unit		5.4	5.4	5.4	5.2	5.6



Analytical Results

Sub-Matrix: ROCK
(Matrix: SOIL)

Client sample ID

				NEL-BH034 (7.9m)	NEL-BH034 (9.28m)	NEL-BH034 (12.05m)	NEL-BH034 (15.95m)	NEL-BH034 (22.9m)
Client sampling date / time				11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-011	EM1712011-012	EM1712011-013	EM1712011-014	EM1712011-015
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-5.8	-6.4	-2.6	-5.2	-8.8
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.0	7.8	4.8	6.8	7.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.2	<0.1	0.9	0.4	<0.1
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	5.8	6.2	6.4	8.1	8.8
pH OX (23B)	----	0.1	pH Unit	6.9	8.5	3.8	5.0	7.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	34	9	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	34	9	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	<0.020	0.054	<0.020	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	<0.020	0.054	<0.020	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	<0.020	0.083	0.069	0.268
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	<0.020	0.083	0.069	0.268
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	52	43	167
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.030	0.022	<0.020	0.021	0.043
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.033	0.024	<0.020	0.037	0.268
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	0.224
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	<10	112
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	0.180
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.074	0.047	0.024	0.022	0.026
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.087	0.051	0.032	0.036	0.120
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	<0.020	<0.020	0.094
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	11	<10	<10	11	77



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH034 (7.9m)	NEL-BH034 (9.28m)	NEL-BH034 (12.05m)	NEL-BH034 (15.95m)	NEL-BH034 (22.9m)
Client sampling date / time				11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	11-Jul-2017 00:00	12-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712011-011	EM1712011-012	EM1712011-013	EM1712011-014	EM1712011-015
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	0.124
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	0.158	0.271	----	----	0.366
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	31	54	----	----	73
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	0.050	0.087	----	----	0.117
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.08	0.03	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	52	20	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	4	2	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.08	0.03	0.27
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	52	20	167
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	4	2	12
EN60: ASLP Leaching Procedure								
Initial pH	----	0.1	pH Unit	6.5	6.3	5.9	6.2	6.3
After HCl pH	----	0.1	pH Unit	1.8	1.8	1.7	1.7	1.7
Extraction Fluid pH	----	0.1	pH Unit	5.0	5.0	5.0	5.0	5.0
Final pH	----	0.1	pH Unit	5.3	5.5	5.1	5.1	5.2



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH058 (19.07m)	NEL-BH058 (18.22m)	NEL-BH058 (22.85m)	----	----
Client sampling date / time				24-Jul-2017 00:00	24-Jul-2017 00:00	24-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EM1712011-016	EM1712011-017	EM1712011-018	-----	-----
				Result	Result	Result	----	----
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.0	-4.6	-1.5	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.1	6.5	3.7	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	1.5	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.9	0.7	3.7	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.7	5.7	6.4	----	----
pH OX (23B)	----	0.1	pH Unit	3.8	5.9	3.1	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	2	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	35	7	75	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	35	5	75	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	0.056	<0.020	0.120	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	0.056	<0.020	0.120	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	----	----
Peroxide Sulfur (23De)	----	0.020	% S	0.083	<0.020	0.168	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	0.083	<0.020	0.168	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	52	<10	105	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.022	0.026	<0.020	----	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.025	0.029	<0.020	----	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.039	0.041	0.033	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.044	0.043	0.046	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	<0.020	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	10	----	----



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH058 (19.07m)	NEL-BH058 (18.22m)	NEL-BH058 (22.85m)	----	----
Client sampling date / time				24-Jul-2017 00:00	24-Jul-2017 00:00	24-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EM1712011-016	EM1712011-017	EM1712011-018	-----	-----
				Result	Result	Result	----	----
EA029-E: Magnesium Values - Continued								
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	<0.020	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	0.06	<0.02	0.17	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	40	<10	105	----	----
Liming Rate	----	1	kg CaCO3/t	3	<1	8	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.06	<0.02	0.17	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	40	<10	105	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	3	<1	8	----	----
EN60: ASLP Leaching Procedure								
Initial pH	----	0.1	pH Unit	6.0	6.1	5.8	----	----
After HCl pH	----	0.1	pH Unit	1.7	1.7	1.7	----	----
Extraction Fluid pH	----	0.1	pH Unit	5.0	5.0	5.0	----	----
Final pH	----	0.1	pH Unit	5.1	5.3	5.4	----	----

CHAIN OF CUSTODY RECORD

GHD



Melbourne Office Address

180 Lonsdale Street, Melbourne 3000

Telephone: 613 8687 8000 Fax: 613 8687 8111

Completion Date / Turnaround

Quote # / GHD Reference

Page ____ of ____

Job Number: **31/35006**

GHD Contact: **RICHA POTDAR**

Project: **North East Link T.A. (Acid Sulphate Testing)**

GHD Project Manager: **RICHA POTDAR**

GHD PM email: **Richa.potdar@ghd.com**

Laboratory: **ALS**

Address: **2-4 Westall Road, Springvale (VIC 3171)**

Laboratory Contact: **Shirley Le Cornu**

Container: **SPOCAS Suite**

Analyses Required: **NAPP, NAG, Heavy metals (see table)**

COURIER AND LABORATORY INSTRUCTIONS:

Sign white copy on receipt and release of samples.
Samples are to be delivered to the Laboratory Address.

On receipt of samples, the laboratory contact
to sign white copy and fax/email to GHD Contact.
On completion of analyses please return white
copy with results.

Pink copy is returned to the sampler once the
courier has signed for the samples.

E-mail results to the GHD Project Manager
and GHD Contact with the GHD Job Number in the e-mail subject line.

Note email format: firstname.lastname@ghd.com

Results to be provided in ESDAT compatible format

SAMPLE COMMENTS

Rock samples for Acid
Sulphate testing (4 tests
as in table/per sample).

Environmental Division
Melbourne

Work Order Reference

EM1712011



Telephone : + 61-3-9549 9800

Sample I.D.	Date	Time	Composite Sample	Sample Mark	Sample Type	Volume (mL)	Number	Volume (mL)	SPOCAS Suite	NAPP	NAG	Heavy metals (see table)
1. NEL-BH043 (5.95m)	12/7/17			R	P				✓	✓	✓	✓
2. NEL-BH043 (11.00m)	12/7/17			R	P				✓	✓	✓	✓
3. NEL-BH043 (11.57m)	12/7/17			R	P				✓	✓	✓	✓
4. NEL-BH043 (18.4m)	12/7/17			R	P				✓	✓	✓	✓
5. NEL-BH043 (34.6m)	11/7/17			R	P				✓	✓	✓	✓
6. NEL-BH033 (12.4m)	11/7/17			R	P				✓	✓	✓	✓
7. NEL-BH033 (21.4m)	11/7/17			R	P				✓	✓	✓	✓
8. NEL-BH033 (24.68m)	11/7/17			R	P				✓	✓	✓	✓
9. NEL-BH033 (26.33m)	11/7/17			R	P				✓	✓	✓	✓
10. NEL-BH033 (29.74m)	11/7/17			R	P				✓	✓	✓	✓
11. NEL-BH034 (7.9m)	11/7/17			R	P				✓	✓	✓	✓
12. NEL-BH034 (9.20m)	11/7/17			R	P				✓	✓	✓	✓
13. NEL-BH034 (12.05m)	11/7/17			R	P				✓	✓	✓	✓
14. NEL-BH034 (15.95m)	11/7/17			R	P				✓	✓	✓	✓
15. NEL-BH034 (22.9m)	12/7/17			R	P				✓	✓	✓	✓
16. NEL-BH058 (18.02m)	24/7/17			R	P				✓	✓	✓	✓
16. NEL-BH058 (19.07m)	24/7/17			R	P				✓	✓	✓	✓

TOTAL NUMBER OF SAMPLES:

GENERAL COMMENTS:

TOTAL NUMBER OF ESQIES:

SAMPLES/ESKY CHILLED? Y/N

CUSTODY DETAILS:

Name	RICHA POTDAR (318583)		Date/Time Received			Date/Time Relinquished		
SAMPLER	ALEX HENDERSON							
GHD SERVICE CENTRE	REBECCA JACKLIN		4.9.17 3:35pm		km			
COURIER	9		4 9 17 3:26pm					
LABORATORY	NIRI (AU)		4/9/17 @ 16:10					

GHD

**Melbourne Office Address**

180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Fax: 613 8687 8111

Completion Date / Turnaround

Quote # / GHD Reference

[illegible]

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM1712011

Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: RICHA POTDAR	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: Richa.Potdar@ghd.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 03 8687 8000	Telephone	: +61-3-8549 9630
Facsimile	: +61 03 8687 8111	Facsimile	: +61-3-8549 9601
Project	: 3135006	Page	: 1 of 3
Order number	: ----	Quote number	: EM2015GHDSE0025 (EN/005/15 VICTORIA (Primary work only))
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: RP		

Dates

Date Samples Received	: 04-Sep-2017 15:36	Issue Date	: 05-Sep-2017
Client Requested Due Date	: 12-Sep-2017	Scheduled Reporting Date	: 12-Sep-2017

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 13.2°C
Receipt Detail	:	No. of samples received / analysed	: 18 / 18

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- **Analytical work for this work order will be conducted at ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA009 Net Acid Production Potential (NAPP)	SOIL - EA011 Net Acid Generation (NAG)	SOIL - EA029 SPOCAS	SOIL - EN60a ASLP Leachate Procedure	SOIL - W-02 ASLP 8 metals (ASLP)
EM1712011-001	12-Jul-2017 00:00	NEL-BH043 (5.95m)	✓	✓	✓	✓	✓
EM1712011-002	12-Jul-2017 00:00	NEL-BH043 (11.00m)	✓	✓	✓	✓	✓
EM1712011-003	12-Jul-2017 00:00	NEL-BH043 (11.57m)	✓	✓	✓	✓	✓
EM1712011-004	12-Jul-2017 00:00	NEL-BH043 (18.4m)	✓	✓	✓	✓	✓
EM1712011-005	11-Jul-2017 00:00	NEL-BH043 (34.6m)	✓	✓	✓	✓	✓
EM1712011-006	11-Jul-2017 00:00	NEL-BH033 (12.4m)	✓	✓	✓	✓	✓
EM1712011-007	11-Jul-2017 00:00	NEL-BH033 (21.4m)	✓	✓	✓	✓	✓
EM1712011-008	11-Jul-2017 00:00	NEL-BH033 (24.68m)	✓	✓	✓	✓	✓
EM1712011-009	11-Jul-2017 00:00	NEL-BH033 (26.33m)	✓	✓	✓	✓	✓
EM1712011-010	11-Jul-2017 00:00	NEL-BH033 (29.74m)	✓	✓	✓	✓	✓
EM1712011-011	11-Jul-2017 00:00	NEL-BH034 (7.9m)	✓	✓	✓	✓	✓
EM1712011-012	11-Jul-2017 00:00	NEL-BH034 (9.28m)	✓	✓	✓	✓	✓
EM1712011-013	11-Jul-2017 00:00	NEL-BH034 (12.05m)	✓	✓	✓	✓	✓
EM1712011-014	11-Jul-2017 00:00	NEL-BH034 (15.95m)	✓	✓	✓	✓	✓
EM1712011-015	12-Jul-2017 00:00	NEL-BH034 (22.9m)	✓	✓	✓	✓	✓
EM1712011-016	24-Jul-2017 00:00	NEL-BH058 (19.07m)	✓	✓	✓	✓	✓
EM1712011-017	24-Jul-2017 00:00	NEL-BH058 (18.22m)	✓	✓	✓	✓	✓
EM1712011-018	24-Jul-2017 00:00	NEL-BH058 (22.85m)	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: SOIL

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

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
ED042T: Sulfur - Total as S (LECO)								
NEL-BH033 (12.4m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH033 (21.4m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH033 (24.68m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH033 (26.33m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH033 (29.74m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH034 (12.05m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH034 (15.95m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH034 (22.9m)	80* dried soil		09-Aug-2017	09-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH034 (7.9m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH034 (9.28m)	80* dried soil		08-Aug-2017	08-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH043 (11.00m)	80* dried soil		09-Aug-2017	09-Aug-2017	04-Sep-2017	✗	----	----
NEL-BH043 (11.57m)	80* dried soil		09-Aug-2017	09-Aug-2017	04-Sep-2017	✗	----	----



Requested Deliverables

- A4 - AU Tax Invoice (INV)

- A4 - AU Tax Invoice (INV)

Email ap-fss@ghd.com

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

[illegible]

QUALITY CONTROL REPORT

Work Order	: EM1712011	Page	: 1 of 8
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: RICHA POTDAR	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 8687 8000	Telephone	: +61-3-8549 9630
Project	: 3135006	Date Samples Received	: 04-Sep-2017
Order number	: ----	Date Analysis Commenced	: 08-Sep-2017
C-O-C number	: ----	Issue Date	: 12-Sep-2017
Sampler	: RP		
Site	: ----		
Quote number	: EN/005/15 VICTORIA (Primary work only)		
No. of samples received	: 18		
No. of samples analysed	: 18		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Ben Felgendrejeris		Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 1103596)									
EB1718340-001	Anonymous	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
EB1718547-006	Anonymous	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
EA011: Net Acid Generation (QC Lot: 1103598)									
EM1712011-002	NEL-BH043 (11.00m)	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
EM1712011-013	NEL-BH034 (12.05m)	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.9	0.9	0.00	No Limit
EA029-A: pH Measurements (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: pH KCl (23A)	----	0.1	pH Unit	6.1	6.2	1.63	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.0	7.0	0.00	0% - 20%
EM1712011-011	NEL-BH034 (7.9m)	EA029: pH KCl (23A)	----	0.1	pH Unit	5.8	6.0	3.39	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	6.9	6.9	0.00	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.00	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-B: Acidity Trail (QC Lot: 1103597) - continued									
EM1712011-011	NEL-BH034 (7.9m)	EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-D: Calcium Values (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.025	0.025	0.00	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.042	0.041	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.030	0.034	10.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.033	0.034	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.046	0.048	2.54	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.058	0.066	11.9	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	0.024	16.5	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	15	38.2	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.074	0.082	10.4	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.087	0.088	0.00	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-E: Magnesium Values (QC Lot: 1103597) - continued									
EM1712011-011	NEL-BH034 (7.9m)	EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	11	<10	11.2	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.090	0.082	9.60	No Limit
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.029	0.026	9.60	No Limit
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	18	16	9.60	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.158	0.164	3.78	No Limit
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.050	0.052	3.78	No Limit
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	31	33	3.78	No Limit
EA029-H: Acid Base Accounting (QC Lot: 1103597)									
EM1712011-001	NEL-BH043 (5.95m)	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1712011-011	NEL-BH034 (7.9m)	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 1107362)									
EM1712011-001	NEL-BH043 (5.95m)	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Zinc	7440-66-6	0.1	mg/L	0.2	0.2	0.00	No Limit

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 Work Order : EM1712011
 Client : GHD PTY LTD
 Project : 3135006



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 1107362) - continued									
EM1712011-010	NEL-BH033 (29.74m)	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Zinc	7440-66-6	0.1	mg/L	0.2	0.2	0.00	No Limit
EG035C: Leachable Mercury by FIMS (QC Lot: 1107053)									
EM1712011-001	NEL-BH043 (5.95m)	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
EM1712011-010	NEL-BH033 (29.74m)	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	LCS	Low	High	
EA011: Net Acid Generation (QCLot: 1103596)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	101	70	130
EA011: Net Acid Generation (QCLot: 1103598)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	97.6	70	130
EA029-A: pH Measurements (QCLot: 1103597)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.2 pH Unit	100	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	3.4 pH Unit	94.1	70	130
EA029-B: Acidity Trail (QCLot: 1103597)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	56 mole H+ / t	98.4	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	170 mole H+ / t	94.8	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1103597)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	106	70	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	96.2	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1103597)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	100	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	103	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1103597)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	95.3	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	106	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1103597)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.020	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: <i>Compound</i>	CAS Number	LOR	Unit	Result				
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1103597) - continued								
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.020	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 1103597)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EN60: ASLP Leaching Procedure (QCLot: 1101751)								
EN60a: Final pH	----	0.1	pH Unit	5.0	----	----	----	----

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005C: Leachable Metals by ICPAES (QCLot: 1107362)								
EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	1 mg/L	111	89	123
EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	0.5 mg/L	104	88	120
EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	1 mg/L	103	86	115
EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	1 mg/L	103	87	117
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	1 mg/L	105	85	117
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	1 mg/L	106	90	116
EG005C: Zinc	7440-66-6	0.1	mg/L	<0.1	1 mg/L	107	87	122
EG035C: Leachable Mercury by FIMS (QCLot: 1107053)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.1	84	117

Matrix Spike (MS) Report

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

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 1107362)							
EM1712011-002	NEL-BH043 (11.00m)	EG005C: Arsenic	7440-38-2	1 mg/L	103	70	130
		EG005C: Cadmium	7440-43-9	0.5 mg/L	101	70	130
		EG005C: Chromium	7440-47-3	1 mg/L	102	70	130
		EG005C: Copper	7440-50-8	1 mg/L	101	70	130



Sub-Matrix: WATER

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 1107362) - continued							
EM1712011-002	NEL-BH043 (11.00m)	EG005C: Lead	7439-92-1	1 mg/L	102	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	102	70	130
		EG005C: Zinc	7440-66-6	1 mg/L	102	70	130
EG035C: Leachable Mercury by FIMS (QCLot: 1107053)							
EM1712011-002	NEL-BH043 (11.00m)	EG035C: Mercury	7439-97-6	0.01 mg/L	101	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order : EM1712011

Page : 1 of 8

Client : GHD PTY LTD
Contact : RICHA POTDAR
Project : 3135006
Site : ----
Sampler : RP
Order number : ----

Laboratory : Environmental Division Melbourne
Telephone : +61-3-8549 9630
Date Samples Received : 04-Sep-2017
Issue Date : 12-Sep-2017
No. of samples received : 18
No. of samples analysed : 18

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

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

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

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

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA011: Net Acid Generation								
80* dried soil (EA011) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	11-Jul-2018	✓	11-Sep-2017	10-Mar-2018	✓
80* dried soil (EA011) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	12-Jul-2018	✓	11-Sep-2017	10-Mar-2018	✓
80* dried soil (EA011) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	24-Jul-2018	✓	11-Sep-2017	10-Mar-2018	✓
EA029-A: pH Measurements								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-B: Acidity Trail								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
EA029-C: Sulfur Trail								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
EA029-D: Calcium Values								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-E: Magnesium Values								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
EA029-G: Retained Acidity								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✔	11-Sep-2017	10-Dec-2017	✔



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA029-H: Acid Base Accounting								
80* dried soil (EA029) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	11-Sep-2017	05-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓
80* dried soil (EA029) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	11-Sep-2017	06-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓
80* dried soil (EA029) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	11-Sep-2017	18-Apr-2020	✓	11-Sep-2017	10-Dec-2017	✓
EN60: ASLP Leaching Procedure								
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m),	NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m)	11-Jul-2017	08-Sep-2017	07-Jan-2018	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH034 (22.9m)	NEL-BH043 (11.00m), NEL-BH043 (18.4m),	12-Jul-2017	08-Sep-2017	08-Jan-2018	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH058 (19.07m), NEL-BH058 (22.85m)	NEL-BH058 (18.22m),	24-Jul-2017	08-Sep-2017	20-Jan-2018	✓	----	----	----

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG005C: Leachable Metals by ICPAES								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)								
NEL-BH043 (5.95m), NEL-BH043 (11.57m), NEL-BH043 (34.6m), NEL-BH033 (21.4m), NEL-BH033 (26.33m), NEL-BH034 (7.9m), NEL-BH034 (12.05m), NEL-BH034 (22.9m), NEL-BH058 (18.22m),	NEL-BH043 (11.00m), NEL-BH043 (18.4m), NEL-BH033 (12.4m), NEL-BH033 (24.68m), NEL-BH033 (29.74m), NEL-BH034 (9.28m), NEL-BH034 (15.95m), NEL-BH058 (19.07m), NEL-BH058 (22.85m)	08-Sep-2017	12-Sep-2017	07-Mar-2018	✓	12-Sep-2017	07-Mar-2018	✓



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG035C: Leachable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)	08-Sep-2017	----	----	----	12-Sep-2017	06-Oct-2017	✔	
NEL-BH043 (5.95m),								NEL-BH043 (11.00m),
NEL-BH043 (11.57m),								NEL-BH043 (18.4m),
NEL-BH043 (34.6m),								NEL-BH033 (12.4m),
NEL-BH033 (21.4m),								NEL-BH033 (24.68m),
NEL-BH033 (26.33m),								NEL-BH033 (29.74m),
NEL-BH034 (7.9m),								NEL-BH034 (9.28m),
NEL-BH034 (12.05m),								NEL-BH034 (15.95m),
NEL-BH034 (22.9m),								NEL-BH058 (19.07m),
NEL-BH058 (18.22m),								NEL-BH058 (22.85m)



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Net Acid Generation	EA011	4	37	10.81	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Net Acid Generation	EA011	2	37	5.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
ASLP for Non & Semivolatile Analytes	EN60a	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Leachable Mercury by FIMS	EG035C	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Mercury by FIMS	EG035C	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Mercury by FIMS	EG035C	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Mercury by FIMS	EG035C	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP- Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
Leachable Mercury by FIMS	EG035C	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
ASLP for Non & Semivolatile Analytes	EN60a	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Dry and Crush	EN84	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CERTIFICATE OF ANALYSIS

Work Order : **EM1712819**
Client : **GHD PTY LTD**
Contact : **RICHA POTDAR**
Address : **LEVEL 8, 180 LONSDALE ST**
MELBOURNE VIC, AUSTRALIA 3001
Telephone : **+61 03 8687 8000**
Project : **3135006**
Order number : **----**
C-O-C number : **----**
Sampler : **RP**
Site : **North East Link**
Quote number : **EN/005/15 VICTORIA (Primary work only)**
No. of samples received : **12**
No. of samples analysed : **12**

Page : 1 of 11
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 19-Sep-2017 09:54
Date Analysis Commenced : 22-Sep-2017
Issue Date : 26-Sep-2017 14:51



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH030 (17.02m)	NEL-BH030 (18.68m)	NEL-BH030 (26.71m)	NEL-BH030 (43.25m)	NEL-BH057 (5.64m)
Client sampling date / time				02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	09-Sep-2017 00:00	02-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712819-001	EM1712819-002	EM1712819-003	EM1712819-004	EM1712819-005
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	0.2
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH057 (15.43m)	NEL-BH057 (21.0m)	NEL-BH057 (40.85m)	NEL-BH057 (48.0m)	NEL-BH042 (15.5m)
Client sampling date / time				02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	16-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712819-006	EM1712819-007	EM1712819-008	EM1712819-009	EM1712819-010
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	0.2	0.4	<0.1	<0.1
Zinc	7440-66-6	0.1	mg/L	<0.1	0.2	0.1	0.1	0.6
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: ASLP LEACHATE
 (Matrix: WATER)

Client sample ID

				NEL-BH042 (31.46m)	NEL-BH042 (45.75m)	----	----	----
Client sampling date / time				16-Sep-2017 00:00	16-Sep-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1712819-011	EM1712819-012	-----	-----	-----
				Result	Result	----	----	----
EG005C: Leachable Metals by ICPAES								
Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	----	----	----
Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	----	----	----
Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	----	----	----
Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	----	----	----
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	----	----	----
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	----	----	----
Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	----	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	----	----	----



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH030 (17.02m)	NEL-BH030 (18.68m)	NEL-BH030 (26.71m)	NEL-BH030 (43.25m)	NEL-BH057 (5.64m)
Client sampling date / time				02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	09-Sep-2017 00:00	02-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712819-001	EM1712819-002	EM1712819-003	EM1712819-004	EM1712819-005
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.2	-2.8	-4.1	-8.6	-3.7
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.2	4.1	4.6	7.5	6.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.3	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	2.0	1.1	<0.1	0.4
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.5	6.4	6.2	7.9	6.3
pH OX (23B)	----	0.1	pH Unit	6.3	3.4	3.6	7.3	6.4
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	58	48	<2	6
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	58	48	<2	6
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	0.094	0.076	<0.020	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	0.094	0.076	<0.020	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	0.132	0.110	0.021	<0.020
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	0.132	0.110	0.021	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	82	69	13	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.028	0.026	0.027	0.054	0.042
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.029	0.026	0.027	0.063	0.042
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	<0.020
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	<10	<10
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.039	0.037	0.033	0.035	0.051
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.039	0.046	0.045	0.047	0.052
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	<0.020	<0.020	<0.020
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	10	<10	<10



Analytical Results

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH030 (17.02m)	NEL-BH030 (18.68m)	NEL-BH030 (26.71m)	NEL-BH030 (43.25m)	NEL-BH057 (5.64m)
Client sampling date / time					02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	09-Sep-2017 00:00	02-Sep-2017 00:00
Compound	CAS Number	LOR	Unit		EM1712819-001	EM1712819-002	EM1712819-003	EM1712819-004	EM1712819-005
				Result	Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued									
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S		<0.020	<0.020	<0.020	<0.020	<0.020
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3		----	----	----	0.162	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		----	----	----	32	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S		----	----	----	0.052	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		<0.02	0.13	0.11	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t		<10	82	69	<10	<10
Liming Rate	----	1	kg CaCO3/t		<1	6	5	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	0.13	0.11	0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	82	69	13	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	6	5	<1	<1
EN60: ASLP Leaching Procedure									
Extraction Fluid pH	----	0.1	pH Unit		2.9	2.9	2.9	2.9	2.9
Final pH	----	0.1	pH Unit		3.3	3.4	3.5	3.7	4.4



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH057 (15.43m)	NEL-BH057 (21.0m)	NEL-BH057 (40.85m)	NEL-BH057 (48.0m)	NEL-BH042 (15.5m)
Client sampling date / time				02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	16-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712819-006	EM1712819-007	EM1712819-008	EM1712819-009	EM1712819-010
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-4.1	1.4	-10.4	<0.5	-7.2
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.1	3.6	7.8	6.2	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	1.5	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	3.2	<0.1	0.2	<0.1
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.4	6.2	6.3	6.5	6.3
pH OX (23B)	----	0.1	pH Unit	6.7	2.8	6.2	3.3	6.6
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	82	4	36	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	82	4	36	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	0.131	<0.020	0.058	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	0.131	<0.020	0.058	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	0.160	0.061	0.094	<0.020
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	0.160	0.061	0.094	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	100	38	59	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	0.036
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.021	<0.020	<0.020	<0.020	0.039
Acid Reacted Calcium (23X)	----	0.020	% Ca	0.021	<0.020	<0.020	<0.020	<0.020
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	10	<10	<10	<10	<10
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.033	0.021	0.034	0.029	0.076
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.041	0.030	0.068	0.032	0.079
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	0.034	<0.020	<0.020
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	28	<10	<10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH057 (15.43m)	NEL-BH057 (21.0m)	NEL-BH057 (40.85m)	NEL-BH057 (48.0m)	NEL-BH042 (15.5m)
Client sampling date / time				02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	02-Sep-2017 00:00	16-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EM1712819-006	EM1712819-007	EM1712819-008	EM1712819-009	EM1712819-010
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	0.044	<0.020	<0.020
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	0.122	----	----	----	0.119
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	24	----	----	----	24
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	0.039	----	----	----	0.038
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	0.16	0.06	0.07	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	100	38	44	<10
Liming Rate	----	1	kg CaCO3/t	<1	7	3	3	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.16	0.06	0.07	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	100	38	44	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	7	3	3	<1
EN60: ASLP Leaching Procedure								
Extraction Fluid pH	----	0.1	pH Unit	2.9	2.9	2.9	2.9	2.9
Final pH	----	0.1	pH Unit	4.2	3.3	3.8	4.4	4.6



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH042 (31.46m)	NEL-BH042 (45.75m)	----	----	----
Client sampling date / time				16-Sep-2017 00:00	16-Sep-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1712819-011	EM1712819-012	-----	-----	-----
				Result	Result	----	----	----
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-3.1	2.5	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.1	3.3	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	0.4	3.2	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.1	6.0	----	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	6.5	6.5	----	----	----
pH OX (23B)	----	0.1	pH Unit	3.3	2.7	----	----	----
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	67	142	----	----	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	67	142	----	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	----	----	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	0.108	0.227	----	----	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	0.108	0.227	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	----	----	----
Peroxide Sulfur (23De)	----	0.020	% S	0.139	0.269	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	0.139	0.269	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	86	168	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.020	<0.020	----	----	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.025	0.024	----	----	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	0.024	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	12	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.040	0.037	----	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.047	0.052	----	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	12	----	----	----



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH042 (31.46m)	NEL-BH042 (45.75m)			
Client sampling date / time				16-Sep-2017 00:00	16-Sep-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1712819-011	EM1712819-012	-----	-----	-----
Result				Result	Result	----	----	----
EA029-E: Magnesium Values - Continued								
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	0.12	0.24	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	74	150	----	----	----
Liming Rate	----	1	kg CaCO3/t	6	11	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.12	0.24	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	74	150	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	6	11	----	----	----
EN60: ASLP Leaching Procedure								
Extraction Fluid pH	----	0.1	pH Unit	2.9	2.9	----	----	----
Final pH	----	0.1	pH Unit	4.1	4.2	----	----	----

GHD



180 Lonsdale Street, Melbourne 3000
Telephone: 613 8687 8000 Fax: 613 8687 8111

Completion Date / Turnaround

Quote # / GHD Reference

Page of

Job Number 31/35006		GHD Contact RICHAR POTDAR		Laboratory: ALS	
Project NEL A-TA (BATCH II of AS Testing)		Address: 2-4, Westall Rd, Springvale (VIC 3171)		Laboratory Contact: Shirley Le Cornu	
GHD Project Manager		GHD Contact RICHAR POTDAR		Container	
GHD PM email		GHD Contact email Richa.Potdar@ghd.com.au		Analyses Required	
Sample I.D.		Date	Time	Type	Volume (mL)
NEL-BH030(17.02m)		02/08/17		SPeGAS Suite	
NEL-BH030(18.68m)		"		NAP	
NEL-BH030(26.71m)		"		NAG	
NEL-BH030(43.25m)		09/08/17		Heavy metals leachability suite	
NEL-BH057 (5.64m)		02/08/17			
NEL-BH057 (15.43m)		"			
NEL-BH057 (21.0m)		"			
NEL-BH057 (40.85m)		"			
NEL-BH057 (48.0m)		"			
NEL-BH042 (15.5m)		16/8/17			
NEL-BH042 (31.46m)		"			
NEL-BH042 (45.75m)		"			
TOTAL NUMBER OF SAMPLES		GENERAL COMMENTS			
TOTAL NUMBER OF ESKIES		Amitha 19/9 9:54			
SAMPLES/ESKY CHILLED? Y/N					
CUSTODY DETAILS					
Name		Date/Time Received		Date/Time Relinquished	
SAMPLER Richa Potdar (318589)		18.9.17 4:25pm		18/09/17, 4:30pm. N Fran	
GHD SERVICE CENTRE REBECCA MACKLIN		16/9/17 4:25pm		19/9/17	
COURIER N					
LABORATORY					

QUALITY CONTROL REPORT

Work Order	: EM1712819	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: RICHA POTDAR	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 8687 8000	Telephone	: +61-3-8549 9630
Project	: 3135006	Date Samples Received	: 19-Sep-2017
Order number	: ----	Date Analysis Commenced	: 22-Sep-2017
C-O-C number	: ----	Issue Date	: 26-Sep-2017
Sampler	: RP		
Site	: North East Link		
Quote number	: EN/005/15 VICTORIA (Primary work only)		
No. of samples received	: 12		
No. of samples analysed	: 12		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 1130677)									
EM1712819-012	NEL-BH042 (45.75m)	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	3.2	3.0	5.75	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	6.0	5.9	0.00	0% - 20%
EM1712819-001	NEL-BH030 (17.02m)	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
EA029-A: pH Measurements (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: pH KCl (23A)	----	0.1	pH Unit	6.5	6.5	0.00	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	3.3	3.2	3.08	0% - 20%
EM1712819-001	NEL-BH030 (17.02m)	EA029: pH KCl (23A)	----	0.1	pH Unit	6.5	6.4	1.55	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	6.3	6.3	0.00	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	0.108	0.107	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	0.108	0.107	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	67	67	0.00	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	67	67	0.00	0% - 20%
EM1712819-001	NEL-BH030 (17.02m)	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	2	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-B: Acidity Trail (QC Lot: 1130678) - continued									
EM1712819-001	NEL-BH030 (17.02m)	EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	2	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.139	0.137	1.31	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.139	0.137	1.31	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	86	85	1.31	No Limit
EM1712819-001	NEL-BH030 (17.02m)	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-D: Calcium Values (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.020	0.020	0.00	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.025	0.025	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1712819-001	NEL-BH030 (17.02m)	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.028	0.027	3.59	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.029	0.030	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.040	0.038	4.90	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.047	0.046	2.15	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1712819-001	NEL-BH030 (17.02m)	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.039	0.038	2.88	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.039	0.042	6.36	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-H: Acid Base Accounting (QC Lot: 1130678)									
EM1712819-011	NEL-BH042 (31.46m)	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit

Page : 4 of 7
 Work Order : EM1712819
 Client : GHD PTY LTD
 Project : 3135006



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-H: Acid Base Accounting (QC Lot: 1130678) - continued									
EM1712819-011	NEL-BH042 (31.46m)	EA029: Net Acidity (sulfur units)	----	0.02	% S	0.12	0.12	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.12	0.12	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	6	5	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	6	5	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	74	73	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	74	73	0.00	No Limit
EM1712819-001	NEL-BH030 (17.02m)	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 1135646)									
EM1712819-001	NEL-BH030 (17.02m)	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Zinc	7440-66-6	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM1712819-010	NEL-BH042 (15.5m)	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EG035C: Leachable Mercury by FIMS (QC Lot: 1135644)									
EM1712819-001	NEL-BH030 (17.02m)	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
EM1712819-010	NEL-BH042 (15.5m)	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA011: Net Acid Generation (QCLot: 1130677)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	97.5	70	130
EA029-A: pH Measurements (QCLot: 1130678)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.2 pH Unit	100	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	3.4 pH Unit	94.1	70	130
EA029-B: Acidity Trail (QCLot: 1130678)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	56 mole H+ / t	98.2	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	170 mole H+ / t	97.0	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1130678)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	87.7	70	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	70.0	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1130678)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	119	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	93.4	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1130678)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	83.4	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	83.4	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1130678)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.020	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.020	----	----	----	----



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-H: Acid Base Accounting (QCLot: 1130678)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EN60: ASLP Leaching Procedure (QCLot: 1132881)								
EN60a: Final pH	----	0.1	pH Unit	2.9	----	----	----	----

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005C: Leachable Metals by ICPAES (QCLot: 1135646)								
EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	1 mg/L	97.1	89	123
EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	0.5 mg/L	100.0	88	120
EG005C: Chromium	7440-47-3	0.1	mg/L	<0.1	1 mg/L	99.3	86	115
EG005C: Copper	7440-50-8	0.1	mg/L	<0.1	1 mg/L	99.0	87	117
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	1 mg/L	102	85	117
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	1 mg/L	98.0	90	116
EG005C: Zinc	7440-66-6	0.1	mg/L	<0.1	1 mg/L	101	87	122
EG035C: Leachable Mercury by FIMS (QCLot: 1135644)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	84	117

Matrix Spike (MS) Report

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

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) Low High	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG005C: Leachable Metals by ICPAES (QCLot: 1135646)							
EM1712819-002	NEL-BH030 (18.68m)	EG005C: Arsenic	7440-38-2	1 mg/L	99.9	70	130
		EG005C: Cadmium	7440-43-9	0.5 mg/L	99.6	70	130
		EG005C: Chromium	7440-47-3	1 mg/L	99.8	70	130
		EG005C: Copper	7440-50-8	1 mg/L	100	70	130
		EG005C: Lead	7439-92-1	1 mg/L	100	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	99.8	70	130
		EG005C: Zinc	7440-66-6	1 mg/L	101	70	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035C: Leachable Mercury by FIMS (QCLot: 1135644)							
EM1712819-002	NEL-BH030 (18.68m)	EG035C: Mercury	7439-97-6	0.01 mg/L	94.2	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1712819	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: RICHA POTDAR	Telephone	: +61-3-8549 9630
Project	: 3135006	Date Samples Received	: 19-Sep-2017
Site	: North East Link	Issue Date	: 26-Sep-2017
Sampler	: RP	No. of samples received	: 12
Order number	: ----	No. of samples analysed	: 12

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA011: Net Acid Generation									
80* dried soil (EA011) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),		NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	02-Sep-2018	✓	25-Sep-2017	24-Mar-2018	✓
80* dried soil (EA011) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	09-Sep-2018	✓	25-Sep-2017	24-Mar-2018	✓
80* dried soil (EA011) NEL-BH042 (15.5m), NEL-BH042 (45.75m)		NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	16-Sep-2018	✓	25-Sep-2017	24-Mar-2018	✓
EA029-A: pH Measurements									
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),		NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	28-May-2020	✓	25-Sep-2017	24-Dec-2017	✓
80* dried soil (EA029) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	04-Jun-2020	✓	25-Sep-2017	24-Dec-2017	✓
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)		NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	11-Jun-2020	✓	25-Sep-2017	24-Dec-2017	✓
EA029-B: Acidity Trail									
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),		NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	28-May-2020	✓	25-Sep-2017	24-Dec-2017	✓
80* dried soil (EA029) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	04-Jun-2020	✓	25-Sep-2017	24-Dec-2017	✓
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)		NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	11-Jun-2020	✓	25-Sep-2017	24-Dec-2017	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method			Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)				Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-C: Sulfur Trail									
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)		02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),		16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
EA029-D: Calcium Values									
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)		02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),		16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
EA029-E: Magnesium Values									
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)		02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)			09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),		16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-F: Excess Acid Neutralising Capacity								
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)		09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
EA029-G: Retained Acidity								
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)		09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
EA029-H: Acid Base Accounting								
80* dried soil (EA029) NEL-BH030 (17.02m), NEL-BH030 (26.71m), NEL-BH057 (15.43m), NEL-BH057 (40.85m),	NEL-BH030 (18.68m), NEL-BH057 (5.64m), NEL-BH057 (21.0m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	28-May-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH030 (43.25m)		09-Sep-2017	25-Sep-2017	04-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔
80* dried soil (EA029) NEL-BH042 (15.5m), NEL-BH042 (45.75m)	NEL-BH042 (31.46m),	16-Sep-2017	25-Sep-2017	11-Jun-2020	✔	25-Sep-2017	24-Dec-2017	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN60: ASLP Leaching Procedure							
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH030 (17.02m), NEL-BH030 (18.68m), NEL-BH030 (26.71m), NEL-BH057 (5.64m), NEL-BH057 (15.43m), NEL-BH057 (21.0m), NEL-BH057 (40.85m), NEL-BH057 (48.0m)	02-Sep-2017	25-Sep-2017	01-Mar-2018	✔	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH030 (43.25m)	09-Sep-2017	25-Sep-2017	08-Mar-2018	✔	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60a) NEL-BH042 (15.5m), NEL-BH042 (31.46m), NEL-BH042 (45.75m)	16-Sep-2017	25-Sep-2017	15-Mar-2018	✔	----	----	----

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005C: Leachable Metals by ICPAES								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)		25-Sep-2017	26-Sep-2017	24-Mar-2018	✔	26-Sep-2017	24-Mar-2018	✔
NEL-BH030 (17.02m),	NEL-BH030 (18.68m),							
NEL-BH030 (26.71m),	NEL-BH030 (43.25m),							
NEL-BH057 (5.64m),	NEL-BH057 (15.43m),							
NEL-BH057 (21.0m),	NEL-BH057 (40.85m),							
NEL-BH057 (48.0m),	NEL-BH042 (15.5m),							
NEL-BH042 (31.46m),	NEL-BH042 (45.75m)							
EG035C: Leachable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)		25-Sep-2017	----	----	----	26-Sep-2017	23-Oct-2017	✔
NEL-BH030 (17.02m),	NEL-BH030 (18.68m),							
NEL-BH030 (26.71m),	NEL-BH030 (43.25m),							
NEL-BH057 (5.64m),	NEL-BH057 (15.43m),							
NEL-BH057 (21.0m),	NEL-BH057 (40.85m),							
NEL-BH057 (48.0m),	NEL-BH042 (15.5m),							
NEL-BH042 (31.46m),	NEL-BH042 (45.75m)							



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Net Acid Generation	EA011	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Net Acid Generation	EA011	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
ASLP for Non & Semivolatile Analytes	EN60a	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Leachable Mercury by FIMS	EG035C	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Mercury by FIMS	EG035C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Mercury by FIMS	EG035C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Mercury by FIMS	EG035C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP- Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
Leachable Mercury by FIMS	EG035C	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
ASLP for Non & Semivolatile Analytes	EN60a	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Dry and Crush	EN84	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CERTIFICATE OF ANALYSIS

Work Order : **EM1805796**
Client : **GHD PTY LTD**
Contact : **MR DAVID QUINN**
Address : **LEVEL 8, 180 LONSDALE ST**
MELBOURNE VIC, AUSTRALIA 3001
Telephone : **----**
Project : **31350060803**
Order number : **----**
C-O-C number : **----**
Sampler : **GHD**
Site : **----**
Quote number : **ME/124/18 - North East Link**
No. of samples received : **63**
No. of samples analysed : **63**

Page : 1 of 35
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 06-Apr-2018 10:25
Date Analysis Commenced : 12-Apr-2018
Issue Date : 30-Apr-2018 12:17



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Samantha Smith	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA031 (Saturated Paste pH): NATA accreditation does not cover the performance of this service.
- EA032 (Saturated Paste EC): NATA accreditation does not cover the performance of this service.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.
- ALS is not NATA accredited for the calculation of saturated resistivity in a soil.

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH114_5.22-5.30 m	NEL-BH008_10.0-10.1 m	NEL-BH099_10.0-10.1 0m	NEL-BH099_20.04-20.18m	NEL-BH095_9.97-10.11m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-001	EM1805796-002	EM1805796-003	EM1805796-004	EM1805796-007	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	-4.6	-6.5	-6.8	-1.9	-5.9	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	6.9	6.3	6.3	4.1	6.7	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	0.6	<0.1	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.8	5.1	4.8	3.9	1.7	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.6	6.5	6.8	5.9	5.9	
ANC as CaCO3	----	0.1	% CaCO3	0.5	0.7	0.7	0.6	0.6	
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0	
EA031: pH (saturated paste)									
ø pH (Saturated Paste)	----	0.1	pH Unit	6.8	7.3	7.6	7.3	----	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	6.2	6.3	6.4	6.4	6.2	
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2	
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.007	0.006	0.122	0.007	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	76	<10	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	0.12	<0.02	
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	76	<10	
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	6	<1	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	0.12	<0.02	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	76	<10	
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	6	<1	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	<1.0	<1.0	<1.0	<1.0	----	
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm	1040	1100	1860	1800	----	
ED040S : Soluble Sulfate by ICPAES									



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH114_5.22-5.30 m	NEL-BH008_10.0-10.1 m	NEL-BH099_10.0-10.1 0m	NEL-BH099_20.04-20. 18m	NEL-BH095_9.97-10.1 1m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-001	EM1805796-002	EM1805796-003	EM1805796-004	EM1805796-007
				Result	Result	Result	Result	Result
ED040S : Soluble Sulfate by ICPAES - Continued								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	10	20	<10	230	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	0.13	<0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	350	310	120	20	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	----
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	----
Sodium	7440-23-5	10	mg/kg	260	250	110	110	----
Potassium	7440-09-7	10	mg/kg	<10	<10	<10	30	----



Analytical Results

Sub-Matrix: ROCK
(Matrix: SOIL)

Client sample ID

				NEL-BH122_4.56-4.64 m	NEL-BH093_5.05-5.17 m	NEL-BH108_5.7-5.79m	NEL-BH092_5.0-5.10m	NEL-BH092_9.85-10.0 m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-008	EM1805796-009	EM1805796-010	EM1805796-011	EM1805796-012
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.6	-3.0	-4.7	-6.2	-4.7
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	7.6	7.1	7.2	7.9	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.6	3.0	5.3	6.2	4.7
ANC as CaCO3	----	0.1	% CaCO3	0.7	0.3	0.5	0.6	0.5
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA031: pH (saturated paste)								
Ø pH (Saturated Paste)	----	0.1	pH Unit	----	7.3	----	----	7.5
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.6	6.4	6.4	7.5	6.8
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.005	0.006	0.013	0.007	0.006
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.51	----	----	0.67	0.31
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	102	----	----	134	62
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.16	----	----	0.21	0.10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH122_4.56-4.64 m	NEL-BH093_5.05-5.17 m	NEL-BH108_5.7-5.79m	NEL-BH092_5.0-5.10m	NEL-BH092_9.85-10.0 m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-008	EM1805796-009	EM1805796-010	EM1805796-011	EM1805796-012
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	<1.0	----	----	21.4
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	----	1530	----	----	910
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	10	----	----	20
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.02	<0.01	<0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	----	320	----	----	520
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	<10	----	----	<10
Magnesium	7439-95-4	10	mg/kg	----	<10	----	----	<10
Sodium	7440-23-5	10	mg/kg	----	240	----	----	390
Potassium	7440-09-7	10	mg/kg	----	<10	----	----	<10



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH089_8.70-8.90 m	NEL-BH089_15.0-15.7 m	NEL-BH087_5.60-5.79 m	NEL-BH087_14.90-15.10m	NEL-BH100_5.10-5.30 m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-013	EM1805796-014	EM1805796-015	EM1805796-016	EM1805796-017
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-2.9	-5.0	-3.6	-6.6	-6.0
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.7	6.7	7.0	7.8	7.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.8	1.1	0.2	<0.1	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.9	5.0	3.6	6.6	6.0
ANC as CaCO3	----	0.1	% CaCO3	0.3	0.5	0.4	0.7	0.6
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.4	7.6	7.8	8.0
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.6	6.2	6.5	6.8	6.4
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.005	0.008	0.007	0.006
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.24	----	0.28	0.64	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	49	----	56	128	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.08	----	0.09	0.20	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	<1



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH089_8.70-8.90 m	NEL-BH089_15.0-15.7 m	NEL-BH087_5.60-5.79 m	NEL-BH087_14.90-15.10m	NEL-BH100_5.10-5.30 m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-013	EM1805796-014	EM1805796-015	EM1805796-016	EM1805796-017
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	1130	1370	1200	1320	2430
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	20	30	30	30	50
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	460	460	300	160	150
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	320	320	250	160	150
Potassium	7440-09-7	10	mg/kg	<10	<10	<10	<10	<10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH100_17.34-17.44m	NEL-BH031_10.04-10.11m	NEL-BH031_20.03-20.13m	NEL-BH083_14.84-15.0m	NEL-BH083_25.0-25.22m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-018	EM1805796-019	EM1805796-020	EM1805796-021	EM1805796-022
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-4.9	-5.3	-7.4	<0.5	<0.5
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	6.9	7.3	6.8	3.6	3.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	1.6	2.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.4	<0.1	0.4	3.6	4.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	8.9	5.3	14.7	7.0	7.0
ANC as CaCO3	----	0.1	% CaCO3	0.9	0.5	1.5	0.7	0.7
Fizz Rating	----	0	Fizz Unit	1	0	1	0	0
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	7.6	7.6	8.3	8.0	8.4
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.7	6.4	8.6	6.7	6.7
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.131	0.012	0.222	0.182	0.222
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	82	<10	139	113	138
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	3.29	----	0.38	0.57	0.54
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	657	----	75	113	107
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.05	----	0.12	0.18	0.17
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.14	0.06	0.11
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	88	38	67
Liming Rate	----	1	kg CaCO3/t	<1	<1	7	3	5
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.13	<0.02	0.22	0.18	0.22
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	82	<10	139	113	138
Liming Rate excluding ANC	----	1	kg CaCO3/t	6	<1	10	8	10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH100_17.34-17.44m	NEL-BH031_10.04-10.11m	NEL-BH031_20.03-20.13m	NEL-BH083_14.84-15.0m	NEL-BH083_25.0-25.22m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-018	EM1805796-019	EM1805796-020	EM1805796-021	EM1805796-022
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	1040	1220	1630	1860	3460
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	260	40	200	140	70
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.13	<0.01	0.24	0.23	0.24
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	160	210	60	40	20
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	260	180	170	110	60
Potassium	7440-09-7	10	mg/kg	20	<10	30	20	<10

Sub-Matrix: **ROCK**
(Matrix: **SOIL**)

NEL-BH084_15.3-15.4 0m	NEL-BH084_20.0-20.0 8m	NEL-BH084_29.63-29. 79m	NEL-BH084_37.95-38. 05m	NEL-BH076_19.88-20. 03m
06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
EM1805796-023	EM1805796-024	EM1805796-025	EM1805796-026	EM1805796-027
Result	Result	Result	Result	Result

Net Acid Production Potential	----	0.5	kg H2SO4/t	-6.6	----	-1.2	10.1	----
--------------------------------------	------	-----	------------	-------------	------	-------------	-------------	------

pH (OX)	----	0.1	pH Unit	7.1	----	4.0	3.0	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	----	2.0	8.0	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	----	4.9	10.2	----

ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	6.6	----	4.9	4.6	----
ANC as CaCO3	----	0.1	% CaCO3	0.7	----	0.5	0.5	----
Fizz Rating	----	0	Fizz Unit	0	----	0	0	----

pH KCl (23A)	----	0.1	pH Unit	----	----	6.2	----	----
pH OX (23B)	----	0.1	pH Unit	----	----	3.3	----	----

Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	----	<2	----	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	87	----	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	87	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	<0.020	----	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	0.140	----	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	0.140	----	----

KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	<0.020	----	----
Peroxide Sulfur (23De)	----	0.020	% S	----	----	0.110	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	0.110	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	69	----	----

KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	<0.020	----	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	<0.020	----	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	<0.020	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	<10	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	<0.020	----	----

EA029-E: Magnesium Values



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH084_15.3-15.4 0m	NEL-BH084_20.0-20.0 8m	NEL-BH084_29.63-29. 79m	NEL-BH084_37.95-38. 05m	NEL-BH076_19.88-20. 03m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-023	EM1805796-024	EM1805796-025	EM1805796-026	EM1805796-027
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	<0.020	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	0.020	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	0.020	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	16	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	0.026	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	0.11	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	69	----	----
Liming Rate	----	1	kg CaCO3/t	----	----	5	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	0.11	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	69	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	5	----	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	----	6.4	6.9	6.9	5.6
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.3	----	6.2	5.3	----
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	2	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.011	----	0.114	0.364	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	71	227	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	0.11	0.37	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	72	230	----
Liming Rate	----	1	kg CaCO3/t	<1	----	5	17	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	0.11	0.37	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	72	230	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	5	17	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	<1.0	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH084_15.3-15.4 0m	NEL-BH084_20.0-20.0 8m	NEL-BH084_29.63-29. 79m	NEL-BH084_37.95-38. 05m	NEL-BH076_19.88-20. 03m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-023	EM1805796-024	EM1805796-025	EM1805796-026	EM1805796-027
				Result	Result	Result	Result	Result
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	----	1110	1530	780	770
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	530	260	850	810
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	----	0.12	0.48	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	----	100	80	50	110
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	20	<10	30	60
Magnesium	7439-95-4	10	mg/kg	----	50	20	100	90
Sodium	7440-23-5	10	mg/kg	----	190	110	170	210
Potassium	7440-09-7	10	mg/kg	----	50	40	80	40

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH076_30.0-30.1	NEL-BH076_39.79-40.	NEL-BH074_20.0-20.1	NEL-BH074_30.0m	NEL-BH074_41.89-42.
				3m	02m	4m		0m	
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-028	EM1805796-029	EM1805796-030	EM1805796-031	EM1805796-032	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	-29.0	----	-4.6	-5.4	-6.1	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	7.7	----	6.6	6.4	6.7	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	----	<0.1	<0.1	<0.1	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	----	0.9	0.7	0.8	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	31.8	----	7.1	7.8	10.4	
ANC as CaCO3	----	0.1	% CaCO3	3.2	----	0.7	0.8	1.1	
Fizz Rating	----	0	Fizz Unit	2	----	0	0	1	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	----	----	----	6.7	----	
pH OX (23B)	----	0.1	pH Unit	----	----	----	4.5	----	
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----	
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	26	----	
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	26	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	----	<0.020	----	
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	----	0.042	----	
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	----	0.042	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	----	<0.020	----	
Peroxide Sulfur (23De)	----	0.020	% S	----	----	----	0.065	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	----	0.065	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	40	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	----	<0.020	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	----	<0.020	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	----	<0.020	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	<10	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	----	<0.020	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH076_30.0-30.1 3m	NEL-BH076_39.79-40. 02m	NEL-BH074_20.0-20.1 4m	NEL-BH074_30.0m	NEL-BH074_41.89-42. 0m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-028	EM1805796-029	EM1805796-030	EM1805796-031	EM1805796-032
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	0.040	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	0.044	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	<0.020	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	0.05	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	31	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	2	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	0.05	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	31	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	2	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	8.1	7.5	7.6	7.7	7.7
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	7.0	----	6.5	6.7	6.7
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.075	----	0.080	0.072	0.138
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	47	----	50	45	86
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.27	----	0.66	0.77	0.68
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1050	----	132	154	136
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.69	----	0.21	0.25	0.22
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH076_30.0-30.1 3m	NEL-BH076_39.79-40. 02m	NEL-BH074_20.0-20.1 4m	NEL-BH074_30.0m	NEL-BH074_41.89-42. 0m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-028	EM1805796-029	EM1805796-030	EM1805796-031	EM1805796-032
				Result	Result	Result	Result	Result
EA033-E: Acid Base Accounting - Continued								
Liming Rate	----	1	kg CaCO ₃ /t	<1	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.08	----	0.08	0.07	0.14
Net Acidity excluding ANC (acidity units)	----	10	mole H ⁺ / t	47	----	50	45	86
Liming Rate excluding ANC	----	1	kg CaCO ₃ /t	4	----	4	3	6
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	4.7	<1.0	<1.0	<1.0	<1.0
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	840	510	1520	1770	1880
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg	530	320	160	130	150
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.09	----	0.08	0.08	0.14
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	220	40	70	80	50
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	490	180	130	130	120
Potassium	7440-09-7	10	mg/kg	10	20	10	<10	<10

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH073_24.90-25.06m	NEL-BH059_5.5m	NEL-BH059_10.04-10.18m	NEL-BH059_20.0-20.21m	NEL-BH137_14.87-15.0m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-033	EM1805796-034	EM1805796-035	EM1805796-036	EM1805796-038	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	-2.7	----	-7.6	-5.6	-5.9	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	5.7	----	7.6	6.7	6.8	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	----	<0.1	<0.1	<0.1	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.9	----	<0.1	0.9	0.7	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	8.2	----	7.6	7.7	5.9	
ANC as CaCO3	----	0.1	% CaCO3	0.8	----	0.8	0.8	0.6	
Fizz Rating	----	0	Fizz Unit	1	----	0	0	0	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	6.6	6.8	----	----	----	
pH OX (23B)	----	0.1	pH Unit	3.3	7.1	----	----	----	
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----	
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	90	<2	----	----	----	
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	90	<2	----	----	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	----	----	----	
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	0.145	<0.020	----	----	----	
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	0.145	<0.020	----	----	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	----	----	----	
Peroxide Sulfur (23De)	----	0.020	% S	0.152	<0.020	----	----	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	0.152	<0.020	----	----	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	95	<10	----	----	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	<0.020	0.049	----	----	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	<0.020	0.050	----	----	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	----	----	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	----	----	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	----	----	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH073_24.90-25.06m	NEL-BH059_5.5m	NEL-BH059_10.04-10.18m	NEL-BH059_20.0-20.21m	NEL-BH137_14.87-15.0m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-033	EM1805796-034	EM1805796-035	EM1805796-036	EM1805796-038
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.020	0.067	----	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.034	0.079	----	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	12	<10	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	0.039	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	<0.020	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	0.15	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	92	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	7	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.15	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	92	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	7	<1	----	----	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	7.4	7.4	7.8	7.7	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.6	----	7.0	6.6	6.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.182	----	0.017	0.066	0.010
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	113	----	11	41	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.89	----	0.72	0.57	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	178	----	143	113	----



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH073_24.90-25.06m	NEL-BH059_5.5m	NEL-BH059_10.04-10.18m	NEL-BH059_20.0-20.21m	NEL-BH137_14.87-15.0m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-033	EM1805796-034	EM1805796-035	EM1805796-036	EM1805796-038
				Result	Result	Result	Result	Result
EA033-C: Acid Neutralising Capacity - Continued								
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.28	----	0.23	0.18	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.18	----	<0.02	0.07	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	113	----	11	41	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	8	----	<1	3	<1
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	<1.0	19.1	1.1	<1.0	----
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	2160	540	1320	1150	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	160	80	30	130	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.18	----	<0.01	0.07	<0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	20	690	190	200	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	<10	<10	----
Magnesium	7439-95-4	10	mg/kg	<10	<10	<10	<10	----
Sodium	7440-23-5	10	mg/kg	80	590	170	220	----
Potassium	7440-09-7	10	mg/kg	20	<10	<10	<10	----



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH037_5m	NEL-BH037_14.98-15.10m	NEL-BH037_25.0-25.08m	NEL-BH124_25.0-25.12m	NEL-BH124_35.03-35.12m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-039	EM1805796-040	EM1805796-041	EM1805796-043	EM1805796-044
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	-2.6	3.9	-3.5	-7.6
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	----	7.1	3.3	6.7	7.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	<0.1	3.7	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	<0.1	6.6	0.8	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	2.6	4.4	3.5	9.4
ANC as CaCO3	----	0.1	% CaCO3	----	0.3	0.4	0.4	1.0
Fizz Rating	----	0	Fizz Unit	----	0	0	0	1
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	7.5	6.9	6.3	7.2	7.4
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	6.4	6.0	6.1	6.6
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.009	0.213	0.011	0.064
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	133	<10	40
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	----	1.24
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	----	247
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	----	0.40
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	0.21	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	133	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	10	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	0.21	<0.02	0.06
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	133	<10	40
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	10	<1	3



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH037_5m	NEL-BH037_14.98-15.10m	NEL-BH037_25.0-25.08m	NEL-BH124_25.0-25.12m	NEL-BH124_35.03-35.12m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-039	EM1805796-040	EM1805796-041	EM1805796-043	EM1805796-044
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	9.4	<1.0	<1.0	<1.0	<1.0
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	1340	2100	790	1420	1720
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	30	40	620	40	90
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	----	<0.01	0.27	<0.01	0.06
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	200	130	260	180	90
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	30	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	70	<10	<10
Sodium	7440-23-5	10	mg/kg	190	140	280	170	120
Potassium	7440-09-7	10	mg/kg	<10	<10	40	<10	10

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH124_45.0-45.1 m	NEL-BH067_12.06-12. 21m	NEL-BH067_25.0-25.1 3m	NEL-BH068_8.20-8.30 m	NEL-BH068_14.96-15. 06m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-045	EM1805796-046	EM1805796-047	EM1805796-048	EM1805796-049	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	-3.8	-3.2	0.9	-1.8	----	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	6.6	6.9	6.7	7.0	----	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	----	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.7	0.4	0.6	<0.1	----	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.5	3.2	4.0	1.8	----	
ANC as CaCO3	----	0.1	% CaCO3	0.8	0.3	0.4	0.2	----	
Fizz Rating	----	0	Fizz Unit	1	0	0	0	----	
EA031: pH (saturated paste)									
ø pH (Saturated Paste)	----	0.1	pH Unit	7.1	5.2	5.8	5.2	6.9	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	6.4	4.9	5.7	4.8	----	
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	6	<2	6	----	
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.112	0.007	0.118	0.014	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	70	<10	74	<10	----	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	----	
Net Acidity (sulfur units)	----	0.02	% S	0.11	<0.02	0.12	0.02	----	
Net Acidity (acidity units)	----	10	mole H+ / t	70	10	74	15	----	
Liming Rate	----	1	kg CaCO3/t	5	<1	6	1	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.11	<0.02	0.12	0.02	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	70	10	74	15	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	5	<1	6	1	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0	
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm	1570	5680	670	11200	2650	
ED040S : Soluble Sulfate by ICPAES									



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH124_45.0-45.1 m	NEL-BH067_12.06-12. 21m	NEL-BH067_25.0-25.1 3m	NEL-BH068_8.20-8.30 m	NEL-BH068_14.96-15. 06m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-045	EM1805796-046	EM1805796-047	EM1805796-048	EM1805796-049
				Result	Result	Result	Result	Result
ED040S : Soluble Sulfate by ICPAES - Continued								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	220	<10	1210	20	100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.12	<0.01	0.16	<0.01	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	60	30	30	<10	<10
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	40	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	<10	260	<10	<10
Sodium	7440-23-5	10	mg/kg	140	20	50	<10	20
Potassium	7440-09-7	10	mg/kg	20	<10	50	<10	20
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	<0.5	----



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH068_19.97-20.05m	NEL-BH039_2.40m	NEL-BH004_2.0-2.45m	NEL-BH004_9.05m	NEL-BH004_15.0-15.45m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-050	EM1805796-051	EM1805796-054	EM1805796-055	EM1805796-056
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	6.7	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	6.8	----
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	----	<0.020	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	----	<0.020	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	----	<0.020	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	----	<0.020	----
Peroxide Sulfur (23De)	----	0.020	% S	----	----	----	0.065	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	----	0.065	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	41	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	----	0.052	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	----	0.057	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	----	<0.020	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	----	<0.020	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	0.097	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	0.116	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	15	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	0.024	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	0.029	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	<10	----



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-BH068_19.97-20.05m	NEL-BH039_2.40m	NEL-BH004_2.0-2.45m	NEL-BH004_9.05m	NEL-BH004_15.0-15.45m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-050	EM1805796-051	EM1805796-054	EM1805796-055	EM1805796-056
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	<0.020	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	0.06	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	41	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	3	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	7.5	----	----	7.0	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	7.1	6.8	----	6.4
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.011	0.011	----	0.024
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	----	15
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	1.07	0.40	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	214	80	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.34	0.13	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	----	15
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	----	1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	<10	----	15
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	----	1



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH068_19.97-20.05m	NEL-BH039_2.40m	NEL-BH004_2.0-2.45m	NEL-BH004_9.05m	NEL-BH004_15.0-15.45m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-050	EM1805796-051	EM1805796-054	EM1805796-055	EM1805796-056
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	20.6	----
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	1850	----	----	560	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	240	----	----	120	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	<10	----	----	380	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	20	----	----	<10	----
Magnesium	7439-95-4	10	mg/kg	20	----	----	<10	----
Sodium	7440-23-5	10	mg/kg	20	----	----	350	----
Potassium	7440-09-7	10	mg/kg	110	----	----	<10	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	----	----	----	0.8	----

Sub-Matrix: ROCK (Matrix: SOIL)				Client sample ID	NEL-BH004_19.5-19.9 5m	NEL-BH070_5.0m	NEL-BH085_5.0-5.12m	NEL-BH085_15.0-15.1 m	NEL-BH042_14.97-15. 08m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-057	EM1805796-060	EM1805796-061	EM1805796-062	EM1805796-063	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	----	----	----	-7.1	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	----	----	----	----	7.2	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	----	----	----	7.7	
ANC as CaCO3	----	0.1	% CaCO3	----	----	----	----	0.8	
Fizz Rating	----	0	Fizz Unit	----	----	----	----	0	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	6.5	5.1	----	----	----	
pH OX (23B)	----	0.1	pH Unit	6.4	4.9	----	----	----	
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	9	----	----	----	
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	2	15	----	----	----	
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	2	6	----	----	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	----	----	----	
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	0.024	----	----	----	
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	<0.020	----	----	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	----	----	----	
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	<0.020	----	----	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	<0.020	----	----	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	----	----	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	<0.020	0.026	----	----	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	<0.020	0.033	----	----	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	----	----	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	----	----	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	----	----	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH004_19.5-19.9 5m	NEL-BH070_5.0m	NEL-BH085_5.0-5.12m	NEL-BH085_15.0-15.1 m	NEL-BH042_14.97-15.08m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-057	EM1805796-060	EM1805796-061	EM1805796-062	EM1805796-063
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.037	0.044	----	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.037	0.049	----	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	----	----	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	----	5.2	7.3	7.2	7.6
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	----	1890	1410	1260	3160
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	90	70	260	20
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	----	----	----	----	0.02
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	----	30	110	80	10
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	----	<10	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	----	20	<10	<10	<10
Sodium	7440-23-5	10	mg/kg	----	120	160	180	50
Potassium	7440-09-7	10	mg/kg	----	10	<10	30	<10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH042_25.15-25.25m	----	----	----	----
Client sampling date / time				06-Apr-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1805796-064	-----	-----	-----	-----
Result					----	----	----	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	6.9	----	----	----	----
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	830	----	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	680	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	20	----	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg	<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg	270	----	----	----	----
Potassium	7440-09-7	10	mg/kg	70	----	----	----	----

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-BH110_5.0-5.20m	NEL-BH095_5.45-5.55m	NEL-BH137_5.0m	NEL-BH005_4.11-4.56m	NEL-BH068_8.20-8.30m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1805796-005	EM1805796-006	EM1805796-037	EM1805796-042	EM1805796-048	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	-5.8	----	----	----	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	----	7.4	----	----	----	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	<0.1	----	----	----	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	<0.1	----	----	----	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	6.4	----	----	----	
ANC as CaCO3	----	0.1	% CaCO3	----	0.6	----	----	----	
Fizz Rating	----	0	Fizz Unit	----	0	----	----	----	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	----	----	----	6.6	----	
pH OX (23B)	----	0.1	pH Unit	----	----	----	7.3	----	
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----	
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	----	
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	----	<0.020	----	
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	----	<0.020	----	
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	----	<0.020	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	----	<0.020	----	
Peroxide Sulfur (23De)	----	0.020	% S	----	----	----	<0.020	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	----	<0.020	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	<10	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	----	0.041	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	----	0.041	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	----	<0.020	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	<10	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	----	<0.020	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

				NEL-BH110_5.0-5.20m	NEL-BH095_5.45-5.55m	NEL-BH137_5.0m	NEL-BH005_4.11-4.56m	NEL-BH068_8.20-8.30m
Client sampling date / time				06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1805796-005	EM1805796-006	EM1805796-037	EM1805796-042	EM1805796-048
				Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	0.087	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	0.087	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	<0.020	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	<0.020	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	<0.020	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	<1	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	----	7.4	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	7.0	----	----
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.007	0.006	0.010	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	0.22	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	44	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-BH110_5.0-5.20m	NEL-BH095_5.45-5.55 m	NEL-BH137_5.0m	NEL-BH005_4.11-4.56 m	NEL-BH068_8.20-8.30 m
Client sampling date / time					06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00
Compound	CAS Number	LOR	Unit		EM1805796-005	EM1805796-006	EM1805796-037	EM1805796-042	EM1805796-048
				Result	Result	Result	Result	Result	Result
EA033-C: Acid Neutralising Capacity - Continued									
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	0.07	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	<1	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	----	18.3	----	----	----	----
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm	----	2310	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg	----	100	----	----	----	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%	----	0.02	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	----	100	----	----	----	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg	----	<10	----	----	----	----
Magnesium	7439-95-4	10	mg/kg	----	<10	----	----	----	----
Sodium	7440-23-5	10	mg/kg	----	140	----	----	----	----
Potassium	7440-09-7	10	mg/kg	----	<10	----	----	----	----
MM820: Sulphate Reducing Bacteria									
Sulphate Reducing Bacteria Population Estimate	----	200	pac/g	----	----	----	----	----	<200
Aggressivity	----	1	-	----	----	----	----	----	Low to Medium



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-BH039_5.9m	NEL-BH039_9.80m	NEL-BH004_9.05m	NEL-BH070_2.0m	----
Client sampling date / time					06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1805796-052	EM1805796-053	EM1805796-055	EM1805796-059	-----
					Result	Result	Result	Result	----
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		6.6	----	----	8.6	----
pH OX (23B)	----	0.1	pH Unit		7.0	----	----	7.7	----
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t		<2	----	----	<2	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t		<2	----	----	<2	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t		<2	----	----	<2	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S		<0.020	----	----	<0.020	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S		<0.020	----	----	<0.020	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S		<0.020	----	----	<0.020	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S		<0.020	----	----	<0.020	----
Peroxide Sulfur (23De)	----	0.020	% S		<0.020	----	----	<0.020	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S		<0.020	----	----	<0.020	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		<10	----	----	<10	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca		0.120	----	----	0.202	----
Peroxide Calcium (23Wh)	----	0.020	% Ca		0.120	----	----	0.246	----
Acid Reacted Calcium (23X)	----	0.020	% Ca		<0.020	----	----	0.044	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		<10	----	----	22	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S		<0.020	----	----	0.035	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg		0.118	----	----	0.038	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg		0.118	----	----	0.074	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg		<0.020	----	----	0.036	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		<10	----	----	30	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S		<0.020	----	----	0.048	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3		<0.020	----	----	0.369	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		<10	----	----	74	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S		<0.020	----	----	0.118	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-BH039_5.9m	NEL-BH039_9.80m	NEL-BH004_9.05m	NEL-BH070_2.0m	----
Client sampling date / time					06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1805796-052	EM1805796-053	EM1805796-055	EM1805796-059	-----
					Result	Result	Result	Result	----
EA029-F: Excess Acid Neutralising Capacity - Continued									
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S		<0.02	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t		<10	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t		<1	----	----	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	----	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	----	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	----	----	<1	----
EA031: pH (saturated paste)									
ø pH (Saturated Paste)	----	0.1	pH Unit		7.0	6.2	----	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		----	5.9	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	5	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		----	<0.02	----	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S		----	0.244	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		----	152	----	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		----	0.25	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	158	----	----	----
Liming Rate	----	1	kg CaCO3/t		----	12	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		----	0.25	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		----	158	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		----	12	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		15.5	21.1	----	----	----
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm		1040	1110	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		30	90	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		140	50	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-BH039_5.9m	NEL-BH039_9.80m	NEL-BH004_9.05m	NEL-BH070_2.0m	----
Client sampling date / time					06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	06-Apr-2018 00:00	----
Compound	CAS Number	LOR	Unit		EM1805796-052	EM1805796-053	EM1805796-055	EM1805796-059	-----
					Result	Result	Result	Result	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	<10	----	----	----
Magnesium	7439-95-4	10	mg/kg		<10	<10	----	----	----
Sodium	7440-23-5	10	mg/kg		290	80	----	----	----
Potassium	7440-09-7	10	mg/kg		<10	<10	----	----	----
EP004: Organic Matter									
Total Organic Carbon	----	0.5	%		0.6	----	----	----	----
MM820: Sulphate Reducing Bacteria									
Sulphate Reducing Bacteria Population Estimate	----	200	pac/g		<200	----	<200	----	----
Aggressivity	----	1	-		Low to Medium	----	Low to Medium	----	----

FQM - Generic Chain of Custody Form

Q4AN(EV)-007-FM1

CONSULTANT: GHD Pty Ltd		ADDRESS / OFFICE:		SAMPLER: GHD		Destination Laboratory	
PROJECT MANAGER (PM): David Quinn		SITE: Melbourne		MOBILE: S.Hilliard 0430 344 657		ALS Springvale	
PROJECT NUMBER & TASK CODE: 31350060803		P.O. NO.:		EMAIL REPORT TO: nazuha.rosli@aecom.co marcin.wieloch@ghd.com		ATT: Shirley LeCornu	
RESULTS REQUIRED (Date): ASAP		QUOTE NO.:		ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)			
FOR LABORATORY USE ONLY COOLER SEAL (circle appropriate) Intact: Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> SAMPLE TEMPERATURE CHILLED: Yes <input type="checkbox"/> No <input type="checkbox"/>		COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:		NAPP (ASS-1) NAG (EA011) Chromium Suite (EA033) SPOCAS Suite (EA029) NEL-Suite 1 NEL-Suite 2 NEL-Suite 3 NEL-Suite 4 NEL-Suite 5 Extra volume for QC or trace LORs etc. NEL-Suite 1 inc. testing of concentration of: Ca2+, Na+, Mg2+, K+, SO42-, Cl- NEL-Suite 2 inc. testing of soil resistivity (to AS 1289.4.4.1) and pH (to AS 1289.4.3.1). NEL-Suite 3 inc. acid sulphate soil testing to include pHKCl, TAA and pHox as per AS 4969.12 and net acidity as per AS 4969.14. Where sample at designated depth is rock not soil, undertake NAG and NAP testing instead. NEL-Suite 4 inc. NAPP (ASS-1) and NAG (EA011) testing. NEL-Suite 5 inc. testing of total organic carbon (TOC) content and sulphate reducing bacteria (SRB). TOC testing to be carried out to (AS 1289.4.1.1).			
SAMPLE INFORMATION (note: S = Soil, W=Water)				CONTAINER INFORMATION			
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total	BAGS
1	NEL-BH114_5.22-5.30m	S			Bag	1	1
2	NEL-BH008_10.0-10.1m	S			Bag	1	1
3	NEL-BH099_10.0-10.10m	S			Bag	1	1
4	NEL-BH099_20.04-20.18m	S			Bag	1	1
5	NEL-BH110_5.0-5.20m	S			Bag	1	1
6	NEL-BH095_5.45-5.55m	S			Bag	1	1
7	NEL-BH095_9.97-10.11m	S			Bag	1	1
8	NEL-BH122_4.56-4.64m	S			Bag	1	1
9	NEL-BH093_5.05-5.17m	S			Bag	1	1
10	NEL-BH108_5.7-5.79m	S			Bag	1	1
11	NEL-BH092_5.0-5.10m	S			Bag	1	1
12	NEL-BH092_9.85-10.0m	S			Bag	1	1
13	NEL-BH089_8.70-8.90m	S			Bag	1	1
14	NEL-BH089_15.0-15.17m	S			Bag	1	1
15	NEL-BH087_5.60-5.79m	S			Bag	1	1
16	NEL-BH087_14.90-15.10m	S			Bag	1	1
17							
RELINQUISHED BY:		RECEIVED BY		RECEIVED BY		METHOD OF SHIPMENT	
Name: ANDY SMO	Date: 6/4/18	Name: SHANE 24	Date:	Name: Nazha	Date: 6/4/18	Con' Note No:	
Of: GHD	Time:	Of:	Time:	Of: ALS	Time: 10:55	Transport Co:	
Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag. Soil Container Codes: Jar = Unpreserved glass jar							

Environmental Division
Melbourne
Work Order Reference
EM1805796



Telephone: + 61-3-9540 9600

COC Page 1 of 4

ANZ

FQM - Generic Chain of Custody Form

CONSULTANT: GHD Pty Ltd		ADDRESS / OFFICE:		SAMPLER: GHD		Destination Laboratory	
PROJECT MANAGER (PM): David Quinn		SITE: Melbourne		MOBILE: S.Hilliard 0430 344 657		ALS Springvale	
PROJECT NUMBER & TASK CODE: 31350060803		P.O. NO.:		EMAIL REPORT TO: nazuha.rosli@aecom.com marcin.wieloch@ghd.com		ATT: Shirley LeCornu	
RESULTS REQUIRED (Date): ASAP		QUOTE NO.:		ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)			
FOR LABORATORY USE ONLY COOLER SEAL (if applicable): Intact: Yes <input type="checkbox"/> No <input type="checkbox"/> SAMPLE TEMPERATURE: CHILLED: Yes <input type="checkbox"/> No <input type="checkbox"/>		COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:		NAPP (ASS-1) NAG (EA011) Chromium Suite (EA023) SPOCAS Suite (EA029) NEL-Suite 1 NEL-Suite 2 NEL-Suite 3 NEL-Suite 4 NEL-Suite 5		Extra volume for QC or trace LORs etc. NEL-Suite 1 inc. testing of concentration of: Ca2+, Na+, Mg2+, K+, SO42-, Cl- NEL-Suite 2 inc. testing of soil resistivity (to AS 1289.4.4.1) and pH (to AS 1289.4.3.1). NEL-Suite 3 inc. acid sulphate soil testing to include pH/KCl, TAA and pHox as per AS 4969.12 and net acidity as per AS 4969.14. Where sample at designated depth is rock not soil, undertake NAG and NAP testing instead. NEL-Suite 4 inc. NAPP (ASS-1) and NAG (EA011) testing. NEL-Suite 5 inc. testing of total organic carbon (TOC) content and sulphate reducing bacteria (SRB). TOC testing to be carried out to (AS 1289.4.1.1).	
SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	
17	NEL-BH100_5.10-5.30m	S			Bag	1	
18	NEL-BH100_17.34-17.44m	S			Bag	1	
19	NEL-BH031_10.04-10.11m	S			Bag	1	
20	NEL-BH031_20.03-20.13m	S			Bag	1	
21	NEL-BH083_14.84-15.0m	S			Bag	1	
22	NEL-BH083_25.0-25.22m	S			Bag	1	
23	NEL-BH084_15.3-15.40m	S			Bag	1	
24	NEL-BH084_20.0-20.08m	S			Bag	1	
25	NEL-BH084_29.63-29.79m	S			Bag	1	
26	NEL-BH084_37.95-38.05m	S			Bag	1	
27	NEL-BH076_19.88-20.03m	S			Bag	1	
28	NEL-BH076_30.0-30.13m	S			Bag	1	
29	NEL-BH076_39.79-40.02m	S			Bag	1	
30	NEL-BH074_20.0-20.14m	S			Bag	1	
31	NEL-BH074_30.0m	S			Bag	1	
32	NEL-BH074_41.89-42.0m	S			Bag	1	
33	NEL-BH073_24.90-25.06m	S			Bag	1	
34	NEL-BH059_5.5m	S			Bag	1	
35	NEL-BH059_10.04-10.18m	S			Bag	1	
36	NEL-BH059_20.0-20.21m	S			Bag	1	
RELINQUISHED BY:		RECEIVED BY:		RECEIVED BY:		METHOD OF SHIPMENT	
Name:	Date:	Name:	Date:	Name:	Date:	Con' Note No:	
Of:	Time:	Of:	Time:	Of:	Time:	Transport Co:	
Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.							

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ANZ

FQM - Generic Chain of Custody Form

Q4AN(EV)-007-FM1

CONSULTANT: GHD Pty Ltd		ADDRESS / OFFICE:		SAMPLER: GHD		Destination Laboratory	
PROJECT MANAGER (PM): David Quinn		SITE: Melbourne		MOBILE: S.Hilliard 0430 344 657		ALS Springvale	
PROJECT NUMBER & TASK COI: 31350060803		P.O. NO.:		EMAIL REPORT TO: nazuha.rosli@aecom.co marcin.wieloch@ghd.com		ATT: Shirley LeCornu	
RESULTS REQUIRED (Date): ASAP		QUOTE NO.:		ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)			
FOR LABORATORY USE ONLY COOLER SEAL (circle appropriate) Intact: Yes <input type="checkbox"/> No <input type="checkbox"/> N/A SAMPLE TEMPERATURE CHILLED: Yes <input type="checkbox"/> No <input type="checkbox"/>		COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:		NAPP (ASS-1) NAG (EA011) Chromium Suite (EA033) SPOCAS Suite (EA029) NEL-Suite 1 NEL-Suite 2 NEL-Suite 3 NEL-Suite 4 NEL-Suite 5		Extra volume for QC or trace LORs etc. NEL-Suite 1 inc. testing of concentration of: Ca2+, Na+, Mg2+, K+, SO42-, Cl-. NEL-Suite 2 inc. testing of soil resistivity (to AS 1289.4.4.1) and pH (to AS 1289.4.3.1). NEL-Suite 3 inc. acid sulphate soil testing to include pHKCl, TAA and pHox as per AS 4969.12 and net acidity as per AS 4969.14. Where sample at designated depth is rock not soil, undertake NAG and NAP testing instead. NEL-Suite 4 inc. NAPP (ASS-1) and NAG (EA011) testing. NEL-Suite 5 inc. testing of total organic carbon (TOC) content and sulphate reducing bacteria (SRB). TOC testing to be carried out to (AS 1289.4.1.1).	
SAMPLE INFORMATION (note: S = Soil, W=Water)				CONTAINER INFORMATION			
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total	
37	NEL-BH137_5.0m	S			Bag	1	
38	NEL-BH137_14.87-15.0m	S			Bag	1	
39	NEL-BH037_5m	S			Bag	1	
40	NEL-BH037_14.98-15.10m	S			Bag	1	
41	NEL-BH037_25.0-25.08m	S			Bag	1	
42	NEL-BH005_4.11-4.56m	S			Bag	1	
43	NEL-BH124_25.0-25.12m	S			Bag	1	
44	NEL-BH124_35.03-35.12m	S			Bag	1	
45	NEL-BH124_45.0-45.1m	S			Bag	1	
46	NEL-BH067_12.06-12.21m	S			Bag	1	
47	NEL-BH067_25.0-25.13m	S			Bag	1	
48	NEL-BH068_8.20-8.30m	S			Bag	1	
49	NEL-BH068_14.96-15.06m	S			Bag	1	
50	NEL-BH068_19.97-20.05m	S			Bag	1	
51	NEL-BH039_2.40m	S			Bag	1	
52	NEL-BH039_5.9m	S			Bag	1	
53	NEL-BH039_9.80m	S			Bag	1	
RELINQUISHED BY:				RECEIVED BY		RECEIVED BY	
Name:		Date:		Name:		Date:	
Of:		Time:		Of:		Time:	
Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.				Soil Container Codes: Jar = Unpreserved glass jar			

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ANZ

FQM - Generic Chain of Custody Form

Q4AN(EV)-007-FM1

CONSULTANT: GHD Pty Ltd.		ADDRESS / OFFICE:		SAMPLER: GHD		Destination Laboratory	
PROJECT MANAGER (PM): David Quinn		SITE: Melbourne		MOBILE: S.Hilliard 0430 344 657		ALS Springvale	
PROJECT NUMBER & TASK COI: 3135060803		P.O. NO.:		EMAIL REPORT TO: nazuha.rosli@aecom.co marcin.wieloch@ghd.com		ATT: Shirley LeCornu	
RESULTS REQUIRED (Date): ASAP		QUOTE NO.:		ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)			
FOR LABORATORY USE ONLY COOLER SEAL (circle appropriate) Intact: Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> SAMPLE TEMPERATURE CHILLED: Yes <input type="checkbox"/> No <input type="checkbox"/>		COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:		Extra volume for QC or trace LORs etc. NEL-Suite 1 inc. testing of concentration of: Ca2+, Na+, Mg2+, K+, SO42-, Cl-. NEL-Suite 2 inc. testing of soil resistivity (to AS 1289.4.4.1) and pH (to AS 1289.4.3.1). NEL-Suite 3 inc. acid sulphate soil testing to include pHKCl, TAA and pHox as per AS 4969.12 and net acidity as per AS 4969.14. Where sample at designated depth is rock not soil, undertake NAG and NAP testing instead. NEL-Suite 4 inc. NAPP (ASS-1) and NAG (EA011) testing. NEL-Suite 5 inc. testing of total organic carbon (TOC) content and sulphate reducing bacteria (SRB). TOC testing to be carried out to (AS 1289.4.1.1).			
SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total Bags	
54	NEL-BH004_2.0-2.45m	S			Bag	1	
55	NEL-BH004_9.05m	S			Bag	1	
56	NEL-BH004_15.0-15.45m	S			Bag	1	
57	NEL-BH004_19.5-19.95m	S			Bag	1	
58	NEL-BH004_24m	S			Bag	1	
59	NEL-BH070_2.0m	S			Bag	1	
60	NEL-BH070_5.0m	S			Bag	1	
61	NEL-BH085_5.0-5.12m	S			Bag	1	
62	NEL-BH085_15.0-15.1m	S			Bag	1	
63	NEL-BH042_14.97-15.08m	S			Bag	1	
64	NEL-BH042_25.15-25.25m	S			Bag	1	
RELINQUISHED BY:		RECEIVED BY:		RECEIVED BY:		METHOD OF SHIPMENT:	
Name:	Date:	Name:	Date:	Name:	Date:	Con' Note No:	
Of:	Time:	Of:	Time:	Of:	Time:	Transport Co:	
Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.							

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SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM1805796

Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR DAVID QUINN	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: david.quinn@ghd.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +61-3-8549 9630
Facsimile	: ----	Facsimile	: +61-3-8549 9626
Project	: 31350060803	Page	: 1 of 8
Order number	:	Quote number	: EM2018GHDSE0003 (ME/124/18 - North East Link)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: GHD		

Dates

Date Samples Received	: 06-Apr-2018 10:25	Issue Date	: 12-Apr-2018
Client Requested Due Date	: 23-Apr-2018	Scheduled Reporting Date	: 23-Apr-2018

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: -0.2°C
Receipt Detail	:	No. of samples received / analysed	: 63 / 63

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
pH (Saturated Paste) : EA031		
NEL-BH114_5.22-5.30m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH008_10.0-10.1m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH099_10.0-10.10m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH099_20.04-20.18m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH095_5.45-5.55m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH093_5.05-5.17m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH092_9.85-10.0m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH089_8.70-8.90m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH089_15.0-15.7m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH087_5.60-5.79m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH087_14.90-15.10m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH100_5.10-5.30m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH100_17.34-17.44m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH031_10.04-10.11m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH031_20.03-20.13m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH083_14.84-15.0m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH083_25.0-25.22m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH084_20.0-20.08m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH084_29.63-29.79m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH084_37.95-38.05m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH076_19.88-20.03m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH076_30.0-30.13m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH076_39.79-40.02m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH074_20.0-20.14m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH074_30.0m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH074_41.89-42.0m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH073_24.90-25.06m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH059_5.5m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH059_10.04-10.18m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH059_20.0-20.21m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH037_5m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH037_14.98-15.10m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH037_25.0-25.08m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH124_25.0-25.12m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH124_35.03-35.12m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH124_45.0-45.1m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH067_12.06-12.21m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH067_25.0-25.13m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH068_8.20-8.30m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH068_14.96-15.06m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH068_19.97-20.05m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH039_5.9m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH039_9.80m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH004_9.05m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH070_5.0m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH085_5.0-5.12m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH085_15.0-15.1m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH042_14.97-15.08m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH042_25.15-25.25m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
Sulfur - Total as S (LECO) : ED042T		
NEL-BH114_5.22-5.30m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH008_10.0-10.1m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH099_10.0-10.10m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH099_20.04-20.18m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH095_5.45-5.55m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH095_9.97-10.11m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH122_4.56-4.64m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH093_5.05-5.17m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH108_5.7-5.79m	- Snap Lock Bag - frozen	- Pulp Bag



Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Sulfur - Total as S (LECO) : ED042T		
NEL-BH092_5.0-5.10m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH092_9.85-10.0m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH089_8.70-8.90m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH089_15.0-15.7m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH087_5.60-5.79m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH087_14.90-15.10m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH100_5.10-5.30m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH100_17.34-17.44m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH031_10.04-10.11m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH031_20.03-20.13m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH083_14.84-15.0m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH083_25.0-25.22m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH084_15.3-15.40m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH084_29.63-29.79m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH084_37.95-38.05m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH076_30.0-30.13m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH074_20.0-20.14m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH074_30.0m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH074_41.89-42.0m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH073_24.90-25.06m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH059_10.04-10.18m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH059_20.0-20.21m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH037_14.98-15.10m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH037_25.0-25.08m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH124_25.0-25.12m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH124_35.03-35.12m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH124_45.0-45.1m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH067_12.06-12.21m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH067_25.0-25.13m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH068_8.20-8.30m	- Snap Lock Bag - frozen	- Pulp Bag
NEL-BH042_14.97-15.08m	- Snap Lock Bag - frozen	- Pulp Bag

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

EM1805796-001	: [06-Apr-2018]	: NEL-BH114_5.22-5.30m
EM1805796-002	: [06-Apr-2018]	: NEL-BH008_10.0-10.1m
EM1805796-003	: [06-Apr-2018]	: NEL-BH099_10.0-10.10m
EM1805796-004	: [06-Apr-2018]	: NEL-BH099_20.04-20.18m
EM1805796-006	: [06-Apr-2018]	: NEL-BH095_5.45-5.55m
EM1805796-007	: [06-Apr-2018]	: NEL-BH095_9.97-10.11m
EM1805796-008	: [06-Apr-2018]	: NEL-BH122_4.56-4.64m
EM1805796-009	: [06-Apr-2018]	: NEL-BH093_5.05-5.17m
EM1805796-012	: [06-Apr-2018]	: NEL-BH092_9.85-10.0m
EM1805796-013	: [06-Apr-2018]	: NEL-BH089_8.70-8.90m
EM1805796-014	: [06-Apr-2018]	: NEL-BH089_15.0-15.7m
EM1805796-015	: [06-Apr-2018]	: NEL-BH087_5.60-5.79m
EM1805796-016	: [06-Apr-2018]	: NEL-BH087_14.90-15.10m
EM1805796-017	: [06-Apr-2018]	: NEL-BH100_5.10-5.30m
EM1805796-018	: [06-Apr-2018]	: NEL-BH100_17.34-17.44m
EM1805796-019	: [06-Apr-2018]	: NEL-BH031_10.04-10.11m
EM1805796-020	: [06-Apr-2018]	: NEL-BH031_20.03-20.13m
EM1805796-021	: [06-Apr-2018]	: NEL-BH083_14.84-15.0m
EM1805796-022	: [06-Apr-2018]	: NEL-BH083_25.0-25.22m
EM1805796-023	: [06-Apr-2018]	: NEL-BH084_15.3-15.40m
EM1805796-024	: [06-Apr-2018]	: NEL-BH084_20.0-20.08m
EM1805796-025	: [06-Apr-2018]	: NEL-BH084_29.63-29.79m
EM1805796-026	: [06-Apr-2018]	: NEL-BH084_37.95-38.05m
EM1805796-027	: [06-Apr-2018]	: NEL-BH076_19.88-20.03m
EM1805796-028	: [06-Apr-2018]	: NEL-BH076_30.0-30.13m
EM1805796-029	: [06-Apr-2018]	: NEL-BH076_39.79-40.02m
EM1805796-030	: [06-Apr-2018]	: NEL-BH074_20.0-20.14m



EM1805796-032	: [06-Apr-2018]	: NEL-BH074_41.89-42.0m
EM1805796-033	: [06-Apr-2018]	: NEL-BH073_24.90-25.06m
EM1805796-035	: [06-Apr-2018]	: NEL-BH059_10.04-10.18m
EM1805796-036	: [06-Apr-2018]	: NEL-BH059_20.0-20.21m
EM1805796-038	: [06-Apr-2018]	: NEL-BH137_14.87-15.0m
EM1805796-040	: [06-Apr-2018]	: NEL-BH037_14.98-15.10m
EM1805796-041	: [06-Apr-2018]	: NEL-BH037_25.0-25.08m
EM1805796-042	: [06-Apr-2018]	: NEL-BH005_4.11-4.56m
EM1805796-043	: [06-Apr-2018]	: NEL-BH124_25.0-25.12m
EM1805796-044	: [06-Apr-2018]	: NEL-BH124_35.03-35.12m
EM1805796-045	: [06-Apr-2018]	: NEL-BH124_45.0-45.1m
EM1805796-046	: [06-Apr-2018]	: NEL-BH067_12.06-12.21m
EM1805796-047	: [06-Apr-2018]	: NEL-BH067_25.0-25.13m
EM1805796-048	: [06-Apr-2018]	: NEL-BH068_8.20-8.30m
EM1805796-049	: [06-Apr-2018]	: NEL-BH068_14.96-15.06m
EM1805796-050	: [06-Apr-2018]	: NEL-BH068_19.97-20.05m
EM1805796-056	: [06-Apr-2018]	: NEL-BH004_15.0-15.45m
EM1805796-057	: [06-Apr-2018]	: NEL-BH004_19.5-19.95m
EM1805796-062	: [06-Apr-2018]	: NEL-BH085_15.0-15.1m
EM1805796-063	: [06-Apr-2018]	: NEL-BH042_14.97-15.08m
EM1805796-064	: [06-Apr-2018]	: NEL-BH042_25.15-25.25m

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ASS1 NAPP	SOIL - EA011 Net Acid Generation (NAG)	SOIL - EA031 pH (Saturated Paste)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)	SOIL - NT-2S Major Anions (Cl, SO4)
EM1805796-001	06-Apr-2018 00:00	NEL-BH114_5.22-5.30m	✓	✓	✓	✓	✓	✓	✓
EM1805796-002	06-Apr-2018 00:00	NEL-BH008_10.0-10.1m	✓	✓	✓	✓	✓	✓	✓
EM1805796-003	06-Apr-2018 00:00	NEL-BH099_10.0-10.10m	✓	✓	✓	✓	✓	✓	✓
EM1805796-004	06-Apr-2018 00:00	NEL-BH099_20.04-20.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-005	06-Apr-2018 00:00	NEL-BH110_5.0-5.20m				✓			
EM1805796-006	06-Apr-2018 00:00	NEL-BH095_5.45-5.55m	✓	✓	✓	✓	✓	✓	✓
EM1805796-007	06-Apr-2018 00:00	NEL-BH095_9.97-10.11m	✓	✓		✓			
EM1805796-008	06-Apr-2018 00:00	NEL-BH122_4.56-4.64m	✓	✓		✓			
EM1805796-009	06-Apr-2018 00:00	NEL-BH093_5.05-5.17m	✓	✓	✓	✓	✓	✓	✓
EM1805796-010	06-Apr-2018 00:00	NEL-BH108_5.7-5.79m	✓	✓		✓			
EM1805796-011	06-Apr-2018 00:00	NEL-BH092_5.0-5.10m	✓	✓		✓			
EM1805796-012	06-Apr-2018 00:00	NEL-BH092_9.85-10.0m	✓	✓	✓	✓	✓	✓	✓
EM1805796-013	06-Apr-2018 00:00	NEL-BH089_8.70-8.90m	✓	✓	✓	✓	✓	✓	✓
EM1805796-014	06-Apr-2018 00:00	NEL-BH089_15.0-15.7m	✓	✓	✓	✓	✓	✓	✓
EM1805796-015	06-Apr-2018 00:00	NEL-BH087_5.60-5.79m	✓	✓	✓	✓	✓	✓	✓
EM1805796-016	06-Apr-2018 00:00	NEL-BH087_14.90-15.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-017	06-Apr-2018 00:00	NEL-BH100_5.10-5.30m	✓	✓	✓	✓	✓	✓	✓
EM1805796-018	06-Apr-2018 00:00	NEL-BH100_17.34-17.4...	✓	✓	✓	✓	✓	✓	✓
EM1805796-019	06-Apr-2018 00:00	NEL-BH031_10.04-10.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-020	06-Apr-2018 00:00	NEL-BH031_20.03-20.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-021	06-Apr-2018 00:00	NEL-BH083_14.84-15.0m	✓	✓	✓	✓	✓	✓	✓



			SOIL - ASS1 NAPP	SOIL - EA011 Net Acid Generation (NAG)	SOIL - EA031 pH (Saturated Paste)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)	SOIL - NT-2S Major Anions (Cl, SO4)
EM1805796-022	06-Apr-2018 00:00	NEL-BH083_25.0-25.22m	✓	✓	✓	✓	✓	✓	✓
EM1805796-023	06-Apr-2018 00:00	NEL-BH084_15.3-15.40m	✓	✓		✓			
EM1805796-024	06-Apr-2018 00:00	NEL-BH084_20.0-20.08m			✓		✓	✓	✓
EM1805796-025	06-Apr-2018 00:00	NEL-BH084_29.63-29.7...	✓	✓	✓	✓	✓	✓	✓
EM1805796-026	06-Apr-2018 00:00	NEL-BH084_37.95-38.0...	✓	✓	✓	✓	✓	✓	✓
EM1805796-027	06-Apr-2018 00:00	NEL-BH076_19.88-20.0...			✓		✓	✓	✓
EM1805796-028	06-Apr-2018 00:00	NEL-BH076_30.0-30.13m	✓	✓	✓	✓	✓	✓	✓
EM1805796-029	06-Apr-2018 00:00	NEL-BH076_39.79-40.0...			✓		✓	✓	✓
EM1805796-030	06-Apr-2018 00:00	NEL-BH074_20.0-20.14m	✓	✓	✓	✓	✓	✓	✓
EM1805796-031	06-Apr-2018 00:00	NEL-BH074_30.0m	✓	✓	✓	✓	✓	✓	✓
EM1805796-032	06-Apr-2018 00:00	NEL-BH074_41.89-42.0m	✓	✓	✓	✓	✓	✓	✓
EM1805796-033	06-Apr-2018 00:00	NEL-BH073_24.90-25.0...	✓	✓	✓	✓	✓	✓	✓
EM1805796-034	06-Apr-2018 00:00	NEL-BH059_5.5m			✓		✓	✓	✓
EM1805796-035	06-Apr-2018 00:00	NEL-BH059_10.04-10.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-036	06-Apr-2018 00:00	NEL-BH059_20.0-20.21m	✓	✓	✓	✓	✓	✓	✓
EM1805796-037	06-Apr-2018 00:00	NEL-BH137_5.0m				✓			
EM1805796-038	06-Apr-2018 00:00	NEL-BH137_14.87-15.0m	✓	✓		✓			
EM1805796-039	06-Apr-2018 00:00	NEL-BH037_5m			✓		✓	✓	✓
EM1805796-040	06-Apr-2018 00:00	NEL-BH037_14.98-15.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-041	06-Apr-2018 00:00	NEL-BH037_25.0-25.08m	✓	✓	✓	✓	✓	✓	✓
EM1805796-043	06-Apr-2018 00:00	NEL-BH124_25.0-25.12m	✓	✓	✓	✓	✓	✓	✓
EM1805796-044	06-Apr-2018 00:00	NEL-BH124_35.03-35.1...	✓	✓	✓	✓	✓	✓	✓
EM1805796-045	06-Apr-2018 00:00	NEL-BH124_45.0-45.1m	✓	✓	✓	✓	✓	✓	✓
EM1805796-046	06-Apr-2018 00:00	NEL-BH067_12.06-12.2...	✓	✓	✓	✓	✓	✓	✓
EM1805796-047	06-Apr-2018 00:00	NEL-BH067_25.0-25.13m	✓	✓	✓	✓	✓	✓	✓
EM1805796-048	06-Apr-2018 00:00	NEL-BH068_8.20-8.30m	✓	✓	✓	✓	✓	✓	✓
EM1805796-049	06-Apr-2018 00:00	NEL-BH068_14.96-15.0...			✓		✓	✓	✓
EM1805796-050	06-Apr-2018 00:00	NEL-BH068_19.97-20.0...			✓		✓	✓	✓
EM1805796-051	06-Apr-2018 00:00	NEL-BH039_2.40m				✓			
EM1805796-052	06-Apr-2018 00:00	NEL-BH039_5.9m			✓		✓	✓	✓
EM1805796-053	06-Apr-2018 00:00	NEL-BH039_9.80m			✓	✓	✓	✓	✓
EM1805796-054	06-Apr-2018 00:00	NEL-BH004_2.0-2.45m				✓			
EM1805796-055	06-Apr-2018 00:00	NEL-BH004_9.05m			✓		✓	✓	✓
EM1805796-056	06-Apr-2018 00:00	NEL-BH004_15.0-15.45m				✓			
EM1805796-060	06-Apr-2018 00:00	NEL-BH070_5.0m			✓		✓	✓	✓
EM1805796-061	06-Apr-2018 00:00	NEL-BH085_5.0-5.12m			✓		✓	✓	✓
EM1805796-062	06-Apr-2018 00:00	NEL-BH085_15.0-15.1m			✓		✓	✓	✓
EM1805796-063	06-Apr-2018 00:00	NEL-BH042_14.97-15.0...	✓	✓	✓		✓	✓	✓
EM1805796-064	06-Apr-2018 00:00	NEL-BH042_25.15-25.2...			✓		✓	✓	✓



Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA029 SPOCAS	SOIL - EA084 Saturated Resistivity	SOIL - EP004 (Carbon) Organic Matter & Total Organic Carbon (Calc.)	SOIL - MM820 (Subcontracted) Sulphate Reducing Bacteria (BART)
EM1805796-001	06-Apr-2018 00:00	NEL-BH114_5.22-5.30m		✓		
EM1805796-002	06-Apr-2018 00:00	NEL-BH008_10.0-10.1m		✓		
EM1805796-003	06-Apr-2018 00:00	NEL-BH099_10.0-10.10m		✓		
EM1805796-004	06-Apr-2018 00:00	NEL-BH099_20.04-20.1...		✓		
EM1805796-006	06-Apr-2018 00:00	NEL-BH095_5.45-5.55m		✓		
EM1805796-009	06-Apr-2018 00:00	NEL-BH093_5.05-5.17m		✓		
EM1805796-012	06-Apr-2018 00:00	NEL-BH092_9.85-10.0m		✓		
EM1805796-013	06-Apr-2018 00:00	NEL-BH089_8.70-8.90m		✓		
EM1805796-014	06-Apr-2018 00:00	NEL-BH089_15.0-15.7m		✓		
EM1805796-015	06-Apr-2018 00:00	NEL-BH087_5.60-5.79m		✓		
EM1805796-016	06-Apr-2018 00:00	NEL-BH087_14.90-15.1...		✓		
EM1805796-017	06-Apr-2018 00:00	NEL-BH100_5.10-5.30m		✓		
EM1805796-018	06-Apr-2018 00:00	NEL-BH100_17.34-17.4...		✓		
EM1805796-019	06-Apr-2018 00:00	NEL-BH031_10.04-10.1...		✓		
EM1805796-020	06-Apr-2018 00:00	NEL-BH031_20.03-20.1...		✓		
EM1805796-021	06-Apr-2018 00:00	NEL-BH083_14.84-15.0m		✓		
EM1805796-022	06-Apr-2018 00:00	NEL-BH083_25.0-25.22m		✓		
EM1805796-024	06-Apr-2018 00:00	NEL-BH084_20.0-20.08m		✓		
EM1805796-025	06-Apr-2018 00:00	NEL-BH084_29.63-29.7...	✓	✓		
EM1805796-026	06-Apr-2018 00:00	NEL-BH084_37.95-38.0...		✓		
EM1805796-027	06-Apr-2018 00:00	NEL-BH076_19.88-20.0...		✓		
EM1805796-028	06-Apr-2018 00:00	NEL-BH076_30.0-30.13m		✓		
EM1805796-029	06-Apr-2018 00:00	NEL-BH076_39.79-40.0...		✓		
EM1805796-030	06-Apr-2018 00:00	NEL-BH074_20.0-20.14m		✓		
EM1805796-031	06-Apr-2018 00:00	NEL-BH074_30.0m	✓	✓		
EM1805796-032	06-Apr-2018 00:00	NEL-BH074_41.89-42.0m		✓		
EM1805796-033	06-Apr-2018 00:00	NEL-BH073_24.90-25.0...	✓	✓		
EM1805796-034	06-Apr-2018 00:00	NEL-BH059_5.5m	✓	✓		
EM1805796-035	06-Apr-2018 00:00	NEL-BH059_10.04-10.1...		✓		
EM1805796-036	06-Apr-2018 00:00	NEL-BH059_20.0-20.21m		✓		
EM1805796-039	06-Apr-2018 00:00	NEL-BH037_5m		✓		
EM1805796-040	06-Apr-2018 00:00	NEL-BH037_14.98-15.1...		✓		
EM1805796-041	06-Apr-2018 00:00	NEL-BH037_25.0-25.08m		✓		
EM1805796-042	06-Apr-2018 00:00	NEL-BH005_4.11-4.56m	✓			
EM1805796-043	06-Apr-2018 00:00	NEL-BH124_25.0-25.12m		✓		
EM1805796-044	06-Apr-2018 00:00	NEL-BH124_35.03-35.1...		✓		
EM1805796-045	06-Apr-2018 00:00	NEL-BH124_45.0-45.1m		✓		
EM1805796-046	06-Apr-2018 00:00	NEL-BH067_12.06-12.2...		✓		
EM1805796-047	06-Apr-2018 00:00	NEL-BH067_25.0-25.13m		✓		
EM1805796-048	06-Apr-2018 00:00	NEL-BH068_8.20-8.30m		✓	✓	✓
EM1805796-049	06-Apr-2018 00:00	NEL-BH068_14.96-15.0...		✓		



			SOIL - EA029 SPOCAS	SOIL - EA084 Saturated Resistivity	SOIL - EP004 (Carbon) Organic Matter & Total Organic Carbon (Calc.)	SOIL - MM820 (Subcontracted) Sulphate Reducing Bacteria (BART)
EM1805796-050	06-Apr-2018 00:00	NEL-BH068_19.97-20.0...		✓		
EM1805796-052	06-Apr-2018 00:00	NEL-BH039_5.9m	✓	✓	✓	✓
EM1805796-053	06-Apr-2018 00:00	NEL-BH039_9.80m		✓		
EM1805796-055	06-Apr-2018 00:00	NEL-BH004_9.05m	✓	✓	✓	✓
EM1805796-057	06-Apr-2018 00:00	NEL-BH004_19.5-19.95m	✓			
EM1805796-059	06-Apr-2018 00:00	NEL-BH070_2.0m	✓			
EM1805796-060	06-Apr-2018 00:00	NEL-BH070_5.0m	✓	✓		
EM1805796-061	06-Apr-2018 00:00	NEL-BH085_5.0-5.12m		✓		
EM1805796-062	06-Apr-2018 00:00	NEL-BH085_15.0-15.1m		✓		
EM1805796-063	06-Apr-2018 00:00	NEL-BH042_14.97-15.0...		✓		
EM1805796-064	06-Apr-2018 00:00	NEL-BH042_25.15-25.2...		✓		

Proactive Holding Time Report

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

[illegible]

QUALITY CONTROL REPORT

Work Order	: EM1805796	Page	: 1 of 13
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR DAVID QUINN	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9630
Project	: 31350060803	Date Samples Received	: 06-Apr-2018
Order number	: ----	Date Analysis Commenced	: 12-Apr-2018
C-O-C number	: ----	Issue Date	: 30-Apr-2018
Sampler	: GHD		
Site	: ----		
Quote number	: ME/124/18 - North East Link		
No. of samples received	: 63		
No. of samples analysed	: 63		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Samantha Smith	Laboratory Coordinator	WRG Subcontracting, Springvale, VIC

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

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 1569068)									
EM1805796-013	NEL-BH089_8.70-8.90m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.8	0.8	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	6.7	6.7	0.00	0% - 20%
EM1805796-001	NEL-BH114_5.22-5.30m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.8	0.7	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	6.9	6.9	0.00	0% - 20%
EA011: Net Acid Generation (QC Lot: 1569073)									
EM1805796-022	NEL-BH083_25.0-25.22m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	2.0	2.0	0.00	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	4.1	4.1	0.00	0% - 20%
		EA011: pH (OX)	----	0.1	pH Unit	3.6	3.6	0.00	0% - 20%
EM1805796-038	NEL-BH137_14.87-15.0m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	0.7	0.6	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	6.8	6.8	0.00	0% - 20%
EA011: Net Acid Generation (QC Lot: 1569076)									
EM1805796-063	NEL-BH042_14.97-15.08m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	7.2	7.1	1.40	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 1569069)									
EM1805796-013	NEL-BH089_8.70-8.90m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.9	2.7	7.35	No Limit
EM1805796-001	NEL-BH114_5.22-5.30m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.6	4.3	6.44	No Limit
EA013: Acid Neutralising Capacity (QC Lot: 1569072)									

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 Work Order : EM1805796
 Client : GHD PTY LTD
 Project : 31350060803



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA013: Acid Neutralising Capacity (QC Lot: 1569072) - continued									
EM1805796-022	NEL-BH083_25.0-25.22m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.0	7.1	0.00	0% - 50%
EM1805796-038	NEL-BH137_14.87-15.0m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.9	5.6	5.23	0% - 50%
EA013: Acid Neutralising Capacity (QC Lot: 1569077)									
EM1805796-063	NEL-BH042_14.97-15.08m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	7.7	7.5	2.39	0% - 50%
EA029-A: pH Measurements (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: pH KCl (23A)	----	0.1	pH Unit	6.2	6.2	0.00	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	3.3	3.2	3.08	0% - 20%
EA029-A: pH Measurements (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: pH KCl (23A)	----	0.1	pH Unit	5.1	5.1	0.00	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	4.9	4.9	0.00	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	0.140	0.149	6.26	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	0.140	0.149	6.26	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	87	93	6.26	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	87	93	6.26	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	0.024	0.025	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	9	10	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	15	16	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	6	6	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.110	0.113	2.33	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.110	0.113	2.33	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	69	70	2.33	No Limit
EA029-C: Sulfur Trail (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-C: Sulfur Trail (QC Lot: 1576022) - continued									
EM1805796-060	NEL-BH070_5.0m	EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-D: Calcium Values (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-D: Calcium Values (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.026	0.022	15.8	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.033	0.033	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.020	0.020	0.00	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.020	0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.026	0.027	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	16	17	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.044	0.039	13.4	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.049	0.058	16.4	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	0.025	22.5	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	16	44.0	No Limit
EA029-H: Acid Base Accounting (QC Lot: 1569074)									
EM1805796-025	NEL-BH084_29.63-29.79m	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	0.11	0.11	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.11	0.11	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	5	5	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	5	5	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	69	70	2.33	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	69	70	2.33	No Limit

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 Work Order : EM1805796
 Client : GHD PTY LTD
 Project : 31350060803



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-H: Acid Base Accounting (QC Lot: 1576022)									
EM1805796-060	NEL-BH070_5.0m	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA031: pH (saturated paste) (QC Lot: 1562746)									
EM1805796-001	NEL-BH114_5.22-5.30m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	6.8	7.0	2.03	0% - 20%
EM1805796-016	NEL-BH087_14.90-15.10m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	7.8	7.9	0.00	0% - 20%
EA031: pH (saturated paste) (QC Lot: 1562747)									
EM1805796-027	NEL-BH076_19.88-20.03m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	5.6	5.9	4.87	0% - 20%
EM1805796-039	NEL-BH037_5m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	7.5	7.5	0.00	0% - 20%
EA031: pH (saturated paste) (QC Lot: 1562748)									
EM1805796-050	NEL-BH068_19.97-20.05m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	7.5	7.5	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1569070)									
EM1805796-011	NEL-BH092_5.0-5.10m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.5	7.7	2.63	0% - 20%
EM1805796-001	NEL-BH114_5.22-5.30m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.2	6.3	1.60	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1569071)									
EM1805796-021	NEL-BH083_14.84-15.0m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.7	6.8	1.48	0% - 20%
EM1805796-035	NEL-BH059_10.04-10.18m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.0	7.2	2.82	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1569075)									
EM1805796-047	NEL-BH067_25.0-25.13m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.7	5.8	1.74	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1569070)									
EM1805796-011	NEL-BH092_5.0-5.10m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.007	0.006	0.00	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EM1805796-001	NEL-BH114_5.22-5.30m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.006	0.00	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-B: Potential Acidity (QC Lot: 1569070) - continued									
EM1805796-001	NEL-BH114_5.22-5.30m	EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA033-B: Potential Acidity (QC Lot: 1569071)									
EM1805796-021	NEL-BH083_14.84-15.0m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.182	0.188	3.58	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	113	117	3.58	0% - 50%
EM1805796-035	NEL-BH059_10.04-10.18m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.017	0.017	0.00	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	11	11	0.00	No Limit
EA033-B: Potential Acidity (QC Lot: 1569075)									
EM1805796-047	NEL-BH067_25.0-25.13m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.118	0.114	3.56	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	74	71	3.56	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1569070)									
EM1805796-011	NEL-BH092_5.0-5.10m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.67	0.62	6.90	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.21	0.20	6.90	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	134	125	6.90	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1569071)									
EM1805796-021	NEL-BH083_14.84-15.0m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.57	0.52	8.22	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.18	0.17	8.22	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	113	104	8.22	0% - 50%
EM1805796-035	NEL-BH059_10.04-10.18m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.72	0.75	4.74	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.23	0.24	4.74	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	143	150	4.74	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1568349)									
EM1805796-001	NEL-BH114_5.22-5.30m	EA055: Moisture Content	----	0.1	%	<1.0	<1.0	0.00	No Limit
EM1805796-016	NEL-BH087_14.90-15.10m	EA055: Moisture Content	----	0.1	%	<1.0	1.2	17.5	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1568350)									
EM1805796-027	NEL-BH076_19.88-20.03m	EA055: Moisture Content	----	0.1	%	<1.0	<1.0	0.00	No Limit
EM1805796-039	NEL-BH037_5m	EA055: Moisture Content	----	0.1	%	9.4	9.7	3.15	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1568354)									
EM1805796-052	NEL-BH039_5.9m	EA055: Moisture Content	----	0.1	%	15.5	15.3	1.22	0% - 50%
ED040S: Soluble Major Anions (QC Lot: 1568345)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED040S: Soluble Major Anions (QC Lot: 1568345) - continued									
EM1805796-015	NEL-BH087_5.60-5.79m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	30	30	0.00	No Limit
EM1805796-001	NEL-BH114_5.22-5.30m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	10	10	0.00	No Limit
ED040S: Soluble Major Anions (QC Lot: 1568348)									
EM1805796-036	NEL-BH059_20.0-20.21m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	130	130	0.00	0% - 50%
EM1805796-027	NEL-BH076_19.88-20.03m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	810	830	2.56	0% - 20%
ED040S: Soluble Major Anions (QC Lot: 1568353)									
EM1805796-050	NEL-BH068_19.97-20.05m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	240	230	0.00	0% - 20%
ED042T: Total Sulfur by LECO (QC Lot: 1580886)									
EM1805796-001	NEL-BH114_5.22-5.30m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.00	No Limit
EM1805796-011	NEL-BH092_5.0-5.10m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.00	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 1580887)									
EM1805796-022	NEL-BH083_25.0-25.22m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.24	0.24	0.00	0% - 20%
EM1805796-035	NEL-BH059_10.04-10.18m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	0.00	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 1580888)									
EM1805796-063	NEL-BH042_14.97-15.08m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.02	0.02	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 1568344)									
EM1805796-016	NEL-BH087_14.90-15.10m	ED045G: Chloride	16887-00-6	10	mg/kg	160	170	0.00	0% - 50%
EM1805796-001	NEL-BH114_5.22-5.30m	ED045G: Chloride	16887-00-6	10	mg/kg	350	350	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1568347)									
EM1805796-039	NEL-BH037_5m	ED045G: Chloride	16887-00-6	10	mg/kg	200	200	0.00	0% - 20%
EM1805796-027	NEL-BH076_19.88-20.03m	ED045G: Chloride	16887-00-6	10	mg/kg	110	110	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 1568352)									
EM1805796-050	NEL-BH068_19.97-20.05m	ED045G: Chloride	16887-00-6	10	mg/kg	<10	<10	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 1568343)									
EM1805796-015	NEL-BH087_5.60-5.79m	ED093S: Calcium	7440-70-2	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	250	250	0.00	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EM1805796-001	NEL-BH114_5.22-5.30m	ED093S: Calcium	7440-70-2	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	260	260	0.00	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 1568346)									
EM1805796-036	NEL-BH059_20.0-20.21m	ED093S: Calcium	7440-70-2	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	220	220	0.00	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EM1805796-027	NEL-BH076_19.88-20.03m	ED093S: Calcium	7440-70-2	10	mg/kg	60	70	0.00	No Limit

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 Work Order : EM1805796
 Client : GHD PTY LTD
 Project : 31350060803



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093S: Soluble Major Cations (QC Lot: 1568346) - continued									
EM1805796-027	NEL-BH076_19.88-20.03m	ED093S: Magnesium	7439-95-4	10	mg/kg	90	90	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	210	220	0.00	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	40	40	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 1568351)									
EM1805796-050	NEL-BH068_19.97-20.05m	ED093S: Calcium	7440-70-2	10	mg/kg	20	20	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	20	20	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	20	20	0.00	No Limit
		ED093S: Potassium	7440-09-7	10	mg/kg	110	110	0.00	0% - 50%
EP004: Organic Matter (QC Lot: 1568848)									
EB1809230-001	Anonymous	EP004: Total Organic Carbon	----	0.5	%	6.1	6.2	0.00	0% - 50%



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA011: Net Acid Generation (QCLot: 1569068)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	96.4	70	130
EA011: Net Acid Generation (QCLot: 1569073)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	93.7	70	130
EA011: Net Acid Generation (QCLot: 1569076)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	97.1	70	130
EA013: Acid Neutralising Capacity (QCLot: 1569069)								
EA013: ANC as H2SO4	----	----	kg H2SO4 equiv./t	----	9.9 kg H2SO4 equiv./t	103	82	120
EA013: Acid Neutralising Capacity (QCLot: 1569072)								
EA013: ANC as H2SO4	----	----	kg H2SO4 equiv./t	----	9.9 kg H2SO4 equiv./t	103	82	120
EA013: Acid Neutralising Capacity (QCLot: 1569077)								
EA013: ANC as H2SO4	----	----	kg H2SO4 equiv./t	----	9.9 kg H2SO4 equiv./t	103	82	120
EA029-A: pH Measurements (QCLot: 1569074)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.6 pH Unit	100	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	4.3 pH Unit	102	70	130
EA029-A: pH Measurements (QCLot: 1576022)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.6 pH Unit	102	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	4.3 pH Unit	100	70	130
EA029-B: Acidity Trail (QCLot: 1569074)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	88.2	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	35.2 mole H+ / t	99.6	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-B: Acidity Trail (QCLot: 1576022)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	83.2	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	35.2 mole H+ / t	114	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1569074)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	91.3	70	130

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-C: Sulfur Trail (QCLot: 1569074) - continued								
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	85.3	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1576022)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	91.4	70	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	86.1	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1569074)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	103	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	86.8	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-D: Calcium Values (QCLot: 1576022)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	117	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	92.4	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1569074)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	88.3	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	82.1	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1576022)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	84.7	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	94.8	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1569074)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.020	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.020	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 1569074)								



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-H: Acid Base Accounting (QCLot: 1569074) - continued								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 1576022)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA031: pH (saturated paste) (QCLot: 1562746)								
EA031: pH (Saturated Paste)	----	----	pH Unit	----	4 pH Unit	100	99	101
				----	7 pH Unit	100	99	101
EA031: pH (saturated paste) (QCLot: 1562747)								
EA031: pH (Saturated Paste)	----	----	pH Unit	----	4 pH Unit	100	99	101
				----	7 pH Unit	100	99	101
EA031: pH (saturated paste) (QCLot: 1562748)								
EA031: pH (Saturated Paste)	----	----	pH Unit	----	4 pH Unit	100	99	101
				----	7 pH Unit	100	99	101
EA033-A: Actual Acidity (QCLot: 1569070)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	102	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	88.2	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1569071)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	100	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	92.6	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1569075)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	100	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	92.6	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1569070)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	84.2	70	130



Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA033-B: Potential Acidity (QCLot: 1569070) - continued								
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1569071)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	87.5	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1569075)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	93.3	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1569070)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	101	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1569071)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	101	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1569075)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	100	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
ED040S: Soluble Major Anions (QCLot: 1568345)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	101	90	114
ED040S: Soluble Major Anions (QCLot: 1568348)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	101	90	114
ED040S: Soluble Major Anions (QCLot: 1568353)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	102	90	114
ED042T: Total Sulfur by LECO (QCLot: 1580886)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	101	70	130
ED042T: Total Sulfur by LECO (QCLot: 1580887)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	100	70	130
ED042T: Total Sulfur by LECO (QCLot: 1580888)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	96.4	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1568344)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	100	83	119
				<10	5000 mg/kg	103	83	119
ED045G: Chloride by Discrete Analyser (QCLot: 1568347)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	102	83	119
				<10	5000 mg/kg	103	83	119



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED045G: Chloride by Discrete Analyser (QCLot: 1568352)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	98.1	83	119
				<10	5000 mg/kg	99.8	83	119
ED093S: Soluble Major Cations (QCLot: 1568343)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	104	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	103	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	105	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	103	80	120
ED093S: Soluble Major Cations (QCLot: 1568346)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	102	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	102	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	105	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	104	80	120
ED093S: Soluble Major Cations (QCLot: 1568351)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	100	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	104	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	98.7	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	100	80	120
EP004: Organic Matter (QCLot: 1568848)								
EP004: Total Organic Carbon	----	0.5	%	<0.5	46.4 %	101	85	115

Matrix Spike (MS) Report

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

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) Low High	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP004: Organic Matter (QCLot: 1568848)							
EB1809230-002	Anonymous	EP004: Total Organic Carbon	----	2.32 %	101	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM1805796**

Page : 1 of 20

Client : **GHD PTY LTD**
Contact : **MR DAVID QUINN**
Project : **31350060803**
Site : **----**
Sampler : **GHD**
Order number :

Laboratory : **Environmental Division Melbourne**
Telephone : **+61-3-8549 9630**
Date Samples Received : **06-Apr-2018**
Issue Date : **30-Apr-2018**
No. of samples received : **63**
No. of samples analysed : **63**

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED042T: Total Sulfur by LECO							
Snap Lock Bag - frozen		19-Apr-2018	13-Apr-2018	6	----	----	----
NEL-BH114_5.22-5.30m,	NEL-BH008_10.0-10.1m,						
NEL-BH099_10.0-10.10m,	NEL-BH099_20.04-20.18m,						
NEL-BH095_5.45-5.55m,	NEL-BH095_9.97-10.11m,						
NEL-BH122_4.56-4.64m,	NEL-BH093_5.05-5.17m,						
NEL-BH108_5.7-5.79m,	NEL-BH092_5.0-5.10m,						
NEL-BH092_9.85-10.0m,	NEL-BH089_8.70-8.90m,						
NEL-BH089_15.0-15.7m,	NEL-BH087_5.60-5.79m,						
NEL-BH087_14.90-15.10m,	NEL-BH100_5.10-5.30m,						
NEL-BH100_17.34-17.44m,	NEL-BH031_10.04-10.11m,						
NEL-BH031_20.03-20.13m,	NEL-BH083_14.84-15.0m,						
NEL-BH083_25.0-25.22m,	NEL-BH084_15.3-15.40m,						
NEL-BH084_29.63-29.79m,	NEL-BH084_37.95-38.05m,						
NEL-BH076_30.0-30.13m,	NEL-BH074_20.0-20.14m,						
NEL-BH074_30.0m,	NEL-BH074_41.89-42.0m,						
NEL-BH073_24.90-25.06m,	NEL-BH059_10.04-10.18m,						
NEL-BH059_20.0-20.21m,	NEL-BH037_14.98-15.10m,						
NEL-BH037_25.0-25.08m,	NEL-BH124_25.0-25.12m,						
NEL-BH124_35.03-35.12m,	NEL-BH124_45.0-45.1m,						
NEL-BH067_12.06-12.21m,	NEL-BH067_25.0-25.13m,						
NEL-BH068_8.20-8.30m,	NEL-BH042_14.97-15.08m						

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA011: Net Acid Generation								
Snap Lock Bag - frozen (EA011)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	14-Oct-2018	✔	
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,								
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,								
NEL-BH095_5.45-5.55m, NEL-BH095_9.97-10.11m,								
NEL-BH122_4.56-4.64m, NEL-BH093_5.05-5.17m,								
NEL-BH108_5.7-5.79m, NEL-BH092_5.0-5.10m,								
NEL-BH092_9.85-10.0m, NEL-BH089_8.70-8.90m,								
NEL-BH089_15.0-15.7m, NEL-BH087_5.60-5.79m,								
NEL-BH087_14.90-15.10m, NEL-BH100_5.10-5.30m,								
NEL-BH100_17.34-17.44m, NEL-BH031_10.04-10.11m,								
NEL-BH031_20.03-20.13m, NEL-BH083_14.84-15.0m,								
NEL-BH083_25.0-25.22m, NEL-BH084_15.3-15.40m,								
NEL-BH084_29.63-29.79m, NEL-BH084_37.95-38.05m,								
NEL-BH076_30.0-30.13m, NEL-BH074_20.0-20.14m,								
NEL-BH074_30.0m, NEL-BH074_41.89-42.0m,								
NEL-BH073_24.90-25.06m, NEL-BH059_10.04-10.18m,								
NEL-BH059_20.0-20.21m, NEL-BH137_14.87-15.0m,								
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,								
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,								
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,								
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,								
NEL-BH042_14.97-15.08m								



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA013: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA013)		06-Apr-2018	17-Apr-2018	06-Apr-2019	✓	17-Apr-2018	14-Oct-2018	✓
NEL-BH114_5.22-5.30m,	NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m,	NEL-BH099_20.04-20.18m,							
NEL-BH095_5.45-5.55m,	NEL-BH095_9.97-10.11m,							
NEL-BH122_4.56-4.64m,	NEL-BH093_5.05-5.17m,							
NEL-BH108_5.7-5.79m,	NEL-BH092_5.0-5.10m,							
NEL-BH092_9.85-10.0m,	NEL-BH089_8.70-8.90m,							
NEL-BH089_15.0-15.7m,	NEL-BH087_5.60-5.79m,							
NEL-BH087_14.90-15.10m,	NEL-BH100_5.10-5.30m,							
NEL-BH100_17.34-17.44m,	NEL-BH031_10.04-10.11m,							
NEL-BH031_20.03-20.13m,	NEL-BH083_14.84-15.0m,							
NEL-BH083_25.0-25.22m,	NEL-BH084_15.3-15.40m,							
NEL-BH084_29.63-29.79m,	NEL-BH084_37.95-38.05m,							
NEL-BH076_30.0-30.13m,	NEL-BH074_20.0-20.14m,							
NEL-BH074_30.0m,	NEL-BH074_41.89-42.0m,							
NEL-BH073_24.90-25.06m,	NEL-BH059_10.04-10.18m,							
NEL-BH059_20.0-20.21m,	NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m,	NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m,	NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m,	NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m,	NEL-BH068_8.20-8.30m,							
NEL-BH042_14.97-15.08m								
EA029-A: pH Measurements								
Snap Lock Bag - frozen (EA029)		06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
NEL-BH084_29.63-29.79m,	NEL-BH074_30.0m,							
NEL-BH073_24.90-25.06m,	NEL-BH059_5.5m,							
NEL-BH005_4.11-4.56m,	NEL-BH039_5.9m,							
NEL-BH004_9.05m,	NEL-BH004_19.5-19.95m,							
NEL-BH070_2.0m								
Snap Lock Bag - frozen (EA029)		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
NEL-BH070_5.0m								
EA029-B: Acidity Trail								
Snap Lock Bag - frozen (EA029)		06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
NEL-BH084_29.63-29.79m,	NEL-BH074_30.0m,							
NEL-BH073_24.90-25.06m,	NEL-BH059_5.5m,							
NEL-BH005_4.11-4.56m,	NEL-BH039_5.9m,							
NEL-BH004_9.05m,	NEL-BH004_19.5-19.95m,							
NEL-BH070_2.0m								
Snap Lock Bag - frozen (EA029)		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
NEL-BH070_5.0m								



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-C: Sulfur Trail								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
EA029-D: Calcium Values								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
EA029-E: Magnesium Values								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
EA029-F: Excess Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-G: Retained Acidity								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓
EA029-H: Acid Base Accounting								
Snap Lock Bag - frozen (EA029) NEL-BH084_29.63-29.79m, NEL-BH073_24.90-25.06m, NEL-BH005_4.11-4.56m, NEL-BH004_9.05m, NEL-BH070_2.0m	NEL-BH074_30.0m, NEL-BH059_5.5m, NEL-BH039_5.9m, NEL-BH004_19.5-19.95m,	06-Apr-2018	17-Apr-2018	30-Dec-2020	✓	17-Apr-2018	16-Jul-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH070_5.0m		06-Apr-2018	19-Apr-2018	30-Dec-2020	✓	19-Apr-2018	18-Jul-2018	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA031: pH (saturated paste)								
Snap Lock Bag - frozen (EA031)	06-Apr-2018	----	----	----	12-Apr-2018	03-Oct-2018	✔	
NEL-BH114_5.22-5.30m,	NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m,	NEL-BH099_20.04-20.18m,							
NEL-BH095_5.45-5.55m,	NEL-BH093_5.05-5.17m,							
NEL-BH092_9.85-10.0m,	NEL-BH089_8.70-8.90m,							
NEL-BH089_15.0-15.7m,	NEL-BH087_5.60-5.79m,							
NEL-BH087_14.90-15.10m,	NEL-BH100_5.10-5.30m,							
NEL-BH100_17.34-17.44m,	NEL-BH031_10.04-10.11m,							
NEL-BH031_20.03-20.13m,	NEL-BH083_14.84-15.0m,							
NEL-BH083_25.0-25.22m,	NEL-BH084_20.0-20.08m,							
NEL-BH084_29.63-29.79m,	NEL-BH084_37.95-38.05m,							
NEL-BH076_19.88-20.03m,	NEL-BH074_30.0m, NEL-BH076_30.0-30.13m,							
NEL-BH076_39.79-40.02m,	NEL-BH074_20.0-20.14m,							
NEL-BH074_41.89-42.0m,								
NEL-BH073_24.90-25.06m,	NEL-BH059_5.5m,							
NEL-BH059_10.04-10.18m,	NEL-BH059_20.0-20.21m,							
NEL-BH037_5m,	NEL-BH037_14.98-15.10m,							
NEL-BH037_25.0-25.08m,	NEL-BH124_25.0-25.12m,							
NEL-BH124_35.03-35.12m,	NEL-BH124_45.0-45.1m,							
NEL-BH067_12.06-12.21m,	NEL-BH067_25.0-25.13m,							
NEL-BH068_8.20-8.30m,	NEL-BH068_14.96-15.06m,							
NEL-BH068_19.97-20.05m,	NEL-BH039_5.9m,							
NEL-BH039_9.80m,	NEL-BH004_9.05m,							
NEL-BH070_5.0m,	NEL-BH085_5.0-5.12m,							
NEL-BH085_15.0-15.1m,	NEL-BH042_14.97-15.08m,							
NEL-BH042_25.15-25.25m								



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	16-Jul-2018	✔
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,							
NEL-BH110_5.0-5.20m, NEL-BH095_5.45-5.55m,							
NEL-BH095_9.97-10.11m, NEL-BH122_4.56-4.64m,							
NEL-BH093_5.05-5.17m, NEL-BH108_5.7-5.79m,							
NEL-BH092_5.0-5.10m, NEL-BH092_9.85-10.0m,							
NEL-BH089_8.70-8.90m, NEL-BH089_15.0-15.7m,							
NEL-BH087_5.60-5.79m, NEL-BH087_14.90-15.10m,							
NEL-BH100_5.10-5.30m, NEL-BH100_17.34-17.44m,							
NEL-BH031_10.04-10.11m, NEL-BH031_20.03-20.13m,							
NEL-BH083_14.84-15.0m, NEL-BH083_25.0-25.22m,							
NEL-BH084_15.3-15.40m, NEL-BH084_29.63-29.79m,							
NEL-BH084_37.95-38.05m, NEL-BH076_30.0-30.13m,							
NEL-BH074_20.0-20.14m, NEL-BH074_30.0m,							
NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m,							
NEL-BH059_10.04-10.18m, NEL-BH059_20.0-20.21m,							
NEL-BH137_5.0m, NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,							
NEL-BH039_2.40m, NEL-BH039_9.80m,							
NEL-BH004_2.0-2.45m, NEL-BH004_15.0-15.45m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	16-Jul-2018	✔
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,							
NEL-BH110_5.0-5.20m, NEL-BH095_5.45-5.55m,							
NEL-BH095_9.97-10.11m, NEL-BH122_4.56-4.64m,							
NEL-BH093_5.05-5.17m, NEL-BH108_5.7-5.79m,							
NEL-BH092_5.0-5.10m, NEL-BH092_9.85-10.0m,							
NEL-BH089_8.70-8.90m, NEL-BH089_15.0-15.7m,							
NEL-BH087_5.60-5.79m, NEL-BH087_14.90-15.10m,							
NEL-BH100_5.10-5.30m, NEL-BH100_17.34-17.44m,							
NEL-BH031_10.04-10.11m, NEL-BH031_20.03-20.13m,							
NEL-BH083_14.84-15.0m, NEL-BH083_25.0-25.22m,							
NEL-BH084_15.3-15.40m, NEL-BH084_29.63-29.79m,							
NEL-BH084_37.95-38.05m, NEL-BH076_30.0-30.13m,							
NEL-BH074_20.0-20.14m, NEL-BH074_30.0m,							
NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m,							
NEL-BH059_10.04-10.18m, NEL-BH059_20.0-20.21m,							
NEL-BH137_5.0m, NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,							
NEL-BH039_2.40m, NEL-BH039_9.80m,							
NEL-BH004_2.0-2.45m, NEL-BH004_15.0-15.45m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	16-Jul-2018	✔
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,							
NEL-BH110_5.0-5.20m, NEL-BH095_5.45-5.55m,							
NEL-BH095_9.97-10.11m, NEL-BH122_4.56-4.64m,							
NEL-BH093_5.05-5.17m, NEL-BH108_5.7-5.79m,							
NEL-BH092_5.0-5.10m, NEL-BH092_9.85-10.0m,							
NEL-BH089_8.70-8.90m, NEL-BH089_15.0-15.7m,							
NEL-BH087_5.60-5.79m, NEL-BH087_14.90-15.10m,							
NEL-BH100_5.10-5.30m, NEL-BH100_17.34-17.44m,							
NEL-BH031_10.04-10.11m, NEL-BH031_20.03-20.13m,							
NEL-BH083_14.84-15.0m, NEL-BH083_25.0-25.22m,							
NEL-BH084_15.3-15.40m, NEL-BH084_29.63-29.79m,							
NEL-BH084_37.95-38.05m, NEL-BH076_30.0-30.13m,							
NEL-BH074_20.0-20.14m, NEL-BH074_30.0m,							
NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m,							
NEL-BH059_10.04-10.18m, NEL-BH059_20.0-20.21m,							
NEL-BH137_5.0m, NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,							
NEL-BH039_2.40m, NEL-BH039_9.80m,							
NEL-BH004_2.0-2.45m, NEL-BH004_15.0-15.45m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	16-Jul-2018	✔
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,							
NEL-BH110_5.0-5.20m, NEL-BH095_5.45-5.55m,							
NEL-BH095_9.97-10.11m, NEL-BH122_4.56-4.64m,							
NEL-BH093_5.05-5.17m, NEL-BH108_5.7-5.79m,							
NEL-BH092_5.0-5.10m, NEL-BH092_9.85-10.0m,							
NEL-BH089_8.70-8.90m, NEL-BH089_15.0-15.7m,							
NEL-BH087_5.60-5.79m, NEL-BH087_14.90-15.10m,							
NEL-BH100_5.10-5.30m, NEL-BH100_17.34-17.44m,							
NEL-BH031_10.04-10.11m, NEL-BH031_20.03-20.13m,							
NEL-BH083_14.84-15.0m, NEL-BH083_25.0-25.22m,							
NEL-BH084_15.3-15.40m, NEL-BH084_29.63-29.79m,							
NEL-BH084_37.95-38.05m, NEL-BH076_30.0-30.13m,							
NEL-BH074_20.0-20.14m, NEL-BH074_30.0m,							
NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m,							
NEL-BH059_10.04-10.18m, NEL-BH059_20.0-20.21m,							
NEL-BH137_5.0m, NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,							
NEL-BH039_2.40m, NEL-BH039_9.80m,							
NEL-BH004_2.0-2.45m, NEL-BH004_15.0-15.45m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)	06-Apr-2018	17-Apr-2018	06-Apr-2019	✔	17-Apr-2018	16-Jul-2018	✔
NEL-BH114_5.22-5.30m, NEL-BH008_10.0-10.1m,							
NEL-BH099_10.0-10.10m, NEL-BH099_20.04-20.18m,							
NEL-BH110_5.0-5.20m, NEL-BH095_5.45-5.55m,							
NEL-BH095_9.97-10.11m, NEL-BH122_4.56-4.64m,							
NEL-BH093_5.05-5.17m, NEL-BH108_5.7-5.79m,							
NEL-BH092_5.0-5.10m, NEL-BH092_9.85-10.0m,							
NEL-BH089_8.70-8.90m, NEL-BH089_15.0-15.7m,							
NEL-BH087_5.60-5.79m, NEL-BH087_14.90-15.10m,							
NEL-BH100_5.10-5.30m, NEL-BH100_17.34-17.44m,							
NEL-BH031_10.04-10.11m, NEL-BH031_20.03-20.13m,							
NEL-BH083_14.84-15.0m, NEL-BH083_25.0-25.22m,							
NEL-BH084_15.3-15.40m, NEL-BH084_29.63-29.79m,							
NEL-BH084_37.95-38.05m, NEL-BH076_30.0-30.13m,							
NEL-BH074_20.0-20.14m, NEL-BH074_30.0m,							
NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m,							
NEL-BH059_10.04-10.18m, NEL-BH059_20.0-20.21m,							
NEL-BH137_5.0m, NEL-BH137_14.87-15.0m,							
NEL-BH037_14.98-15.10m, NEL-BH037_25.0-25.08m,							
NEL-BH124_25.0-25.12m, NEL-BH124_35.03-35.12m,							
NEL-BH124_45.0-45.1m, NEL-BH067_12.06-12.21m,							
NEL-BH067_25.0-25.13m, NEL-BH068_8.20-8.30m,							
NEL-BH039_2.40m, NEL-BH039_9.80m,							
NEL-BH004_2.0-2.45m, NEL-BH004_15.0-15.45m							



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Snap Lock Bag - frozen (EA055)	06-Apr-2018	----	----	----	16-Apr-2018	20-Apr-2018	✓
NEL-BH114_5.22-5.30m,	NEL-BH008_10.0-10.1m,						
NEL-BH099_10.0-10.10m,	NEL-BH099_20.04-20.18m,						
NEL-BH095_5.45-5.55m,	NEL-BH093_5.05-5.17m,						
NEL-BH092_9.85-10.0m,	NEL-BH089_8.70-8.90m,						
NEL-BH089_15.0-15.7m,	NEL-BH087_5.60-5.79m,						
NEL-BH087_14.90-15.10m,	NEL-BH100_5.10-5.30m,						
NEL-BH100_17.34-17.44m,	NEL-BH031_10.04-10.11m,						
NEL-BH031_20.03-20.13m,	NEL-BH083_14.84-15.0m,						
NEL-BH083_25.0-25.22m,	NEL-BH084_20.0-20.08m,						
NEL-BH084_29.63-29.79m,	NEL-BH084_37.95-38.05m,						
NEL-BH076_19.88-20.03m,	NEL-BH074_30.0m, NEL-BH076_30.0-30.13m,						
NEL-BH076_39.79-40.02m,	NEL-BH074_20.0-20.14m,						
NEL-BH074_41.89-42.0m,							
NEL-BH073_24.90-25.06m,	NEL-BH059_5.5m,						
NEL-BH059_10.04-10.18m,	NEL-BH059_20.0-20.21m,						
NEL-BH037_5m,	NEL-BH037_14.98-15.10m,						
NEL-BH037_25.0-25.08m,	NEL-BH124_25.0-25.12m,						
NEL-BH124_35.03-35.12m,	NEL-BH124_45.0-45.1m,						
NEL-BH067_12.06-12.21m,	NEL-BH067_25.0-25.13m,						
NEL-BH068_8.20-8.30m,	NEL-BH068_14.96-15.06m,						
NEL-BH039_5.9m,	NEL-BH039_9.80m,						
NEL-BH004_9.05m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED040S : Soluble Sulfate by ICPAES								
Snap Lock Bag - frozen (ED040S) NEL-BH114_5.22-5.30m, NEL-BH099_10.0-10.10m, NEL-BH095_5.45-5.55m, NEL-BH092_9.85-10.0m, NEL-BH089_15.0-15.7m, NEL-BH087_14.90-15.10m, NEL-BH100_17.34-17.44m, NEL-BH031_20.03-20.13m, NEL-BH083_25.0-25.22m, NEL-BH084_29.63-29.79m, NEL-BH076_19.88-20.03m, NEL-BH076_39.79-40.02m, NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m, NEL-BH059_10.04-10.18m, NEL-BH037_5m, NEL-BH037_25.0-25.08m, NEL-BH124_35.03-35.12m, NEL-BH067_12.06-12.21m, NEL-BH068_8.20-8.30m,	NEL-BH008_10.0-10.1m, NEL-BH099_20.04-20.18m, NEL-BH093_5.05-5.17m, NEL-BH089_8.70-8.90m, NEL-BH087_5.60-5.79m, NEL-BH100_5.10-5.30m, NEL-BH031_10.04-10.11m, NEL-BH083_14.84-15.0m, NEL-BH084_20.0-20.08m, NEL-BH084_37.95-38.05m, NEL-BH074_30.0m, NEL-BH076_30.0-30.13m, NEL-BH074_20.0-20.14m, NEL-BH059_5.5m, NEL-BH059_20.0-20.21m, NEL-BH037_14.98-15.10m, NEL-BH124_25.0-25.12m, NEL-BH124_45.0-45.1m, NEL-BH067_25.0-25.13m, NEL-BH068_14.96-15.06m	06-Apr-2018	19-Apr-2018	04-May-2018	✔	20-Apr-2018	17-May-2018	✔
Snap Lock Bag - frozen (ED040S) NEL-BH068_19.97-20.05m, NEL-BH039_9.80m, NEL-BH070_5.0m, NEL-BH085_15.0-15.1m, NEL-BH042_25.15-25.25m	NEL-BH039_5.9m, NEL-BH004_9.05m, NEL-BH085_5.0-5.12m, NEL-BH042_14.97-15.08m,	06-Apr-2018	23-Apr-2018	04-May-2018	✔	23-Apr-2018	21-May-2018	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED042T: Total Sulfur by LECO								
80* dried soil (ED042T)								
NEL-BH137_14.87-15.0m		06-Apr-2018	19-Apr-2018	04-May-2018	✓	19-Apr-2018	04-May-2018	✓
Snap Lock Bag - frozen (ED042T)								
NEL-BH114_5.22-5.30m,	NEL-BH008_10.0-10.1m,	06-Apr-2018	19-Apr-2018	13-Apr-2018	✗	19-Apr-2018	16-Oct-2018	✓
NEL-BH099_10.0-10.10m,	NEL-BH099_20.04-20.18m,							
NEL-BH095_5.45-5.55m,	NEL-BH095_9.97-10.11m,							
NEL-BH122_4.56-4.64m,	NEL-BH093_5.05-5.17m,							
NEL-BH108_5.7-5.79m,	NEL-BH092_5.0-5.10m,							
NEL-BH092_9.85-10.0m,	NEL-BH089_8.70-8.90m,							
NEL-BH089_15.0-15.7m,	NEL-BH087_5.60-5.79m,							
NEL-BH087_14.90-15.10m,	NEL-BH100_5.10-5.30m,							
NEL-BH100_17.34-17.44m,	NEL-BH031_10.04-10.11m,							
NEL-BH031_20.03-20.13m,	NEL-BH083_14.84-15.0m,							
NEL-BH083_25.0-25.22m,	NEL-BH084_15.3-15.40m,							
NEL-BH084_29.63-29.79m,	NEL-BH084_37.95-38.05m,							
NEL-BH076_30.0-30.13m,	NEL-BH074_20.0-20.14m,							
NEL-BH074_30.0m,	NEL-BH074_41.89-42.0m,							
NEL-BH073_24.90-25.06m,	NEL-BH059_10.04-10.18m,							
NEL-BH059_20.0-20.21m,	NEL-BH037_14.98-15.10m,							
NEL-BH037_25.0-25.08m,	NEL-BH124_25.0-25.12m,							
NEL-BH124_35.03-35.12m,	NEL-BH124_45.0-45.1m,							
NEL-BH067_12.06-12.21m,	NEL-BH067_25.0-25.13m,							
NEL-BH068_8.20-8.30m,	NEL-BH042_14.97-15.08m							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Snap Lock Bag - frozen (ED045G) NEL-BH114_5.22-5.30m, NEL-BH099_10.0-10.10m, NEL-BH095_5.45-5.55m, NEL-BH092_9.85-10.0m, NEL-BH089_15.0-15.7m, NEL-BH087_14.90-15.10m, NEL-BH100_17.34-17.44m, NEL-BH031_20.03-20.13m, NEL-BH083_25.0-25.22m, NEL-BH084_29.63-29.79m, NEL-BH076_19.88-20.03m, NEL-BH076_39.79-40.02m, NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m, NEL-BH059_10.04-10.18m, NEL-BH037_5m, NEL-BH037_25.0-25.08m, NEL-BH124_35.03-35.12m, NEL-BH067_12.06-12.21m, NEL-BH068_8.20-8.30m,	NEL-BH008_10.0-10.1m, NEL-BH099_20.04-20.18m, NEL-BH093_5.05-5.17m, NEL-BH089_8.70-8.90m, NEL-BH087_5.60-5.79m, NEL-BH100_5.10-5.30m, NEL-BH031_10.04-10.11m, NEL-BH083_14.84-15.0m, NEL-BH084_20.0-20.08m, NEL-BH084_37.95-38.05m, NEL-BH074_30.0m, NEL-BH076_30.0-30.13m, NEL-BH074_20.0-20.14m, NEL-BH059_5.5m, NEL-BH059_20.0-20.21m, NEL-BH037_14.98-15.10m, NEL-BH124_25.0-25.12m, NEL-BH124_45.0-45.1m, NEL-BH067_25.0-25.13m, NEL-BH068_14.96-15.06m	06-Apr-2018	19-Apr-2018	04-May-2018	✔	20-Apr-2018	17-May-2018	✔
Snap Lock Bag - frozen (ED045G) NEL-BH068_19.97-20.05m, NEL-BH039_9.80m, NEL-BH070_5.0m, NEL-BH085_15.0-15.1m, NEL-BH042_25.15-25.25m	NEL-BH039_5.9m, NEL-BH004_9.05m, NEL-BH085_5.0-5.12m, NEL-BH042_14.97-15.08m,	06-Apr-2018	23-Apr-2018	04-May-2018	✔	23-Apr-2018	21-May-2018	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation				Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093S: Soluble Major Cations									
Snap Lock Bag - frozen (ED093S)	NEL-BH114_5.22-5.30m, NEL-BH099_10.0-10.10m, NEL-BH095_5.45-5.55m, NEL-BH092_9.85-10.0m, NEL-BH089_15.0-15.7m, NEL-BH087_14.90-15.10m, NEL-BH100_17.34-17.44m, NEL-BH031_20.03-20.13m, NEL-BH083_25.0-25.22m, NEL-BH084_29.63-29.79m, NEL-BH076_19.88-20.03m, NEL-BH076_39.79-40.02m, NEL-BH074_41.89-42.0m, NEL-BH073_24.90-25.06m, NEL-BH059_10.04-10.18m, NEL-BH037_5m, NEL-BH037_25.0-25.08m, NEL-BH124_35.03-35.12m, NEL-BH067_12.06-12.21m, NEL-BH068_8.20-8.30m,	NEL-BH008_10.0-10.1m, NEL-BH099_20.04-20.18m, NEL-BH093_5.05-5.17m, NEL-BH089_8.70-8.90m, NEL-BH087_5.60-5.79m, NEL-BH100_5.10-5.30m, NEL-BH031_10.04-10.11m, NEL-BH083_14.84-15.0m, NEL-BH084_20.0-20.08m, NEL-BH084_37.95-38.05m, NEL-BH074_30.0m, NEL-BH076_30.0-30.13m, NEL-BH074_20.0-20.14m, NEL-BH059_5.5m, NEL-BH059_20.0-20.21m, NEL-BH037_14.98-15.10m, NEL-BH124_25.0-25.12m, NEL-BH124_45.0-45.1m, NEL-BH067_25.0-25.13m, NEL-BH068_14.96-15.06m	06-Apr-2018	19-Apr-2018	03-Oct-2018	✔	20-Apr-2018	03-Oct-2018	✔
Snap Lock Bag - frozen (ED093S)	NEL-BH068_19.97-20.05m, NEL-BH039_9.80m, NEL-BH070_5.0m, NEL-BH085_15.0-15.1m, NEL-BH042_25.15-25.25m	NEL-BH039_5.9m, NEL-BH004_9.05m, NEL-BH085_5.0-5.12m, NEL-BH042_14.97-15.08m,	06-Apr-2018	23-Apr-2018	03-Oct-2018	✔	23-Apr-2018	03-Oct-2018	✔
EP004: Organic Matter									
Snap Lock Bag - frozen (EP004)	NEL-BH068_8.20-8.30m, NEL-BH004_9.05m	NEL-BH039_5.9m,	06-Apr-2018	19-Apr-2018	03-Oct-2018	✔	19-Apr-2018	03-Oct-2018	✔



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	5	41	12.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	5	49	10.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	5	49	10.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	5	46	10.87	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	5	49	10.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	5	43	11.63	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	5	41	12.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	5	49	10.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	5	41	12.20	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	3	49	6.12	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	6	49	12.24	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	46	6.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	3	49	6.12	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	6	49	12.24	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	14	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	3	49	6.12	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	3	49	6.12	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	46	6.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	3	49	6.12	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	3	41	7.32	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	2	14	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP- Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Acid Neutralising Capacity (ANC)	EA013	SOIL	In house: Referenced to USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquantitatively estimate the likely reactivity. The soil is then reacted with an known excess quantity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
pH (Saturated Paste)	* EA031	SOIL	In house: Referenced to USEPA 600/2 - 78 - 054 - pH determined on a saturated paste by ISE.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Resistivity (Saturated Paste)	EA084	SOIL	In house: Calculated from Saturated Paste Electrical Conductivity
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Sulfur - Total as S (LECO)	ED042T	SOIL	In house: Dried and pulverised sample is combusted in a high temperature furnace in the presence of strong oxidants / catalysts. The evolved S (as SO2) is measured by infra-red detector
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3).
Sulphate Reducing Bacteria BART	MM820	SOIL	Microbiological analysis subcontracted to ALS Scoresby. NATA accreditation does not cover performance of this service.

Preparation Methods	Method	Matrix	Method Descriptions
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Work Order : EM1805796
Client : GHD PTY LTD
Project : 31350060803



Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CERTIFICATE OF ANALYSIS

Work Order : **EM1806836**
Client : **GHD PTY LTD**
Contact : **MR DAVID QUINN**
Address : **LEVEL 8, 180 LONSDALE ST**
MELBOURNE VIC, AUSTRALIA 3001
Telephone : **----**
Project : **31350060803**
Order number : **----**
C-O-C number : **----**
Sampler : **GHD**
Site : **----**
Quote number : **ME/124/18 - North East Link**
No. of samples received : **7**
No. of samples analysed : **7**

Page : 1 of 6
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 24-Apr-2018 09:10
Date Analysis Commenced : 27-Apr-2018
Issue Date : 10-May-2018 17:31



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA031 (Saturated Paste pH): NATA accreditation does not cover the performance of this service.
- EA032 (Saturated Paste EC): NATA accreditation does not cover the performance of this service.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Excess ANC not required because pH OX less than 6.5.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.
- ALS is not NATA accredited for the calculation of saturated resistivity in a soil.



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH073_12.0-12.7 5m	NEL-BH037_0.45-0.5m	NEL-BH039_14.5-14.9 1m	NEL-BH039_19.0-19.4 5m	NEL-BH004_19.5-19.9 5m
Client sampling date / time				23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1806836-001	EM1806836-002	EM1806836-003	EM1806836-004	EM1806836-005
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	----	----	----	-3.0
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	----	----	----	----	7.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	----	----	----	3.6
ANC as CaCO3	----	0.1	% CaCO3	----	----	----	----	0.4
Fizz Rating	----	0	Fizz Unit	----	----	----	----	0
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	4.0	----	6.6	4.5	6.7
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	7.0	----	----	7.0
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	----	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.014	----	----	0.011
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	----	----	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	2.94	----	----	0.53
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	587	----	----	106
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.94	----	----	0.17
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	----	<1



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH073_12.0-12.7 5m	NEL-BH037_0.45-0.5m	NEL-BH039_14.5-14.9 1m	NEL-BH039_19.0-19.4 5m	NEL-BH004_19.5-19.9 5m
Client sampling date / time				23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00	23-Apr-2018 00:00
Compound	CAS Number	LOR	Unit	EM1806836-001	EM1806836-002	EM1806836-003	EM1806836-004	EM1806836-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	27.6	----	37.4	27.9	18.3
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	2340	----	1000	680	820
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	----	130	240	60
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	----	----	----	----	0.02
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	180	----	470	730	450
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	----	<10	<10	<10
Magnesium	7439-95-4	10	mg/kg	<10	----	<10	20	<10
Sodium	7440-23-5	10	mg/kg	130	----	390	510	360
Potassium	7440-09-7	10	mg/kg	<10	----	10	10	10



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH004_23.9-24.0 m	NEL-BH150_5.35-5.45 m	----	----	----
Client sampling date / time				23-Apr-2018 00:00	23-Apr-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1806836-006	EM1806836-007	-----	-----	-----
				Result	Result	----	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	5.9	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	5.9	----	----	----
EA029-B: Acidity Trail								
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	----	9	----	----	----
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	9	----	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	<0.020	----	----	----
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	<0.020	----	----	----
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	<0.020	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	<0.020	----	----	----
Peroxide Sulfur (23De)	----	0.020	% S	----	<0.020	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	<0.020	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	<10	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	<0.020	----	----	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	<0.020	----	----	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	<0.020	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	<0.020	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	<0.020	----	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	<0.020	----	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	<0.020	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	<0.020	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	----



Analytical Results

Sub-Matrix: **ROCK**
 (Matrix: **SOIL**)

Client sample ID

				NEL-BH004_23.9-24.0 m	NEL-BH150_5.35-5.45 m	----	----	----
Client sampling date / time				23-Apr-2018 00:00	23-Apr-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM1806836-006	EM1806836-007	-----	-----	-----
Result				Result	Result	----	----	----
EA029-H: Acid Base Accounting - Continued								
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	----	----	----
EA031: pH (saturated paste)								
ø pH (Saturated Paste)	----	0.1	pH Unit	6.6	5.7	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	18.2	21.2	----	----	----
EA084: Saturated Resistivity								
Resistivity at 25°C	----	10	ohm cm	480	14300	----	----	----
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	260	20	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	200	20	----	----	----
ED093S: Soluble Major Cations								
Calcium	7440-70-2	10	mg/kg	<10	<10	----	----	----
Magnesium	7439-95-4	10	mg/kg	10	<10	----	----	----
Sodium	7440-23-5	10	mg/kg	270	20	----	----	----
Potassium	7440-09-7	10	mg/kg	20	<10	----	----	----

FQM - Generic Chain of Custody Form

Environmental Division
Melbourne
Work Order Reference
EM1806836



Telephone : + 61-3-8549 9600

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM1806836

<p>Client : GHD PTY LTD</p> <p>Contact : MR DAVID QUINN</p> <p>Address : LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001</p> <p>E-mail : david.quinn@ghd.com</p> <p>Telephone : ----</p> <p>Facsimile : ----</p> <p>Project : 31350060803</p> <p>Order number :</p> <p>C-O-C number : ----</p> <p>Site : ----</p> <p>Sampler : GHD</p>	<p>Laboratory : Environmental Division Melbourne</p> <p>Contact : Shirley LeCornu</p> <p>Address : 4 Westall Rd Springvale VIC Australia 3171</p> <p>E-mail : shirley.lecornu@Alsglobal.com</p> <p>Telephone : +61-3-8549 9630</p> <p>Facsimile : +61-3-8549 9626</p> <p>Page : 1 of 4</p> <p>Quote number : EM2018GHDSE0003 (ME/124/18 - North East Link)</p> <p>QC Level : NEPM 2013 B3 & ALS QC Standard</p>
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Dates

Date Samples Received : 24-Apr-2018 09:10	Issue Date : 26-Apr-2018
Client Requested Due : 10-May-2018	Scheduled Reporting Date : 10-May-2018
Date	

Delivery Details

Mode of Delivery : Carrier	Security Seal : Intact.
No. of coolers/boxes : 1	Temperature : 0.8°C - Ice present
Receipt Detail :	No. of samples received / analysed : 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Acid Neutralising Capacity (ANC) : EA013		
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Snap Lock Bag - frozen
Cations - soluble by ICP-AES : ED093S		
NEL-BH073_12.0-12.75m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_14.5-14.91m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_19.0-19.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_23.9-24.0m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH150_5.35-5.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
Chloride Soluble By Discrete Analyser : ED045G		
NEL-BH073_12.0-12.75m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_14.5-14.91m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_19.0-19.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_23.9-24.0m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH150_5.35-5.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
Major Anions - Soluble : ED040S		
NEL-BH073_12.0-12.75m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_14.5-14.91m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_19.0-19.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_23.9-24.0m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH150_5.35-5.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
pH (Saturated Paste) : EA031		
NEL-BH073_12.0-12.75m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_14.5-14.91m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH039_19.0-19.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH004_23.9-24.0m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
NEL-BH150_5.35-5.45m	- Snap Lock Bag - frozen on receipt at ALS	- Soil Glass Jar - Unpreserved
Sulfur - Total as S (LECO) : ED042T		
NEL-BH004_19.5-19.95m	- Snap Lock Bag - frozen on receipt at ALS	- Pulp Bag

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



EM1806836-001	: [23-Apr-2018]	: NEL-BH073_12.0-12.75m
EM1806836-003	: [23-Apr-2018]	: NEL-BH039_14.5-14.91m
EM1806836-004	: [23-Apr-2018]	: NEL-BH039_19.0-19.45m
EM1806836-005	: [23-Apr-2018]	: NEL-BH004_19.5-19.95m
EM1806836-006	: [23-Apr-2018]	: NEL-BH004_23.9-24.0m
EM1806836-007	: [23-Apr-2018]	: NEL-BH150_5.35-5.45m

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ASS1 NAPP	SOIL - EA031 pH (Saturated Paste)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - EA084 Saturated Resistivity	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)	SOIL - NT-2S Major Anions (Cl, SO4)
EM1806836-001	23-Apr-2018 00:00	NEL-BH073_12.0-12.75m		✓		✓	✓	✓	✓
EM1806836-002	23-Apr-2018 00:00	NEL-BH037_0.45-0.5m			✓				
EM1806836-003	23-Apr-2018 00:00	NEL-BH039_14.5-14.91m		✓		✓	✓	✓	✓
EM1806836-004	23-Apr-2018 00:00	NEL-BH039_19.0-19.45m		✓		✓	✓	✓	✓
EM1806836-005	23-Apr-2018 00:00	NEL-BH004_19.5-19.95m	✓	✓	✓	✓	✓	✓	✓
EM1806836-006	23-Apr-2018 00:00	NEL-BH004_23.9-24.0m		✓		✓	✓	✓	✓
EM1806836-007	23-Apr-2018 00:00	NEL-BH150_5.35-5.45m		✓		✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA011 Net Acid Generation (NAG)	SOIL - EA029 SPOCAS
EM1806836-005	23-Apr-2018 00:00	NEL-BH004_19.5-19.95m	✓	
EM1806836-007	23-Apr-2018 00:00	NEL-BH150_5.35-5.45m		✓

Proactive Holding Time Report

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

[illegible]

QUALITY CONTROL REPORT

Work Order	: EM1806836	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR DAVID QUINN	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9630
Project	: 31350060803	Date Samples Received	: 24-Apr-2018
Order number	: ----	Date Analysis Commenced	: 27-Apr-2018
C-O-C number	: ----	Issue Date	: 10-May-2018
Sampler	: GHD		
Site	: ----		
Quote number	: ME/124/18 - North East Link		
No. of samples received	: 7		
No. of samples analysed	: 7		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

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

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 1614181)									
EM1806836-005	NEL-BH004_19.5-19.95m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	7.2	7.2	0.00	0% - 20%
EM1806980-001	Anonymous	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: pH (OX)	----	0.1	pH Unit	7.8	7.7	1.29	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 1614180)									
EM1806836-005	NEL-BH004_19.5-19.95m	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	3.6	4.0	9.01	No Limit
EM1806980-001	Anonymous	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	5.4	4.5	17.3	0% - 50%
EA029-A: pH Measurements (QC Lot: 1614179)									
EB1810584-004	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	7.0	7.1	1.42	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.0	6.9	1.44	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1614179)									
EB1810584-004	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 1614179)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-C: Sulfur Trail (QC Lot: 1614179) - continued									
EB1810584-004	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.022	0.020	9.56	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.022	0.020	9.56	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	14	12	9.56	No Limit
EA029-D: Calcium Values (QC Lot: 1614179)									
EB1810584-004	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.026	0.028	6.38	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.040	0.036	10.3	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1614179)									
EB1810584-004	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.039	0.042	6.86	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.042	0.042	0.00	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-H: Acid Base Accounting (QC Lot: 1614179)									
EB1810584-004	Anonymous	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.02	0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	14	12	9.56	No Limit
EA031: pH (saturated paste) (QC Lot: 1602335)									
EM1806836-001	NEL-BH073_12.0-12.75m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	4.0	4.1	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1614178)									
EB1810313-002	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.8	8.9	1.13	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1614178)									
EB1810313-002	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.013	0.012	0.00	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1614178)									
EB1810313-002	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.32	0.34	9.23	0% - 20%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-C: Acid Neutralising Capacity (QC Lot: 1614178) - continued									
EB1810313-002	Anonymous	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.10	0.11	0.00	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	63	69	9.23	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1606790)									
EB1810502-002	Anonymous	EA055: Moisture Content	----	0.1	%	15.6	15.3	2.40	0% - 50%
EB1810502-033	Anonymous	EA055: Moisture Content	----	0.1	%	13.7	13.1	4.82	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1606791)									
EM1806836-003	NEL-BH039_14.5-14.91m	EA055: Moisture Content	----	0.1	%	37.4	37.8	1.09	0% - 20%
ED040S: Soluble Major Anions (QC Lot: 1606786)									
EM1806836-007	NEL-BH150_5.35-5.45m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	20	20	0.00	No Limit
EB1810549-001	Anonymous	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	4270	4940	14.6	0% - 20%
ED042T: Total Sulfur by LECO (QC Lot: 1627328)									
EB1810734-003	Anonymous	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.18	0.18	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 1606785)									
EB1810549-001	Anonymous	ED045G: Chloride	16887-00-6	10	mg/kg	10	20	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 1606789)									
EM1806836-007	NEL-BH150_5.35-5.45m	ED093S: Calcium	7440-70-2	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	20	30	0.00	No Limit
		ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EB1810549-001	Anonymous	ED093S: Calcium	7440-70-2	10	mg/kg	1370	1570	13.1	0% - 20%
		ED093S: Magnesium	7439-95-4	10	mg/kg	190	210	10.8	0% - 20%
		ED093S: Sodium	7440-23-5	10	mg/kg	220	250	15.8	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	20	20	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA011: Net Acid Generation (QCLot: 1614181)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	99.2	70	130
EA013: Acid Neutralising Capacity (QCLot: 1614180)								
EA013: ANC as H2SO4	----	----	kg H2SO4 equiv./t	----	9.9 kg H2SO4 equiv./t	98.0	82	120
EA029-A: pH Measurements (QCLot: 1614179)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.6 pH Unit	106	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	4.3 pH Unit	100	70	130
EA029-B: Acidity Trail (QCLot: 1614179)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	85.1	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	35.2 mole H+ / t	88.6	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1614179)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	78.3	70	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	85.9	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1614179)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	93.8	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	92.1	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1614179)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	91.0	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	83.4	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 1614179)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-H: Acid Base Accounting (QCLot: 1614179) - continued								
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA031: pH (saturated paste) (QCLot: 1602335)								
EA031: pH (Saturated Paste)	----	----	pH Unit	----	4 pH Unit	100	99	101
				----	7 pH Unit	100	99	101
EA033-A: Actual Acidity (QCLot: 1614178)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	104	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	84.5	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1614178)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	84.6	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1614178)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	101	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
ED040S: Soluble Major Anions (QCLot: 1606786)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	93.9	90	114
ED042T: Total Sulfur by LECO (QCLot: 1627328)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	104	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1606785)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	99.5	83	119
				<10	5000 mg/kg	99.6	83	119
ED093S: Soluble Major Cations (QCLot: 1606789)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	98.7	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	100	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	98.1	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	98.3	80	120

Matrix Spike (MS) Report

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

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

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM1806836**

Page : 1 of 7

Client : **GHD PTY LTD**
Contact : **MR DAVID QUINN**
Project : **31350060803**
Site : **----**
Sampler : **GHD**
Order number :

Laboratory : **Environmental Division Melbourne**
Telephone : **+61-3-8549 9630**
Date Samples Received : **24-Apr-2018**
Issue Date : **10-May-2018**
No. of samples received : **7**
No. of samples analysed : **7**

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED042T: Total Sulfur by LECO						
Snap Lock Bag - frozen on receipt at ALS NEL-BH004_19.5-19.95m	09-May-2018	30-Apr-2018	9	----	----	----

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA011: Net Acid Generation							
Snap Lock Bag - frozen on receipt at ALS (EA011) NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	31-Oct-2018	✓
EA013: Acid Neutralising Capacity							
Snap Lock Bag - frozen on receipt at ALS (EA013) NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	31-Oct-2018	✓
EA029-A: pH Measurements							
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓
EA029-B: Acidity Trail							
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓
EA029-C: Sulfur Trail							
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓
EA029-D: Calcium Values							
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓
EA029-E: Magnesium Values							
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA029-F: Excess Acid Neutralising Capacity								
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓	
EA029-G: Retained Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓	
EA029-H: Acid Base Accounting								
Snap Lock Bag - frozen on receipt at ALS (EA029) NEL-BH150_5.35-5.45m	23-Apr-2018	04-May-2018	16-Jan-2021	✓	04-May-2018	02-Aug-2018	✓	
EA031: pH (saturated paste)								
Snap Lock Bag - frozen on receipt at ALS (EA031) NEL-BH073_12.0-12.75m, NEL-BH039_19.0-19.45m, NEL-BH004_23.9-24.0m,	NEL-BH039_14.5-14.91m, NEL-BH004_19.5-19.95m, NEL-BH150_5.35-5.45m	23-Apr-2018	----	----	----	27-Apr-2018	20-Oct-2018	✓
EA033-A: Actual Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) NEL-BH037_0.45-0.5m,	NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	02-Aug-2018	✓
EA033-B: Potential Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) NEL-BH037_0.45-0.5m,	NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	02-Aug-2018	✓
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen on receipt at ALS (EA033) NEL-BH037_0.45-0.5m,	NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	02-Aug-2018	✓
EA033-D: Retained Acidity								
Snap Lock Bag - frozen on receipt at ALS (EA033) NEL-BH037_0.45-0.5m,	NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	02-Aug-2018	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen on receipt at ALS (EA033) NEL-BH037_0.45-0.5m,	NEL-BH004_19.5-19.95m	23-Apr-2018	04-May-2018	23-Apr-2019	✓	04-May-2018	02-Aug-2018	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Snap Lock Bag - frozen on receipt at ALS (EA055) NEL-BH073_12.0-12.75m, NEL-BH039_19.0-19.45m, NEL-BH004_23.9-24.0m,	NEL-BH039_14.5-14.91m, NEL-BH004_19.5-19.95m, NEL-BH150_5.35-5.45m	23-Apr-2018	----	----	----	01-May-2018	20-Oct-2018	✓
ED040S : Soluble Sulfate by ICPAES								
Snap Lock Bag - frozen on receipt at ALS (ED040S) NEL-BH073_12.0-12.75m, NEL-BH039_19.0-19.45m, NEL-BH004_23.9-24.0m,	NEL-BH039_14.5-14.91m, NEL-BH004_19.5-19.95m, NEL-BH150_5.35-5.45m	23-Apr-2018	03-May-2018	21-May-2018	✓	03-May-2018	31-May-2018	✓
ED042T: Total Sulfur by LECO								
Snap Lock Bag - frozen on receipt at ALS (ED042T) NEL-BH004_19.5-19.95m		23-Apr-2018	09-May-2018	30-Apr-2018	✗	09-May-2018	05-Nov-2018	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Snap Lock Bag - frozen on receipt at ALS (ED045G) NEL-BH073_12.0-12.75m, NEL-BH039_19.0-19.45m, NEL-BH004_23.9-24.0m,	NEL-BH039_14.5-14.91m, NEL-BH004_19.5-19.95m, NEL-BH150_5.35-5.45m	23-Apr-2018	03-May-2018	21-May-2018	✔	03-May-2018	31-May-2018	✔
ED093S: Soluble Major Cations								
Snap Lock Bag - frozen on receipt at ALS (ED093S) NEL-BH073_12.0-12.75m, NEL-BH039_19.0-19.45m, NEL-BH004_23.9-24.0m,	NEL-BH039_14.5-14.91m, NEL-BH004_19.5-19.95m, NEL-BH150_5.35-5.45m	23-Apr-2018	03-May-2018	20-Oct-2018	✔	03-May-2018	20-Oct-2018	✔



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	2	6	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP- Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Acid Neutralising Capacity (ANC)	EA013	SOIL	In house: Referenced to USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquantitatively estimate the likely reactivity. The soil is then reacted with an known excess quantity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
pH (Saturated Paste)	* EA031	SOIL	In house: Referenced to USEPA 600/2 - 78 - 054 - pH determined on a saturated paste by ISE.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Resistivity (Saturated Paste)	EA084	SOIL	In house: Calculated from Saturated Paste Electrical Conductivity
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Sulfur - Total as S (LECO)	ED042T	SOIL	In house: Dried and pulverised sample is combusted in a high temperature furnace in the presence of strong oxidants / catalysts. The evolved S (as SO2) is measured by infra-red detector
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house



Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CERTIFICATE OF ANALYSIS

Work Order : **EM1813212**
Client : **GHD PTY LTD**
Contact : **MR DAVID QUINN**
Address : **LEVEL 8, 180 LONSDALE ST**
MELBOURNE VIC, AUSTRALIA 3001
Telephone : **----**
Project : **31350061101**
Order number : **----**
C-O-C number : **----**
Sampler : **SCOTT HILLIARD**
Site : **Melbourne**
Quote number : **ME/124/18 - North East Link**
No. of samples received : **14**
No. of samples analysed : **14**

Page : 1 of 9
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9630
Date Samples Received : 17-Aug-2018 16:45
Date Analysis Commenced : 21-Aug-2018
Issue Date : 27-Aug-2018 09:14



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA031 (Saturated Paste pH): NATA accreditation does not cover the performance of this service.
- EA032 (Saturated Paste EC): NATA accreditation does not cover the performance of this service.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.
- ALS is not NATA accredited for the calculation of saturated resistivity in a soil.



Analytical Results

Sub-Matrix: ROCK
 (Matrix: SOIL)

Client sample ID

				NEL-EF-BH017_10m	NEL-EF-BH017_20m	NEL-EF-BH018_20m	NEL-EF-BH019_10m	NEL-EF-BH019_20m
Client sampling date / time				14-Aug-2018 00:00	14-Aug-2018 00:00	17-Jul-2018 00:00	13-Jul-2018 00:00	13-Jul-2018 00:00
Compound	CAS Number	LOR	Unit	EM1813212-004	EM1813212-005	EM1813212-008	EM1813212-010	EM1813212-011
				Result	Result	Result	Result	Result
EA009: Nett Acid Production Potential								
Net Acid Production Potential	----	0.5	kg H2SO4/t	-0.1	-3.1	-3.6	-8.4	-6.4
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.5	4.0	4.0	7.3	6.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	2.1	0.6	0.6	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	4.8	2.6	2.9	<0.1	0.2
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	9.0	8.9	10.0	9.0	7.0
ANC as CaCO3	----	0.1	% CaCO3	0.9	0.9	1.0	0.9	0.7
Fizz Rating	----	0	Fizz Unit	0	0	1	1	0
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.9	7.0	6.8	6.4	6.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.211	0.164	0.179	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	132	102	112	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.42	0.65	0.37	----	0.31
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	84	130	75	----	62
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.13	0.21	0.12	----	0.10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.12	0.02	0.10	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	76	16	62	<10	<10
Liming Rate	----	1	kg CaCO3/t	6	1	5	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.21	0.16	0.18	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	132	102	112	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	10	8	8	<1	<1
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.29	0.19	0.21	0.02	0.02

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH009_2.9m	NEL-EF-BH015_6.5m	NEL-EF-BH017_2m	NEL-EF-BH018_1.90m	NEL-EF-BH018_10m
Client sampling date / time				04-Jul-2018 00:00	29-Jun-2018 00:00	15-Jun-2018 00:00	25-Jun-2018 00:00	17-Jul-2018 00:00	
Compound	CAS Number	LOR	Unit	EM1813212-001	EM1813212-002	EM1813212-003	EM1813212-006	EM1813212-007	
				Result	Result	Result	Result	Result	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	----	----	----	-7.7	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	----	----	----	----	7.1	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	----	----	----	<0.1	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	----	----	----	8.6	
ANC as CaCO3	----	0.1	% CaCO3	----	----	----	----	0.9	
Fizz Rating	----	0	Fizz Unit	----	----	----	----	0	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	----	----	5.9	6.7	----	
pH OX (23B)	----	0.1	pH Unit	----	----	6.3	7.7	----	
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	2	<2	----	
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	7	<2	----	
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	4	<2	----	
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	<0.020	<0.020	----	
Peroxide Sulfur (23De)	----	0.020	% S	----	----	<0.020	<0.020	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	<0.020	<0.020	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	<10	<10	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	0.037	<0.020	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	0.039	0.021	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	<0.020	0.021	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	<10	11	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	<0.020	<0.020	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH009_2.9m	NEL-EF-BH015_6.5m	NEL-EF-BH017_2m	NEL-EF-BH018_1.90m	NEL-EF-BH018_10m
Client sampling date / time					04-Jul-2018 00:00	29-Jun-2018 00:00	15-Jun-2018 00:00	25-Jun-2018 00:00	17-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1813212-001	EM1813212-002	EM1813212-003	EM1813212-006	EM1813212-007
				Result	Result	Result	Result	Result	Result
EA029-E: Magnesium Values - Continued									
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	0.128	0.055	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	0.132	0.072	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	<0.020	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	<10	14	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	<0.020	0.023	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	----	0.145	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	----	29	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	----	0.046	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	<0.02	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	<10	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	<1	<1	----
EA031: pH (saturated paste)									
ø pH (Saturated Paste)	----	0.1	pH Unit	8.0	7.1	6.9	7.3	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	7.5	6.4	----	6.7	6.4	----
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	<2	<2	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	<0.02	<0.02	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	----	<0.005	<0.005	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	----	<10	<10	----
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.00	----	----	0.36	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	399	----	----	72	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH009_2.9m	NEL-EF-BH015_6.5m	NEL-EF-BH017_2m	NEL-EF-BH018_1.90m	NEL-EF-BH018_10m
Client sampling date / time					04-Jul-2018 00:00	29-Jun-2018 00:00	15-Jun-2018 00:00	25-Jun-2018 00:00	17-Jul-2018 00:00
Compound	CAS Number	LOR	Unit		EM1813212-001	EM1813212-002	EM1813212-003	EM1813212-006	EM1813212-007
				Result	Result	Result	Result	Result	Result
EA033-C: Acid Neutralising Capacity - Continued									
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		0.64	----	----	0.11	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	----	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	----	<10	<10
Liming Rate	----	1	kg CaCO3/t		<1	<1	----	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	<0.02	----	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	<10	----	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	<1	----	<1	<1
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		9.0	16.5	16.5	8.7	----
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm		950	790	1490	800	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		130	60	20	20	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		----	----	----	----	0.03
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		80	410	40	490	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		<10	<10	<10	<10	----
Magnesium	7439-95-4	10	mg/kg		<10	<10	<10	<10	----
Sodium	7440-23-5	10	mg/kg		190	350	110	130	----
Potassium	7440-09-7	10	mg/kg		<10	<10	<10	<10	----

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH019_5m	NEL-BH101_1.90m	NEL-BH101_7.50m	NEL-EF-BH014_1.5m	----
Client sampling date / time				04-Jul-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00	[29-Jun-2018]	----	
Compound	CAS Number	LOR	Unit	EM1813212-009	EM1813212-012	EM1813212-013	EM1813212-014	-----	
				Result	Result	Result	Result	----	
EA009: Nett Acid Production Potential									
Net Acid Production Potential	----	0.5	kg H2SO4/t	----	-7.5	-5.8	----	----	
EA011: Net Acid Generation									
pH (OX)	----	0.1	pH Unit	----	7.4	7.2	----	----	
NAG (pH 4.5)	----	0.1	kg H2SO4/t	----	<0.1	<0.1	----	----	
NAG (pH 7.0)	----	0.1	kg H2SO4/t	----	<0.1	<0.1	----	----	
EA013: Acid Neutralising Capacity									
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	----	8.1	6.4	----	----	
ANC as CaCO3	----	0.1	% CaCO3	----	0.8	0.6	----	----	
Fizz Rating	----	0	Fizz Unit	----	0	0	----	----	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	----	----	6.7	5.8	----	
pH OX (23B)	----	0.1	pH Unit	----	----	7.2	6.4	----	
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	<2	2	----	
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	<2	4	----	
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	<2	2	----	
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	<0.020	<0.020	----	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	<0.020	<0.020	----	
Peroxide Sulfur (23De)	----	0.020	% S	----	----	<0.020	<0.020	----	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	<0.020	<0.020	----	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	<10	<10	----	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	0.020	<0.020	----	
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	0.025	<0.020	----	
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	<0.020	<0.020	----	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	<10	<10	----	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	<0.020	<0.020	----	
EA029-E: Magnesium Values									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH019_5m	NEL-BH101_1.90m	NEL-BH101_7.50m	NEL-EF-BH014_1.5m	----
Client sampling date / time					04-Jul-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00	[29-Jun-2018]	----
Compound	CAS Number	LOR	Unit		EM1813212-009	EM1813212-012	EM1813212-013	EM1813212-014	-----
				Result	Result	Result	Result	Result	----
EA029-E: Magnesium Values - Continued									
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	0.067	0.045	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	0.081	0.051	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	<0.020	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	11	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	<0.020	<0.020	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	0.096	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	19	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	0.031	----	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	<1	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	<0.02	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	<10	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	<1	<1	----
EA031: pH (saturated paste)									
ø pH (Saturated Paste)	----	0.1	pH Unit	----	7.3	7.4	7.4	6.8	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	6.4	6.6	6.7	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	<0.005	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	----	----
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.40	0.30	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	79	59	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	NEL-EF-BH019_5m	NEL-BH101_1.90m	NEL-BH101_7.50m	NEL-EF-BH014_1.5m	----
Client sampling date / time					04-Jul-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00	[29-Jun-2018]	----
Compound	CAS Number	LOR	Unit		EM1813212-009	EM1813212-012	EM1813212-013	EM1813212-014	-----
				Result	Result	Result	Result	Result	----
EA033-C: Acid Neutralising Capacity - Continued									
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		----	0.13	0.09	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t		<1	<1	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	<10	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	<1	<1	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		----	18.2	19.2	5.3	----
EA084: Saturated Resistivity									
Resistivity at 25°C	----	10	ohm cm		----	520	730	1160	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		----	190	160	40	----
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		----	0.02	0.02	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		----	730	720	170	----
ED093S: Soluble Major Cations									
Calcium	7440-70-2	10	mg/kg		----	<10	<10	<10	----
Magnesium	7439-95-4	10	mg/kg		----	<10	<10	<10	----
Sodium	7440-23-5	10	mg/kg		----	600	600	170	----
Potassium	7440-09-7	10	mg/kg		----	<10	10	<10	----

ANZ

FQM - Generic Chain of Custody Form

Q4AN(EV)-007-FM1

CONSULTANT: GHD Pty Ltd		ADDRESS / OFFICE:		SAMPLER: GHD		Destination Laboratory	
PROJECT MANAGER (PM): David Quinn		SITE: Melbourne		MOBILE: S.Hilliard 0430 344 657		ALS Springvale	
PROJECT NUMBER & TASK CODE: 31350061101		P.O. NO.:		EMAIL REPORT TO: kory.auch@ghd.com marcin.wieloch@ghd.com		ATT: Shirley LeCornu	
RESULTS REQUIRED (Date): Regular TAT		QUOTE NO.:		ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)			

FOR LABORATORY USE ONLY		COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:		NAPP (ASS-1) NAG (EA011) Chromium Suite (EA033) SPOCAS Suite (EA029) NEL-Suite 1 NEL-Suite 2 NEL-Suite 3 NEL-Suite 4 NEL-Suite 5		Extra volume for QC or trace LORs etc. NEL-Suite 1 inc. testing of concentration of: Ca2+, Na+, Mg2+, K+, SO42-, Cl- NEL-Suite 2 inc. testing of soil resistivity (to AS 1289.4.4.1) and pH (to AS 1289.4.3.1). NEL-Suite 3 inc. acid sulphate soil testing to include pH/KCl, TAA and pH/Ox as per AS 4969.12 and net acidity as per AS 4969.14. Where sample at designated depth is rock not soil, undertake NAG and NAP testing instead. NEL-Suite 4 inc. NAPP (ASS-1) and NAG (EA011) testing. NEL-Suite 5 inc. testing of total organic carbon (TOC) content and sulphate reducing bacteria (SRB). TOC testing to be carried out to (AS 1289.4.1.1).	
COOLER SEAL (GHD PROPERTY)		- Note: Please send to GHD Lab Reports					
Initial: Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>							
SAMPLER TEMPERATURE							
CHILLED: Yes <input type="checkbox"/> No <input type="checkbox"/>							

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION	
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total Bags
1	NEL-EF-BH009_2.9m	S	4/7/18		ASS	1
2	NEL-EF-BH015_6.5m	S	29/6/18		ASS	1
3	NEL-EF-BH017_2m	S	15/6/18		ASS	1
4	NEL-EF-BH017_10m	S	14/8/18		ASS	1
5	NEL-EF-BH017_20m	S	14/8/18		ASS	1
6	NEL-EF-BH018_1.90m	S	25/6/18		ASS	1
7	NEL-EF-BH018_10m	S	17/7/18		ASS	1
8	NEL-EF-BH018_20m	S	17/7/18		ASS	1
9	NEL-EF-BH019_5m	S	4/7/18		ASS	1
10	NEL-EF-BH019_10m	S	13/7/18		ASS	1
11	NEL-EF-BH019_20m	S	13/7/18		ASS	1
12	NEL-BH101_1.90m	S	29/6/18		ASS	1
13	NEL-BH101_7.50m	S	29/6/18		ASS	1
14	NEL-EF-BH014_1.5m	S	- ?		ASS	1
dates as per bags NP (ALS) 20/8.						

RELINQUISHED BY:		RECEIVED BY:		RECEIVED BY:		METHOD OF SHIPMENT	
Name:	Date:	Name:	Date:	Name: <i>Korn</i>	Date: <i>17/8</i>	Con' Note No:	
Of:	Time:	Of:	Time:	Of: <i>An</i>	Time: <i>16:40</i>	Transport Co:	

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

Soil Container Codes: Jar = Unpreserved glass jar

Environmental Division
Melbourne
Work Order Reference
EM1813212



Telephone : + 61-3-8549 9800

Not frozen at time of sampling

COC Page of

QUALITY CONTROL REPORT

Work Order	: EM1813212	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR DAVID QUINN	Contact	: Shirley LeCornu
Address	: LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9630
Project	: 31350061101	Date Samples Received	: 17-Aug-2018
Order number	:	Date Analysis Commenced	: 21-Aug-2018
C-O-C number	: ----	Issue Date	: 27-Aug-2018
Sampler	: SCOTT HILLIARD		
Site	: Melbourne		
Quote number	: ME/124/18 - North East Link		
No. of samples received	: 14		
No. of samples analysed	: 14		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 1889883)									
EM1813212-004	NEL-EF-BH017_10m	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	2.1	2.2	0.00	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	4.8	4.9	3.28	0% - 20%
		EA011: pH (OX)	----	0.1	pH Unit	3.5	3.4	2.90	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 1889881)									
EB1820255-002	Anonymous	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	4.6	3.8	17.2	No Limit
EA029-A: pH Measurements (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	6.6	6.2	6.25	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.2	7.1	1.40	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.00	No Limit

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 Work Order : EM1813212
 Client : GHD PTY LTD
 Project : 31350061101



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-D: Calcium Values (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.115	0.114	0.00	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.138	0.137	0.00	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.022	0.023	0.00	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	11	11	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.099	0.101	1.60	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.109	0.105	3.55	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.102	0.110	6.76	No Limit
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.033	0.035	6.76	No Limit
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	20	22	6.76	No Limit
EA029-H: Acid Base Accounting (QC Lot: 1889882)									
EB1820258-001	Anonymous	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	<0.02	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	0.00	No Limit
		EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
		EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA031: pH (saturated paste) (QC Lot: 1887525)									
EM1813212-014	NEL-EF-BH014_1.5m	EA031: pH (Saturated Paste)	----	0.1	pH Unit	6.8	6.8	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1889880)									
EB1819629-055	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.7	9.7	0.00	0% - 20%
EB1820175-010	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.07	0.08	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	46	47	2.29	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.3	4.3	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1889884)									
EM1813212-005	NEL-EF-BH017_20m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit

Page : 4 of 7
 Work Order : EM1813212
 Client : GHD PTY LTD
 Project : 31350061101



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-A: Actual Acidity (QC Lot: 1889884) - continued									
EM1813212-005	NEL-EF-BH017_20m	EA033: pH KCl (23A)	----	0.1	pH Unit	7.0	7.3	4.20	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1889880)									
EB1819629-055	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.131	0.126	4.08	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	82	79	4.08	No Limit
EB1820175-010	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.00	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA033-B: Potential Acidity (QC Lot: 1889884)									
EM1813212-005	NEL-EF-BH017_20m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.164	0.158	3.51	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	102	99	3.51	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1889880)									
EB1819629-055	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.33	5.41	1.55	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.71	1.73	1.55	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1060	1080	1.55	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1889884)									
EM1813212-005	NEL-EF-BH017_20m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.65	0.75	14.8	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.21	0.24	14.8	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	130	151	14.8	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1887111)									
EM1813212-003	NEL-EF-BH017_2m	EA055: Moisture Content	----	0.1	%	16.5	16.5	0.00	0% - 50%
ED040S: Soluble Major Anions (QC Lot: 1887106)									
EM1813212-001	NEL-EF-BH009_2.9m	ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	130	160	20.4	0% - 50%
ED042T: Total Sulfur by LECO (QC Lot: 1889917)									
EM1813212-004	NEL-EF-BH017_10m	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.29	0.28	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1887107)									
EM1813212-001	NEL-EF-BH009_2.9m	ED045G: Chloride	16887-00-6	10	mg/kg	80	90	16.9	No Limit
ED093S: Soluble Major Cations (QC Lot: 1887108)									
EM1813212-001	NEL-EF-BH009_2.9m	ED093S: Calcium	7440-70-2	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Magnesium	7439-95-4	10	mg/kg	<10	<10	0.00	No Limit
		ED093S: Sodium	7440-23-5	10	mg/kg	190	210	13.5	0% - 20%
		ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA011: Net Acid Generation (QCLot: 1889883)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	22.5 kg H2SO4/t	98.8	70	130
EA013: Acid Neutralising Capacity (QCLot: 1889881)								
EA013: ANC as H2SO4	----	----	kg H2SO4 equiv./t	----	9.9 kg H2SO4 equiv./t	97.5	82	120
EA029-A: pH Measurements (QCLot: 1889882)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.6 pH Unit	106	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	4.3 pH Unit	109	70	130
EA029-B: Acidity Trail (QCLot: 1889882)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	83.6	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	35.2 mole H+ / t	85.4	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1889882)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	89.6	70	130
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	87.9	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1889882)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	114	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	100	70	130
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1889882)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	78.0	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	82.1	70	130
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1889882)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.020	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1889882) - continued								
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.020	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 1889882)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EA029: Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	----	----	----	----
EA031: pH (saturated paste) (QCLot: 1887525)								
EA031: pH (Saturated Paste)	----	----	pH Unit	----	4 pH Unit	100	99	101
				----	7 pH Unit	100	99	101
EA033-A: Actual Acidity (QCLot: 1889880)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	104	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	81.7	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1889884)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.6 pH Unit	104	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	17.7 mole H+ / t	85.1	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1889880)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	95.9	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1889884)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.25483 % S	93.7	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1889880)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	106	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1889884)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	106	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
ED040S: Soluble Major Anions (QCLot: 1887106)								
ED040S: Sulfate as SO4 2-	14808-79-8	10	mg/kg	<10	500 mg/kg	101	90	114



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike	Spike Recovery (%)	Recovery Limits (%)	
					Concentration	LCS	Low	High
ED042T: Total Sulfur by LECO (QCLot: 1889917)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	107	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1887107)								
ED045G: Chloride	16887-00-6	10	mg/kg	<10	50 mg/kg	91.7	83	119
				<10	5000 mg/kg	98.6	83	119
ED093S: Soluble Major Cations (QCLot: 1887108)								
ED093S: Calcium	7440-70-2	10	mg/kg	<10	500 mg/kg	99.1	80	120
ED093S: Magnesium	7439-95-4	10	mg/kg	<10	500 mg/kg	102	80	120
ED093S: Sodium	7440-23-5	10	mg/kg	<10	500 mg/kg	99.5	80	120
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	99.7	80	120

Matrix Spike (MS) Report

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

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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1813212	Page	: 1 of 11
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: MR DAVID QUINN	Telephone	: +61-3-8549 9630
Project	: 31350061101	Date Samples Received	: 17-Aug-2018
Site	: Melbourne	Issue Date	: 27-Aug-2018
Sampler	: SCOTT HILLIARD	No. of samples received	: 14
Order number	:	No. of samples analysed	: 14

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Snap Lock Bag - frozen NEL-EF-BH009_2.9m	----	----	----	21-Aug-2018	18-Jul-2018	34
Snap Lock Bag - frozen NEL-EF-BH017_2m	----	----	----	21-Aug-2018	29-Jun-2018	53
Snap Lock Bag - frozen NEL-EF-BH018_1.90m	----	----	----	21-Aug-2018	09-Jul-2018	43
Snap Lock Bag - frozen NEL-EF-BH015_6.5m, NEL-BH101_7.50m, NEL-BH101_1.90m, NEL-EF-BH014_1.5m	----	----	----	21-Aug-2018	13-Jul-2018	39
ED040S : Soluble Sulfate by ICPAES						
Snap Lock Bag - frozen NEL-EF-BH009_2.9m	22-Aug-2018	01-Aug-2018	21	----	----	----
Snap Lock Bag - frozen NEL-EF-BH017_2m	22-Aug-2018	13-Jul-2018	40	----	----	----
Snap Lock Bag - frozen NEL-EF-BH018_1.90m	22-Aug-2018	23-Jul-2018	30	----	----	----
Snap Lock Bag - frozen NEL-EF-BH015_6.5m, NEL-BH101_7.50m, NEL-BH101_1.90m, NEL-EF-BH014_1.5m	22-Aug-2018	27-Jul-2018	26	----	----	----
ED042T: Total Sulfur by LECO						
Pulp Bag NEL-EF-BH019_10m, NEL-EF-BH019_20m	22-Aug-2018	10-Aug-2018	12	22-Aug-2018	10-Aug-2018	12
Pulp Bag NEL-EF-BH018_10m, NEL-EF-BH018_20m	22-Aug-2018	14-Aug-2018	8	22-Aug-2018	14-Aug-2018	8
Pulp Bag NEL-BH101_1.90m, NEL-BH101_7.50m	22-Aug-2018	27-Jul-2018	26	22-Aug-2018	27-Jul-2018	26
ED045G: Chloride by Discrete Analyser						
Snap Lock Bag - frozen NEL-EF-BH009_2.9m	22-Aug-2018	01-Aug-2018	21	----	----	----
Snap Lock Bag - frozen NEL-EF-BH017_2m	22-Aug-2018	13-Jul-2018	40	----	----	----
Snap Lock Bag - frozen NEL-EF-BH018_1.90m	22-Aug-2018	23-Jul-2018	30	----	----	----
Snap Lock Bag - frozen NEL-EF-BH015_6.5m, NEL-BH101_7.50m, NEL-BH101_1.90m, NEL-EF-BH014_1.5m	22-Aug-2018	27-Jul-2018	26	----	----	----



Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA011: Net Acid Generation								
Snap Lock Bag - frozen (EA011) NEL-EF-BH019_10m, NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA011) NEL-EF-BH017_10m, NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA011) NEL-EF-BH018_10m, NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA011) NEL-BH101_1.90m, NEL-BH101_7.50m	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	19-Feb-2019	✓	
EA013: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA013) NEL-EF-BH019_10m, NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA013) NEL-EF-BH017_10m, NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA013) NEL-EF-BH018_10m, NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	19-Feb-2019	✓	
Snap Lock Bag - frozen (EA013) NEL-BH101_1.90m, NEL-BH101_7.50m	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	19-Feb-2019	✓	
EA029-A: pH Measurements								
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	
EA029-B: Acidity Trail								
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓	



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-C: Sulfur Trail							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
EA029-D: Calcium Values							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
EA029-E: Magnesium Values							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
EA029-F: Excess Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
EA029-G: Retained Acidity							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
EA029-H: Acid Base Accounting							
Snap Lock Bag - frozen (EA029) NEL-EF-BH017_2m	15-Jun-2018	23-Aug-2018	10-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-EF-BH018_1.90m	25-Jun-2018	23-Aug-2018	20-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA029) NEL-BH101_7.50m, NEL-EF-BH014_1.5m	29-Jun-2018	23-Aug-2018	24-Mar-2021	✓	23-Aug-2018	21-Nov-2018	✓



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA031: pH (saturated paste)								
Snap Lock Bag - frozen (EA031) NEL-EF-BH009_2.9m		04-Jul-2018	----	----	----	21-Aug-2018	31-Dec-2018	✓
Snap Lock Bag - frozen (EA031) NEL-EF-BH017_2m		15-Jun-2018	----	----	----	21-Aug-2018	12-Dec-2018	✓
Snap Lock Bag - frozen (EA031) NEL-EF-BH018_1.90m		25-Jun-2018	----	----	----	21-Aug-2018	22-Dec-2018	✓
Snap Lock Bag - frozen (EA031) NEL-EF-BH015_6.5m, NEL-BH101_7.50m,	NEL-BH101_1.90m, NEL-EF-BH014_1.5m	29-Jun-2018	----	----	----	21-Aug-2018	26-Dec-2018	✓
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033) NEL-EF-BH009_2.9m,	NEL-EF-BH019_5m	04-Jul-2018	23-Aug-2018	04-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_1.90m		25-Jun-2018	23-Aug-2018	25-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH015_6.5m, NEL-BH101_7.50m	NEL-BH101_1.90m,	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033) NEL-EF-BH009_2.9m,	NEL-EF-BH019_5m	04-Jul-2018	23-Aug-2018	04-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_1.90m		25-Jun-2018	23-Aug-2018	25-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH015_6.5m, NEL-BH101_7.50m	NEL-BH101_1.90m,	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033) NEL-EF-BH009_2.9m,	NEL-EF-BH019_5m	04-Jul-2018	23-Aug-2018	04-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_1.90m		25-Jun-2018	23-Aug-2018	25-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH015_6.5m, NEL-BH101_7.50m	NEL-BH101_1.90m,	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033) NEL-EF-BH009_2.9m,	NEL-EF-BH019_5m	04-Jul-2018	23-Aug-2018	04-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_1.90m		25-Jun-2018	23-Aug-2018	25-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH015_6.5m, NEL-BH101_7.50m	NEL-BH101_1.90m,	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033) NEL-EF-BH009_2.9m,	NEL-EF-BH019_5m	04-Jul-2018	23-Aug-2018	04-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	23-Aug-2018	13-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	23-Aug-2018	14-Aug-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	23-Aug-2018	17-Jul-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH018_1.90m		25-Jun-2018	23-Aug-2018	25-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓
Snap Lock Bag - frozen (EA033) NEL-EF-BH015_6.5m, NEL-BH101_7.50m	NEL-BH101_1.90m,	29-Jun-2018	23-Aug-2018	29-Jun-2019	✓	23-Aug-2018	21-Nov-2018	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Snap Lock Bag - frozen (EA055) NEL-EF-BH009_2.9m		04-Jul-2018	----	----	----	21-Aug-2018	18-Jul-2018	✘
Snap Lock Bag - frozen (EA055) NEL-EF-BH017_2m		15-Jun-2018	----	----	----	21-Aug-2018	29-Jun-2018	✘
Snap Lock Bag - frozen (EA055) NEL-EF-BH018_1.90m		25-Jun-2018	----	----	----	21-Aug-2018	09-Jul-2018	✘
Snap Lock Bag - frozen (EA055) NEL-EF-BH015_6.5m, NEL-BH101_7.50m,	NEL-BH101_1.90m, NEL-EF-BH014_1.5m	29-Jun-2018	----	----	----	21-Aug-2018	13-Jul-2018	✘
ED040S : Soluble Sulfate by ICPAES								
Snap Lock Bag - frozen (ED040S) NEL-EF-BH009_2.9m		04-Jul-2018	22-Aug-2018	01-Aug-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED040S) NEL-EF-BH017_2m		15-Jun-2018	22-Aug-2018	13-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED040S) NEL-EF-BH018_1.90m		25-Jun-2018	22-Aug-2018	23-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED040S) NEL-EF-BH015_6.5m, NEL-BH101_7.50m,	NEL-BH101_1.90m, NEL-EF-BH014_1.5m	29-Jun-2018	22-Aug-2018	27-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔
ED042T: Total Sulfur by LECO								
Pulp Bag (ED042T) NEL-EF-BH019_10m,	NEL-EF-BH019_20m	13-Jul-2018	22-Aug-2018	10-Aug-2018	✘	22-Aug-2018	10-Aug-2018	✘
Pulp Bag (ED042T) NEL-EF-BH017_10m,	NEL-EF-BH017_20m	14-Aug-2018	22-Aug-2018	11-Sep-2018	✔	22-Aug-2018	11-Sep-2018	✔
Pulp Bag (ED042T) NEL-EF-BH018_10m,	NEL-EF-BH018_20m	17-Jul-2018	22-Aug-2018	14-Aug-2018	✘	22-Aug-2018	14-Aug-2018	✘
Pulp Bag (ED042T) NEL-BH101_1.90m,	NEL-BH101_7.50m	29-Jun-2018	22-Aug-2018	27-Jul-2018	✘	22-Aug-2018	27-Jul-2018	✘
ED045G: Chloride by Discrete Analyser								
Snap Lock Bag - frozen (ED045G) NEL-EF-BH009_2.9m		04-Jul-2018	22-Aug-2018	01-Aug-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED045G) NEL-EF-BH017_2m		15-Jun-2018	22-Aug-2018	13-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED045G) NEL-EF-BH018_1.90m		25-Jun-2018	22-Aug-2018	23-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔
Snap Lock Bag - frozen (ED045G) NEL-EF-BH015_6.5m, NEL-BH101_7.50m,	NEL-BH101_1.90m, NEL-EF-BH014_1.5m	29-Jun-2018	22-Aug-2018	27-Jul-2018	✘	22-Aug-2018	19-Sep-2018	✔

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 Client : GHD PTY LTD
 Project : 31350061101



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093S: Soluble Major Cations								
Snap Lock Bag - frozen (ED093S) NEL-EF-BH009_2.9m		04-Jul-2018	22-Aug-2018	31-Dec-2018	✓	22-Aug-2018	31-Dec-2018	✓
Snap Lock Bag - frozen (ED093S) NEL-EF-BH017_2m		15-Jun-2018	22-Aug-2018	12-Dec-2018	✓	22-Aug-2018	12-Dec-2018	✓
Snap Lock Bag - frozen (ED093S) NEL-EF-BH018_1.90m		25-Jun-2018	22-Aug-2018	22-Dec-2018	✓	22-Aug-2018	22-Dec-2018	✓
Snap Lock Bag - frozen (ED093S) NEL-EF-BH015_6.5m, NEL-BH101_7.50m, NEL-BH101_1.90m, NEL-EF-BH014_1.5m		29-Jun-2018	22-Aug-2018	26-Dec-2018	✓	22-Aug-2018	26-Dec-2018	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Cations - soluble by ICP-AES	ED093S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (Saturated Paste)	EA031	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride Soluble By Discrete Analyser	ED045G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP- Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Acid Neutralising Capacity (ANC)	EA013	SOIL	In house: Referenced to USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquantitatively estimate the likely reactivity. The soil is then reacted with an known excess quantity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
pH (Saturated Paste)	* EA031	SOIL	In house: Referenced to USEPA 600/2 - 78 - 054 - pH determined on a saturated paste by ISE.
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Resistivity (Saturated Paste)	EA084	SOIL	In house: Calculated from Saturated Paste Electrical Conductivity
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Sulfur - Total as S (LECO)	ED042T	SOIL	In house: Dried and pulverised sample is combusted in a high temperature furnace in the presence of strong oxidants / catalysts. The evolved S (as SO ₂) is measured by infra-red detector
Chloride Soluble By Discrete Analyser	ED045G	SOIL	In house: Referenced to APHA 4500-Cl- E. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm. Analysis is performed on a 1:5 soil / water leachate.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

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Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM1813212

<p>Client : GHD PTY LTD</p> <p>Contact : MR DAVID QUINN</p> <p>Address : LEVEL 8, 180 LONSDALE ST MELBOURNE VIC, AUSTRALIA 3001</p> <p>E-mail : david.quinn@ghd.com</p> <p>Telephone : ----</p> <p>Facsimile : ----</p> <p>Project : 31350061101</p> <p>Order number :</p> <p>C-O-C number : ----</p> <p>Site : Melbourne</p> <p>Sampler : SCOTT HILLIARD</p>	<p>Laboratory : Environmental Division Melbourne</p> <p>Contact : Shirley LeCornu</p> <p>Address : 4 Westall Rd Springvale VIC Australia 3171</p> <p>E-mail : shirley.lecornu@Alsglobal.com</p> <p>Telephone : +61-3-8549 9630</p> <p>Facsimile : +61-3-8549 9626</p> <p>Page : 1 of 4</p> <p>Quote number : EM2018GHDSE0003 (ME/124/18 - North East Link)</p> <p>QC Level : NEPM 2013 B3 & ALS QC Standard</p>
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Dates

<p>Date Samples Received : 17-Aug-2018 16:45</p> <p>Client Requested Due : 27-Aug-2018</p> <p>Date :</p>	<p>Issue Date : 20-Aug-2018</p> <p>Scheduled Reporting Date : 27-Aug-2018</p>
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Delivery Details

<p>Mode of Delivery : Carrier</p> <p>No. of coolers/boxes : 1</p> <p>Receipt Detail :</p>	<p>Security Seal : Intact.</p> <p>Temperature : 4.5°C - Ice present</p> <p>No. of samples received / analysed : 14 / 14</p>
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General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
pH (Saturated Paste) : EA031		
NEL-EF-BH009_2.9m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-EF-BH015_6.5m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-EF-BH017_2m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-EF-BH018_1.90m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH101_1.90m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-BH101_7.50m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved
NEL-EF-BH014_1.5m	- Snap Lock Bag - frozen	- Soil Glass Jar - Unpreserved

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA029 SPOCAS	SOIL - EA031 pH (Saturated Paste)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - EA084 Saturated Resistivity	SOIL - NT-1S Major Cations (Ca, Mg, Na, K)	SOIL - NT-2S Major Anions (Cl, SO4)
EM1813212-001	04-Jul-2018 00:00	NEL-EF-BH009_2.9m		✓	✓	✓	✓	✓	✓
EM1813212-002	29-Jun-2018 00:00	NEL-EF-BH015_6.5m		✓	✓	✓	✓	✓	✓
EM1813212-003	15-Jun-2018 00:00	NEL-EF-BH017_2m	✓	✓		✓	✓	✓	✓
EM1813212-004	14-Aug-2018 00:00	NEL-EF-BH017_10m			✓				
EM1813212-005	14-Aug-2018 00:00	NEL-EF-BH017_20m			✓				
EM1813212-006	25-Jun-2018 00:00	NEL-EF-BH018_1.90m	✓	✓	✓	✓	✓	✓	✓
EM1813212-007	17-Jul-2018 00:00	NEL-EF-BH018_10m			✓				
EM1813212-008	17-Jul-2018 00:00	NEL-EF-BH018_20m			✓				
EM1813212-009	04-Jul-2018 00:00	NEL-EF-BH019_5m			✓				
EM1813212-010	13-Jul-2018 00:00	NEL-EF-BH019_10m			✓				
EM1813212-011	13-Jul-2018 00:00	NEL-EF-BH019_20m			✓				
EM1813212-012	29-Jun-2018 00:00	NEL-BH101_1.90m		✓	✓	✓	✓	✓	✓
EM1813212-013	29-Jun-2018 00:00	NEL-BH101_7.50m	✓	✓	✓	✓	✓	✓	✓
EM1813212-014	[29-Jun-2018]	NEL-EF-BH014_1.5m	✓	✓		✓	✓	✓	✓



Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ASS1 NAPP	SOIL - EA011 Net Acid Generation (NAG)
EM1813212-004	14-Aug-2018 00:00	NEL-EF-BH017_10m	✓	✓
EM1813212-005	14-Aug-2018 00:00	NEL-EF-BH017_20m	✓	✓
EM1813212-007	17-Jul-2018 00:00	NEL-EF-BH018_10m	✓	✓
EM1813212-008	17-Jul-2018 00:00	NEL-EF-BH018_20m	✓	✓
EM1813212-010	13-Jul-2018 00:00	NEL-EF-BH019_10m	✓	✓
EM1813212-011	13-Jul-2018 00:00	NEL-EF-BH019_20m	✓	✓
EM1813212-012	29-Jun-2018 00:00	NEL-BH101_1.90m	✓	✓
EM1813212-013	29-Jun-2018 00:00	NEL-BH101_7.50m	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

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

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA055: Moisture Content								
NEL-BH101_1.90m	Snap Lock Bag - frozen		----	13-Jul-2018	17-Aug-2018	✗	----	----
NEL-BH101_7.50m	Snap Lock Bag - frozen		----	13-Jul-2018	17-Aug-2018	✗	----	----
NEL-EF-BH009_2.9m	Snap Lock Bag - frozen		----	18-Jul-2018	17-Aug-2018	✗	----	----
NEL-EF-BH014_1.5m	Snap Lock Bag - frozen		----	13-Jul-2018	17-Aug-2018	✗	----	----
NEL-EF-BH015_6.5m	Snap Lock Bag - frozen		----	13-Jul-2018	17-Aug-2018	✗	----	----
NEL-EF-BH017_2m	Snap Lock Bag - frozen		----	29-Jun-2018	17-Aug-2018	✗	----	----
NEL-EF-BH018_1.90m	Snap Lock Bag - frozen		----	09-Jul-2018	17-Aug-2018	✗	----	----
ED040S: Major Anions - Soluble								
NEL-BH101_1.90m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-BH101_7.50m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH009_2.9m	Snap Lock Bag - frozen		01-Aug-2018	29-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH014_1.5m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH015_6.5m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH017_2m	Snap Lock Bag - frozen		13-Jul-2018	10-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH018_1.90m	Snap Lock Bag - frozen		23-Jul-2018	20-Aug-2018	17-Aug-2018	✗	----	----
ED042T: Sulfur - Total as S (LECO)								
NEL-BH101_1.90m	Pulp Bag		27-Jul-2018	27-Jul-2018	17-Aug-2018	✗	----	----
NEL-BH101_7.50m	Pulp Bag		27-Jul-2018	27-Jul-2018	17-Aug-2018	✗	----	----
NEL-EF-BH018_10m	Pulp Bag		14-Aug-2018	14-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH018_20m	Pulp Bag		14-Aug-2018	14-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH019_10m	Pulp Bag		10-Aug-2018	10-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH019_20m	Pulp Bag		10-Aug-2018	10-Aug-2018	17-Aug-2018	✗	----	----
ED045G: Chloride Soluble By Discrete Analyser								
NEL-BH101_1.90m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-BH101_7.50m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH009_2.9m	Snap Lock Bag - frozen		01-Aug-2018	29-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH014_1.5m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH015_6.5m	Snap Lock Bag - frozen		27-Jul-2018	24-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH017_2m	Snap Lock Bag - frozen		13-Jul-2018	10-Aug-2018	17-Aug-2018	✗	----	----
NEL-EF-BH018_1.90m	Snap Lock Bag - frozen		23-Jul-2018	20-Aug-2018	17-Aug-2018	✗	----	----

