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QUARTERLY GROUNDWATER MONITORING

SCONE WASTE FACILITY AREA

Noblet Road
Scone
NSW 2337

Upper Hunter Shire Council

0450054

December 2018

PROJECT NAME	Scone Waste Facility Groundwater Monitoring
PROJECT ID	DLH1186/0450054
DOCUMENT CONTROL NUMBER	H001861
PREPARED FOR	Upper Hunter Shire Council
APPROVED FOR RELEASE BY	Michael Gaggin
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DOCUMENT CONTROL					
VERSION	**DATE**	**COMMENT**	**PREPARED BY**	**REVIEWED BY**	**APPROVED BY**
H001861	21.01.2019	Draft	Jon Mansfield	Michael Gaggin	Michael Gaggin

ERM Services Australia Pty Ltd: ABN 80 601 661 634

ADELAIDE
5 Peel Street
Adelaide, SA, 5000
Ph: +61 8 8332 0960
Fax: +61 7 3844 5858

BRISBANE
Level 4, 201 Leichardt Street
Brisbane, Qld 4000
Ph: +61 7 3004 6400

MELBOURNE
Level 10, 224 Queen Street
Melbourne, Vic 3000
Ph: +61 3 9036 2637
Fax: +61 2 9870 0999

PERTH
Level 18, 140 St Georges Terrace
Perth, WA 6000
Ph: +61 8 9481 4961

NEWCASTLE
Level 4, 45 Watt St
Newcastle NSW 2300
Ph: +61 2 4933 0001

MELBOURNE
Level 6, 99 King Street
Melbourne, Vic 3000
Ph: +61 3 9036 2637
Fax: +61 2 9870 0999

SYDNEY
Unit 11 Macquarie Link, 227 Lane Cove Rd
Macquarie Park, NSW 2113
Ph: +61 2 9476 1765
Fax: +61 2 9476 1557

309 Kent Street
North Sydney, NSW 2000
Ph: +61 2 9870 0900
Fax: +61 2 9870 0999

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ABBREVIATIONS

ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
DEC	Department of Environment and Conservation (NSW)
EC	Electrical Conductivity
EPA	Environment Protection Authority (NSW)
ERM	ERM Services Australia (formerly DLA Environmental Services)
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OCP	Organochlorine Pesticides
TOC	Total Organic Carbon

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1.0 INTRODUCTION

1.1 General

ERM Services Australia (ERM) was engaged by Upper Hunter Shire Council (the Client) to conduct annual and quarterly groundwater monitoring as required by the New South Wales (NSW) Environmental Protection Authority (EPA) Environmental Protection Licence (EPL) 5863 for the following site:

Scone Waste Facility Area
Noblet Road Scone NSW 2337 (the Site).

Refer to **Figure 1:** *Site Location Regional* and **Figure 2**: *Site Location Local*.

The Groundwater Monitoring Report provides an overview of the current condition of groundwater at the Site in relation to the Site Criteria and satisfies the groundwater monitoring requirements of EPL 5863.

The report has been prepared utilising information obtained as part of the investigation process, from previous monitoring reports and from experience, knowledge, and current industry practice in the monitoring of similar sites.

Quarterly groundwater monitoring was undertaken on Thursday 6th December 2018 by staff of ERM.

1.2 Scope of Works

The scope of work provided by Upper Hunter Shire Council indicates that annual and quarterly groundwater monitoring is required at the following groundwater sampling locations:

- MWA;
- MWB;
- MWC;
- MWD (landfill leachate monitoring well); and
- MWE.

Refer to **Figure 3:** *Site Layout with Sample Locations.*

2.0 MONITORING PARAMETERS

The following sample analysis parameters and monitoring frequency were provided by Upper Hunter Shire Council for the groundwater wells. Threshold Criteria are primarily sourced from *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000), *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* ('NEPM', NEPC 2013), and the *Australian Drinking Water Guidelines* (NHMRC / NRMMC, 2011).

Table 2a: Analytes, Threshold Criteria and Monitoring Frequency for Groundwater Monitoring Wells

Analytes	Units	Threshold Criteria NEPM 2013 / ANZECC 2000 Fresh Water 95%	Monitoring Frequency
Calcium	mg/L	NA	Quarterly
Alkalinity (total)	mg/L	NA	Quarterly
Chloride	mg/L	NA	Quarterly
Fluoride	mg/L	NA	Quarterly
Iron	mg/L	0.3[B]	Quarterly
Magnesium	mg/L	NA	Quarterly
Manganese	mg/L	1.9[A]	Quarterly
Organochlorine pesticides (OCP)	mg/L	0.00001[C]	Quarterly
Potassium	mg/L	410[D]	Quarterly
pH	pH	6.5 – 8	Quarterly
Sodium	mg/L	NA	Quarterly
Ammonia	mg/L	0.9[A]	Quarterly
Nitrate	mg/L	0.7	Quarterly
Sulfate	mg/L	NA	Quarterly
Total organic carbon (TOC)	mg/L	4	Quarterly
Total phenolics	mg/L	0.32	Quarterly
Electrical conductivity (EC)	µS/cm	NA	Quarterly

A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009

SAMPLING METHODOLOGY

3.1 Groundwater Sampling

Groundwater samples were collected from well locations MWA, MWB, MWC, MWD and MWE. Purging and sampling of monitoring wells was conducted in accordance with the NEPM (NEPC, 2013) and the *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007).

3.0

Wells were purged using a disposable bailer whilst being measured for physiochemical stability to indicate the flow of formation water. Physiochemical properties were measured at regular intervals following the purging of each equipment volume using an In-Situ Smartroll Water Quality Meter. Stable conditions were indicated by monitoring the following parameters for three consecutive readings of:

- pH ± 0.1 unit;
- Electrical Conductivity ± 5%;
- Temperature ± 0.20;
- Redox Potential ± 10%; and
- Dissolved Oxygen ± 10%.

Groundwater field data sheets are supplied as **Attachment 4.**

Samples were obtained using a dedicated disposable bailer which was changed between each monitoring well to minimise the potential for cross contamination. Sampling equipment was cleaned prior to sampling and between sample locations to prevent cross contamination. The cleaning procedure included:

- Washing and brush scrub with phosphate free laboratory grade detergent;
- Rinsing with water of a potable quality; and
- Rinsing with deionised water.

Groundwater samples were collected into laboratory prepared and supplied sample containers for specific analytes (i.e. into a combination of plastic unpreserved, plastic preserved, glass amber unpreserved and preserved glass vials). Samples were collected and filled into the respective sample containers so no head space remained in the sample container, with no loss of any preservation agents, where present. Groundwater samples collected for metals analysis were filtered through 0.45um filter. Samples were placed immediately into a chilled cooler to minimise the likelihood for the loss of potential volatile components. It is opinion of ERM that decontamination procedures were appropriate during groundwater sampling and no cross contamination can be inferred.

RESULTS

All wells were sampled during the December 2018 sampling event, results are summarised in **Table 4a – Table 4e** below.

4.0 Sampling Locations are displayed in **Figure 3. Refer to Attachment 1** for Laboratory Certificates and **Attachment 2** for a tabulated summary of the laboratory results.

Table 4a – Groundwater Results Comparison December 2018

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWA Jan 2018	MWA Apr 2018	MWA July 2018	MWA Dec 2018
Calcium	mg/L	NA	590	640	590	560
Alkalinity (total)	mg/L	NA	490	490	480	470
Chloride	mg/L	NA	7200	7100	7300	6600
Fluoride	mg/L	NA	0.13	0.13	0.14	0.14
Iron	mg/L	0.3[B]	ND	ND	0.170	ND
Magnesium	mg/L	NA	1200	1200	1100	1100
Manganese	mg/L	1.9[A]	0.010	0.02	0.010	0.01
OCP	mg/L	0.00001[C]	ND	ND	ND	ND
Potassium	mg/L	410[D]	4.9	4.4	4.4	4.4
pH	pH	6.5 – 8	7.0	6.9	6.7	6.7
Sodium	mg/L	NA	2000	2100	1900	2000
Ammonia	mg/L	0.9[A]	0.12	0.16	0.16	0.02
Nitrate	mg/L	0.7	ND	ND	ND	0.25
Sulfate	mg/L	NA	40	41	42	49
TOC	mg/L	4.0	**5.6**	3.6	2.3	2.6
Total phenolics	mg/L	0.32	ND	0.02	ND	ND
EC	µS/cm	NA	20000	21000	19000	20000

Samples highlighted in **Bold** exceed threshold criteria
ND = No Detection above Laboratory LOR
A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009
NA – Not Applicable

Table 4b – Groundwater Results Comparison December 2018

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWB Jan 2018	MWB Apr 2018	MWB July 2018	MWB Dec 2018
Calcium	mg/L	NA	600	650	590	550
Alkalinity (total)	mg/L	NA	420	390	400	380
Chloride	mg/L	NA	5400	5700	5600	5500
Fluoride	mg/L	NA	0.24	0.28	0.26	0.27
Iron	mg/L	0.3[B]	ND	ND	0.021	ND
Magnesium	mg/L	NA	810	810	720	670
Manganese	mg/L	1.9[A]	0.005	0.01	0.007	0.006
OCP	mg/L	0.00001[C]	ND	ND	ND	ND
Potassium	mg/L	410[D]	3.6	3.6	3.6	3.6
pH	pH	6.5 – 8	7.0	7.2	6.9	6.9
Sodium	mg/L	NA	1700	1700	1500	1600
Ammonia	mg/L	0.9[A]	0.09	0.09	0.08	0.05
Nitrate	mg/L	0.7	ND	0.46	ND	0.51
Sulfate	mg/L	NA	66	70	74	76
TOC	mg/L	4.0	**6.2**	**4.8**	3.5	**4.2**
Total phenolics	mg/L	0.32	ND	ND	ND	ND
EC	µS/cm	NA	16000	16000	15000	15000

Samples highlighted in **Bold** exceed threshold criteria
ND = No Detection above Laboratory LOR
A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009
NA – Not Applicable

Table 4c – Groundwater Results Comparison December 2018

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWC Jan 2018	MWC Apr 2018	MWC July 2018	MWC Dec 2018
Calcium	mg/L	NA	200	270	350	350
Alkalinity (total)	mg/L	NA	580	550	590	580
Chloride	mg/L	NA	2400	3200	4200	4200
Fluoride	mg/L	NA	0.26	0.31	0.23	0.22
Iron	mg/L	0.3[B]	ND	ND	0.019	ND
Magnesium	mg/L	NA	330	440	490	500
Manganese	mg/L	1.9[A]	**12**	**15**	**9.1**	**6.5**
OCP	mg/L	0.00001[C]	ND	ND	ND	ND
Potassium	mg/L	410[D]	1.8	1.8	2.6	2.4
pH	pH	6.5 – 8	6.9	6.9	6.7	6.7
Sodium	mg/L	NA	1100	1400	1400	1500
Ammonia	mg/L	0.9[A]	0.16	0.22	0.09	0.07
Nitrate	mg/L	0.7	**1.7**	**2.5**	**0.95**	**2.2**
Sulfate	mg/L	NA	110	130	140	160
TOC	mg/L	4.0	**12**	**9.0**	**6.5**	**8.8**
Total phenolics	mg/L	0.32	ND	ND	ND	ND
EC	µS/cm	NA	8700	11000	12000	13000

Samples highlighted in **Bold** exceed threshold criteria
ND = No Detection above Laboratory LOR
A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009
NA – Not Applicable

Table 4d – Groundwater Results Comparison December 2018

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWD (leachate) Jan 2018	MWD (leachate) Apr 2018	MWD (leachate) July 2018	MWD (leachate) Dec 2018
Calcium	mg/L	NA	160	120	96	120
Alkalinity (total)	mg/L	NA	2400	2500	2500	2700
Chloride	mg/L	NA	3100	3600	3300	3400
Fluoride	mg/L	NA	0.30	0.34	0.28	0.28
Iron	mg/L	0.3[B]	**1.1**	**1.1**	**2.0**	**1.5**
Magnesium	mg/L	NA	270	290	220	240
Manganese	mg/L	1.9[A]	0.29	0.18	0.180	0.19
OCP	mg/L	0.00001[C]	ND	ND	ND	ND
Potassium	mg/L	410[D]	220	200	210	220
pH	pH	6.5 – 8	7.7	7.7	7.6	7.5
Sodium	mg/L	NA	1900	1900	1700	1900
Ammonia	mg/L	0.9[A]	**330**	**320**	**330**	**340**
Nitrate	mg/L	0.7	ND	ND	ND	ND
Sulfate	mg/L	NA	93	110	81	59
TOC	mg/L	4.0	**340**	**340**	**320**	**340**
Total phenolics	mg/L	0.32	0.03	0.05	0.05	0.09
EC	µS/cm	NA	13000	14000	13000	14000

Samples highlighted in **Bold** exceed threshold criteria
ND = No Detection above Laboratory LOR
A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009
NA – Not Applicable

As MWD is a landfill leachate monitoring well, the Threshold Criteria are only applicable as indicators of general water quality for comparison to the wells surrounding the landfill. Exceedances of the Threshold Criteria for MWD are expected and do not indicate contamination is leaving the Site.

Table 4e – Groundwater Results Comparison December 2018

Sampling Parameter	Units	Threshold Criteria (mg/L)	MWE Jan 2018	MWE Apr 2018	MWE July 2018	MWE Dec 2018
Calcium	mg/L	NA	56	59	56	55
Alkalinity (total)	mg/L	NA	1200	1200	1200	1200
Chloride	mg/L	NA	280	280	270	300
Fluoride	mg/L	NA	0.47	0.56	0.51	0.52
Iron	mg/L	0.3[B]	0.01	ND	0.015	0.008
Magnesium	mg/L	NA	55	53	53	55
Manganese	mg/L	1.9[A]	0.24	0.14	0.160	ND
OCP	mg/L	0.00001[C]	ND	ND	ND	ND
Potassium	mg/L	410[D]	1.6	1.2	1.3	0.7
pH	pH	6.5 – 8	7.4	7.4	7.4	7.3
Sodium	mg/L	NA	520	550	530	550
Ammonia	mg/L	0.9[A]	0.04	0.07	0.09	0.22
Nitrate	mg/L	0.7	ND	ND	ND	ND
Sulfate	mg/L	NA	91	85	92	120
TOC	mg/L	4.0	**15**	**7.9**	**6**	**6.5**
Total phenolics	mg/L	0.32	ND	ND	ND	ND
EC	µS/cm	NA	3000	3200	2900	3000

Samples highlighted in **Bold** exceed threshold criteria
ND = No Detection above Laboratory LOR
A – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
B - Interim working level, in absence of reliable trigger value
C - Trigger value for DDT used in absence of trigger value for total OCP
D – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009
NA – Not Applicable

5.0 DISCUSSION

The sites' topography is a downslope to the west and the inferred hydraulic gradient is generally to the west. Wells MWA, MWB and MWC are located down-hydraulic gradient of the landfill. Well MWE is considered to be up-hydraulic gradient of the landfill. Well MWD is located within the landfill, and targets the leachate within the landfill.

The water sampled from well MWD is landfill leachate and as such the Threshold Criteria is not applied in the context of receptor exposure, but as an indicator of current conditions of the leachate. MWD is to be used as a general indicator of water quality within the landfill for comparison to the external monitoring wells.

The following is a summary of the results of the December 2018 sampling event in relation to the Threshold Criteria. The following exceedances of the Threshold Criteria occurred:

- Nitrate in MWC exceeded the Threshold Criteria (0.7 mg/L) with a concentration of 2.2 mg/L. Nitrate concentrations have been fluctuating within this well with concentrations between 1mg/L in July 2018 and 3.0 mg/L in April 2018. There was no nitrate detected in leachate well MWD in this event.
- Manganese in MWC exceeded the Threshold Criteria (1.9 mg/L) with a concentration of 6.5 mg/L. Manganese concentrations have been fluctuating within this well with the highest concentration of 12 mg/L in January 2018. Manganese concentrations in leachate well MWD have been consistently below the Threshold Criteria.
- Total Organic Carbon (TOC) exceeds the Threshold Criteria (4 mg/L) in monitoring wells MWB, MWC and MWE, as follows:
    - TOC in MWB reported a concentration of 4.2 mg/L (December 2018). TOC in MWB has fluctuated throughout the year, with all concentrations exceeding the Threshold Criteria;
    - TOC in MWC reported a concentration of 8.8 mg/L (December 2018). TOC in MWC has fluctuated throughout the year, with all concentrations exceeding the Threshold Criteria; and,
    - TOC in MWE also reported a concentration of 6.5 mg/L (December 2018). TOC in MWE has fluctuated throughout the year, with all concentrations exceeding the Threshold Criteria.

  The Threshold Criteria used for TOC is intended for drinking water. The TOC concentrations in MWE indicates that TOC is likely to be elevated in the local groundwater.

All other analytes in all other wells reported detections which were within the Threshold Criteria.

The following notable changes or concentrations occurred within the groundwater analytes in landfill leachate well MWD:

- Ammonia in MWD exceeded the Threshold Criteria (0.9mg/L) with a concentration of 340 mg/L. The concentration of ammonia in MWD have remained elevated and consistent, with 330 mg/L in July 2018, 320 mg/L in April 2018 and 330 mg/L in January 2018. Concentrations of Ammonia in MWD have consistently been substantially higher than in the surrounding wells.

- Iron in MWD exceeded the Threshold Criteria (0.3mg/L) with a concentration of 1.5 mg/L. Iron concentrations in MWD have fluctuated over its recent history, but displayed a similar elevated result of 2.0mg/L in July 2018 and 1.1mg/L in April and January 2018.

- TOC in MWD reported a concentration of 340 mg/L, increasing slightly from 320mg/L reported in July 2018, however concentrations remain consistent.

Refer to **Attachment 3** – Data Log.

The data can be viewed on a trending basis as more results become available.

6.0 CONCLUSIONS

The results of laboratory analysis of the samples collected from the Scone Waste Facility Area during the December 2018 quarterly sampling event confirmed several exceedances of the Threshold Criteria in the wells external to the landfill area itself. The Threshold Criteria are sourced from the ANZECC 2000 Guidelines for Fresh Water 95% level of protection, NEPM 2013 and Australian Drinking Water Guidelines 2011.

The following analytes exceeded the Threshold Criteria during the December 2018 sampling event: nitrate and manganese in MWC, and TOC in MWB, MWC and MWE. There were no other exceedances of the Threshold Criteria in the wells surrounding the landfill.

Some exceedances have been explained by local conditions. Trending of analytes over time may indicate a seasonal fluctuation of regional groundwater conditions. All remaining exceedances are in MWD which is the leachate monitoring well. Concentrations in MWD are elevated with respect to remaining well network, which indicates minimal releases of landfill leachate into the local groundwater is likely to be occurring.

The elevated concentrations of nitrate, manganese and TOC in the monitoring wells external to the landfill do not necessarily indicate the concentrations are due to the landfill leachate, future testing and trending of data will allow for appropriate comparisons.

The next water sampling event will be the quarterly monitoring event undertaken in January 2019.

7.0 REFERENCES

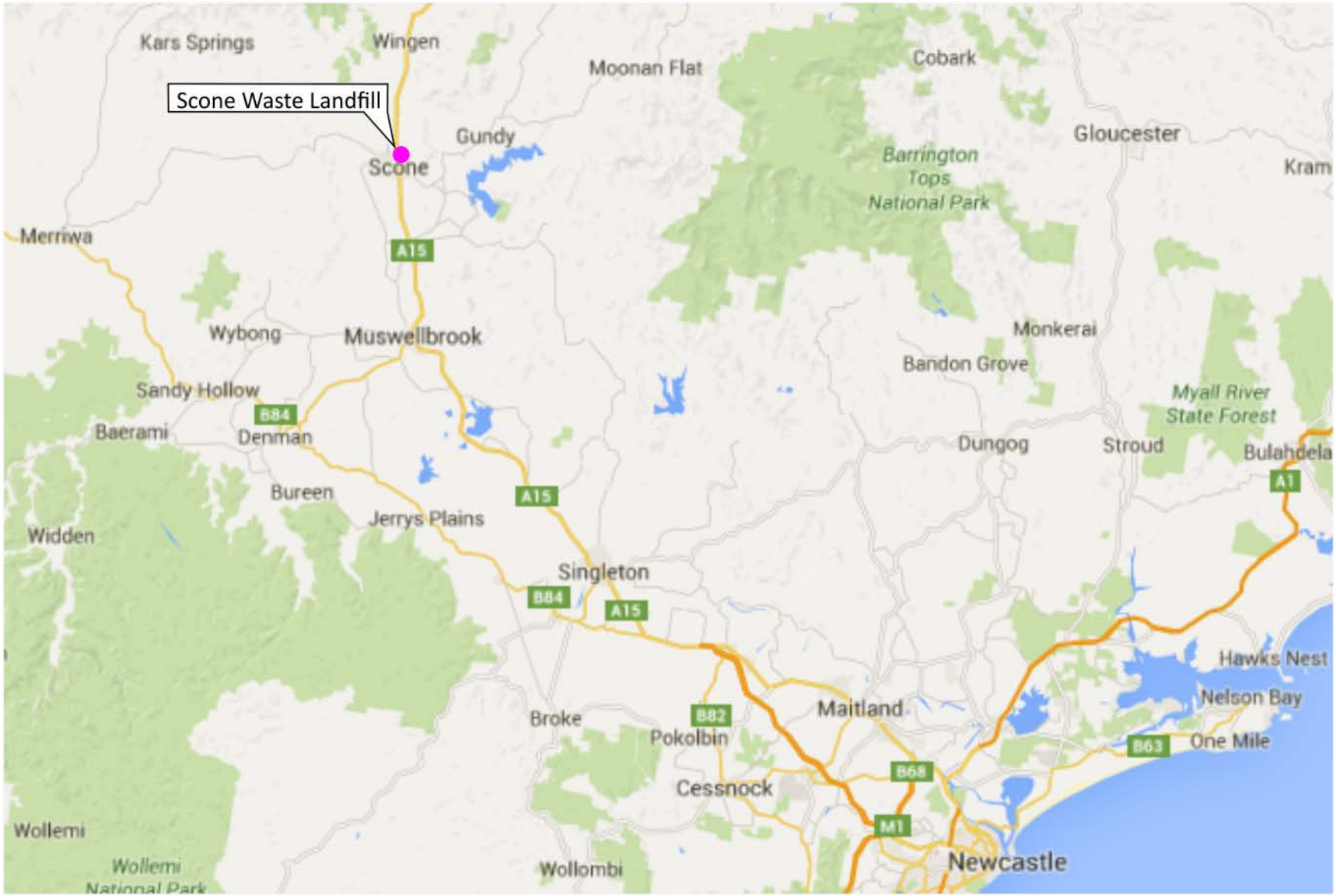
ANZECC/ARMCANZ (2000). *Australian Water Quality Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, October 2000.

NEPC (1999). *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).* National Environment Protection Council.

NHMRC / NRMMC (2011). *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy.* National Health and Medical Research Council, National Resource Management Ministerial Council.

NSW DEC (2007). *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination.* New South Wales Department of Environment and Conservation.

FIGURE 1 – SITE LOCATION REGIONAL



Legend

- Site location - Noblet Rd, Scone

N

Approximate Scale

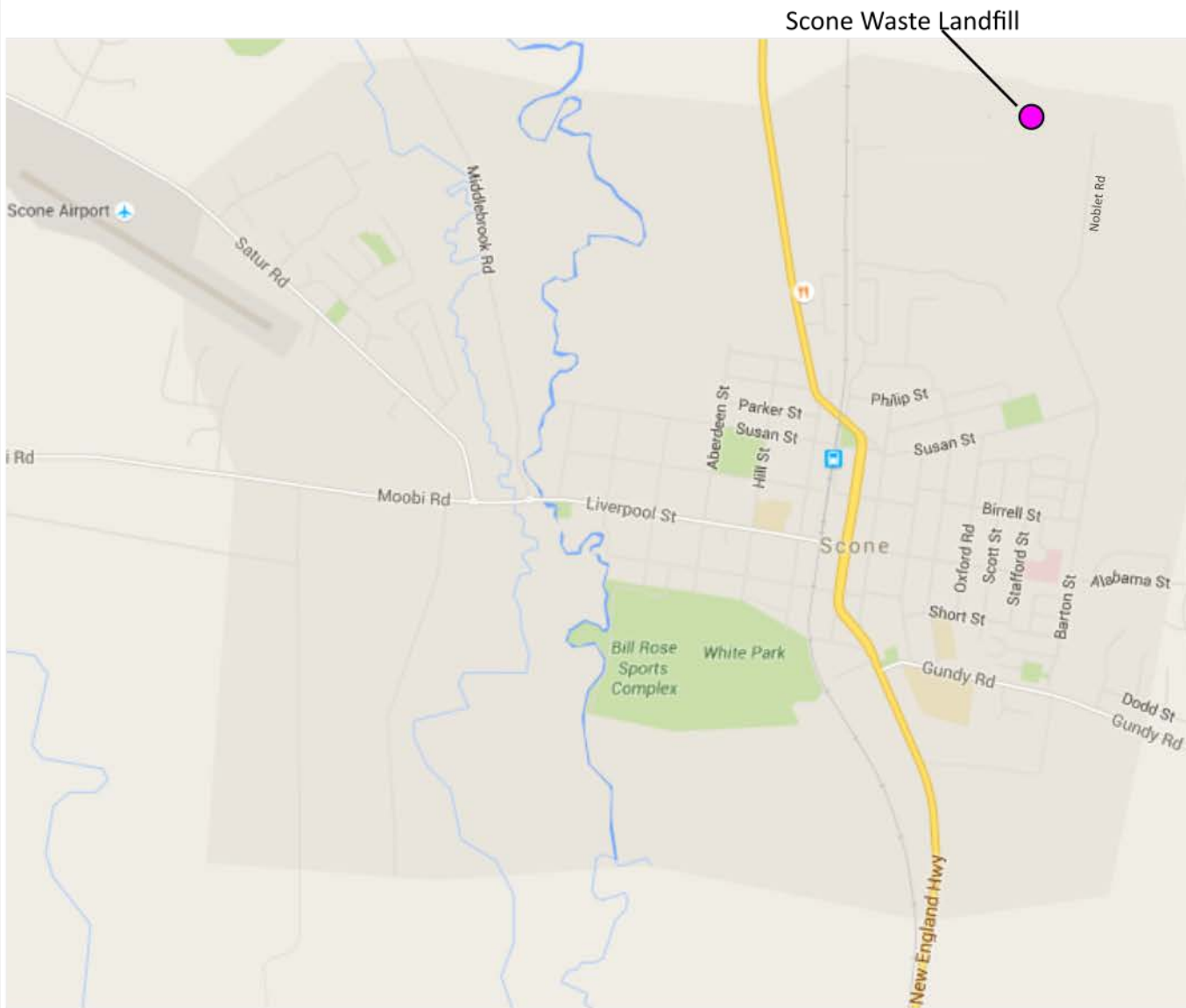
0m 10 km 20 km 30 km 40 km 50 km

ERM
Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557
Maitland Office
Phone (02) 4933 0001

Title: Site location regional

Client	Project No.	Figure No	Date
Upper Hunter Shire Council	DLH1186	1	15/5/2018
	Scale: As Shown	Compiled: KS	Revision: R02

FIGURE 2 – SITE LOCATION LOCAL



Legend

Site Location - Noblet Rd, Scone

Approximate Scale

0 km 0.5 km 1 km

ERM

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title			
Site location local			
Client		Figure No	Date
Upper Hunter Shire Council		2	15/5/2018
Project No.	Scale	Compiled	Revision
DLH1186	As Shown	KS	R02

FIGURE 3 – SITE LAYOUT WITH SAMPLE LOCATIONS

Legend

- Groundwater well location

N

Approximate Scale

0m 50m 100m

ERM

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title: Site layout with sample locations

Client	Project No.	Figure No	Date
Upper Hunter Shire Council	DLH1186	3	15/5/2018
	Scale: As Shown	Compiled: KS	Revision: R02

ATTACHMENT 1 – NATA CERTIFIED ANALYTICAL RESULTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Stephen Challinor
Client	ERM SERVICES AUSTRALIA PTY LTD
Address	Level 4, 45 Watt St Newcastle NSW 2300
Telephone	0409 223 465
Facsimile	61 2 98700999
Email	stephen.challinor@erm.com
Project	**0450057 - UNSC**
Order Number	(Not specified)
Samples	5

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE187247 R0**
Date Received	11/12/2018
Date Reported	18/12/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ion Chromatography - The Limit of Reporting (LOR) has been raised for NO3-N due to high conductivity of the sample requiring dilution.

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

OC Pesticides in Water [AN420] Tested: 12/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Total Phenolics in Water [AN289] Tested: 12/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05	**0.09**	<0.05

Forms of Carbon [AN190] Tested: 13/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Total Organic Carbon as NPOC	mg/L	0.2	**2.6**	**4.2**	**8.8**	**340**	**6.5**

Anions by Ion Chromatography in Water [AN245] Tested: 12/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Fluoride	mg/L	0.1	**0.14**	**0.27**	**0.22**	**0.28**	**0.52**
Chloride	mg/L	1	**6600**	**5500**	**4200**	**3400**	**300**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.25**	**0.51**	**2.2**	<0.050 ↑	<0.005
Sulfate, SO4	mg/L	1	**49**	**76**	**160**	**59**	**120**

pH in water [AN101] Tested: 11/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
pH**	No unit	-	**6.7**	**6.9**	**6.7**	**7.5**	**7.3**

Conductivity and TDS by Calculation - Water [AN106] Tested: 11/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Conductivity @ 25 C	µS/cm	2	20000	15000	13000	14000	3000
Total Dissolved Solids (by calculation)	mg/L	2	12000	9100	7600	8500	1800

Alkalinity [AN135] Tested: 13/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Bicarbonate Alkalinity as CaCO3	mg/L	5	470	380	580	2300	1200
Carbonate Alkalinity as CaCO3	mg/L	1	<1	<1	<1	370	<1
Hydroxide Alkalinity as CaCO3	mg/L	5	<5	<5	<5	<5	<5
Phenolphthalein Alkalinity as CaCO3*	mg/L	5	<5	<5	<5	190	<5
Total Alkalinity as CaCO3	mg/L	5	470	380	580	2700	1200

Acidity and Free CO2 [AN140] Tested: 13/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Acidity to pH 8.3	mg CaCO3/L	5	90	41	81	190	38

Ammonia Nitrogen by Discrete Analyser (Aquakem) [AN291] Tested: 11/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.02**	**0.05**	**0.07**	**340**	**0.22**

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 11/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Calcium, Ca	mg/L	0.1	560	550	350	120	55
Magnesium, Mg	mg/L	0.1	1100	670	500	240	55
Sodium, Na	mg/L	0.1	2000	1600	1500	1900	550
Potassium, K	mg/L	0.2	4.4	3.6	2.4	220	0.7

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 11/12/2018

PARAMETER	UOM	LOR	MWA WATER - 6/12/2018 SE187247.001	MWB WATER - 6/12/2018 SE187247.002	MWC WATER - 6/12/2018 SE187247.003	MWD WATER - 6/12/2018 SE187247.004	MWE WATER - 6/12/2018 SE187247.005
Iron, Fe	µg/L	5	<5	<5	<5	**1500**	**8**
Manganese, Mn	µg/L	1	**10**	**6**	**6500**	**190**	<1

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present , measured by the conductivity, are present as NaCl.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN140	Acidity by Titration: The water sample is titrated with sodium hydroxide to designated pH end point. In a sample containing only carbon dioxide, bicarbonates and carbonates, titration to pH 8.3 at 25°C corresponds to stoichiometric neutralisation of carbonic acid to bicarbonate. Method reference APHA 2310 B.
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO2 is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O2/C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN289	Analysis of Total Phenols in Soil Sediment and Water: Steam distillable phenols react with 4-aminoantipyrine at pH 7.9±0.1 in the presence of potassium ferricyanide to form a coloured antipyrine dye analysed by Discrete Analyser. Reference APHA 5530 B/D.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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STATEMENT OF QA/QC PERFORMANCE

SE187247 R0

CLIENT DETAILS

Contact	Stephen Challinor
Client	ERM SERVICES AUSTRALIA PTY LTD
Address	Level 4, 45 Watt St Newcastle NSW 2300
Telephone	0409 223 465
Facsimile	61 2 98700999
Email	stephen.challinor@erm.com
Project	**0450057 - UNSC**
Order Number	(Not specified)
Samples	5

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE187247 R0**
Date Received	11 Dec 2018
Date Reported	18 Dec 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Acidity and Free CO2	5 items
	pH in water	5 items
Analysis Date	Acidity and Free CO2	5 items
	Forms of Carbon	5 items
	pH in water	5 items

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Other Lab	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	5 Water
Date documentation received	11/12/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	7.4°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE187247 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Acidity and Free CO2

Method: ME-(AU)-[ENV]AN140

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163497	06 Dec 2018	11 Dec 2018	07 Dec 2018	13 Dec 2018†	07 Dec 2018	13 Dec 2018†
MWB	SE187247.002	LB163497	06 Dec 2018	11 Dec 2018	07 Dec 2018	13 Dec 2018†	07 Dec 2018	13 Dec 2018†
MWC	SE187247.003	LB163497	06 Dec 2018	11 Dec 2018	07 Dec 2018	13 Dec 2018†	07 Dec 2018	13 Dec 2018†
MWD	SE187247.004	LB163497	06 Dec 2018	11 Dec 2018	07 Dec 2018	13 Dec 2018†	07 Dec 2018	13 Dec 2018†
MWE	SE187247.005	LB163497	06 Dec 2018	11 Dec 2018	07 Dec 2018	13 Dec 2018†	07 Dec 2018	13 Dec 2018†

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163537	06 Dec 2018	11 Dec 2018	20 Dec 2018	13 Dec 2018	20 Dec 2018	17 Dec 2018
MWB	SE187247.002	LB163537	06 Dec 2018	11 Dec 2018	20 Dec 2018	13 Dec 2018	20 Dec 2018	17 Dec 2018
MWC	SE187247.003	LB163537	06 Dec 2018	11 Dec 2018	20 Dec 2018	13 Dec 2018	20 Dec 2018	17 Dec 2018
MWD	SE187247.004	LB163537	06 Dec 2018	11 Dec 2018	20 Dec 2018	13 Dec 2018	20 Dec 2018	17 Dec 2018
MWE	SE187247.005	LB163537	06 Dec 2018	11 Dec 2018	20 Dec 2018	13 Dec 2018	20 Dec 2018	17 Dec 2018

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163276	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWB	SE187247.002	LB163276	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWC	SE187247.003	LB163276	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWD	SE187247.004	LB163276	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	12 Dec 2018
MWE	SE187247.005	LB163276	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163332	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	17 Dec 2018
MWB	SE187247.002	LB163332	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	17 Dec 2018
MWC	SE187247.003	LB163332	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	17 Dec 2018
MWD	SE187247.004	LB163332	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	17 Dec 2018
MWE	SE187247.005	LB163332	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	17 Dec 2018

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163287	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWB	SE187247.002	LB163287	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWC	SE187247.003	LB163287	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWD	SE187247.004	LB163287	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018
MWE	SE187247.005	LB163287	06 Dec 2018	11 Dec 2018	03 Jan 2019	11 Dec 2018	03 Jan 2019	11 Dec 2018

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163424	06 Dec 2018	11 Dec 2018	13 Dec 2018	13 Dec 2018	13 Dec 2018	14 Dec 2018†
MWB	SE187247.002	LB163424	06 Dec 2018	11 Dec 2018	13 Dec 2018	13 Dec 2018	13 Dec 2018	14 Dec 2018†
MWC	SE187247.003	LB163424	06 Dec 2018	11 Dec 2018	13 Dec 2018	13 Dec 2018	13 Dec 2018	14 Dec 2018†
MWD	SE187247.004	LB163424	06 Dec 2018	11 Dec 2018	13 Dec 2018	13 Dec 2018	13 Dec 2018	14 Dec 2018†
MWE	SE187247.005	LB163424	06 Dec 2018	11 Dec 2018	13 Dec 2018	13 Dec 2018	13 Dec 2018	14 Dec 2018†

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163267	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWB	SE187247.002	LB163267	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWC	SE187247.003	LB163267	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWD	SE187247.004	LB163267	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWE	SE187247.005	LB163267	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163334	06 Dec 2018	11 Dec 2018	13 Dec 2018	12 Dec 2018	21 Jan 2019	14 Dec 2018
MWB	SE187247.002	LB163334	06 Dec 2018	11 Dec 2018	13 Dec 2018	12 Dec 2018	21 Jan 2019	14 Dec 2018
MWC	SE187247.003	LB163334	06 Dec 2018	11 Dec 2018	13 Dec 2018	12 Dec 2018	21 Jan 2019	14 Dec 2018
MWD	SE187247.004	LB163334	06 Dec 2018	11 Dec 2018	13 Dec 2018	12 Dec 2018	21 Jan 2019	17 Dec 2018
MWE	SE187247.005	LB163334	06 Dec 2018	11 Dec 2018	13 Dec 2018	12 Dec 2018	21 Jan 2019	17 Dec 2018

pH in water

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref

HOLDING TIME SUMMARY

SE187247 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

pH in water (continued)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163287	06 Dec 2018	11 Dec 2018	07 Dec 2018	11 Dec 2018†	07 Dec 2018	11 Dec 2018†
MWB	SE187247.002	LB163287	06 Dec 2018	11 Dec 2018	07 Dec 2018	11 Dec 2018†	07 Dec 2018	11 Dec 2018†
MWC	SE187247.003	LB163287	06 Dec 2018	11 Dec 2018	07 Dec 2018	11 Dec 2018†	07 Dec 2018	11 Dec 2018†
MWD	SE187247.004	LB163287	06 Dec 2018	11 Dec 2018	07 Dec 2018	11 Dec 2018†	07 Dec 2018	11 Dec 2018†
MWE	SE187247.005	LB163287	06 Dec 2018	11 Dec 2018	07 Dec 2018	11 Dec 2018†	07 Dec 2018	11 Dec 2018†

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163323	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	12 Dec 2018
MWB	SE187247.002	LB163323	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	12 Dec 2018
MWC	SE187247.003	LB163323	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	12 Dec 2018
MWD	SE187247.004	LB163323	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	12 Dec 2018
MWE	SE187247.005	LB163323	06 Dec 2018	11 Dec 2018	03 Jan 2019	12 Dec 2018	03 Jan 2019	12 Dec 2018

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MWA	SE187247.001	LB163266	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWB	SE187247.002	LB163266	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWC	SE187247.003	LB163266	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWD	SE187247.004	LB163266	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018
MWE	SE187247.005	LB163266	06 Dec 2018	11 Dec 2018	04 Jun 2019	11 Dec 2018	04 Jun 2019	11 Dec 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Water — **Method: ME-(AU)-[ENV]AN420**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	MWA	SE187247.001	%	40 - 130%	68
	MWB	SE187247.002	%	40 - 130%	61
	MWC	SE187247.003	%	40 - 130%	67
	MWD	SE187247.004	%	40 - 130%	52
	MWE	SE187247.005	%	40 - 130%	50

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Acidity and Free CO2

Method: ME-(AU)-[ENV]AN140

Sample Number	Parameter	Units	LOR	Result
LB163497.001	Acidity to pH 8.3	mg CaCO3/L	5	<5

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result
LB163537.001	Bicarbonate Alkalinity as CaCO3	mg/L	5	<5
	Carbonate Alkalinity as CaCO3	mg/L	1	<1
	Total Alkalinity as CaCO3	mg/L	5	<5

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result
LB163276.001	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result
LB163332.001	Fluoride	mg/L	0.1	<0.10
	Chloride	mg/L	1	<0.05
	Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005
	Sulfate, SO4	mg/L	1	<1.0

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result
LB163287.001	Conductivity @ 25 C	µS/cm	2	<2
	Total Dissolved Solids (by calculation)	mg/L	2	<2

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Number	Parameter	Units	LOR	Result
LB163424.001	Total Organic Carbon as NPOC	mg/L	0.2	<0.2
LB163424.025	Total Organic Carbon as NPOC	mg/L	0.2	<0.2

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result
LB163267.001	Calcium, Ca	mg/L	0.1	<0.1
	Magnesium, Mg	mg/L	0.1	<0.1
	Potassium, K	mg/L	0.2	<0.2
	Sodium, Na	mg/L	0.1	<0.1

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB163334.001	Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
	Alpha BHC	µg/L	0.1	<0.1
	Lindane (gamma BHC)	µg/L	0.1	<0.1
	Heptachlor	µg/L	0.1	<0.1
	Aldrin	µg/L	0.1	<0.1
	Beta BHC	µg/L	0.1	<0.1
	Delta BHC	µg/L	0.1	<0.1
	Heptachlor epoxide	µg/L	0.1	<0.1
	Alpha Endosulfan	µg/L	0.1	<0.1
	Gamma Chlordane	µg/L	0.1	<0.1
	Alpha Chlordane	µg/L	0.1	<0.1
	p,p'-DDE	µg/L	0.1	<0.1
	Dieldrin	µg/L	0.1	<0.1
	Endrin	µg/L	0.1	<0.1
	Beta Endosulfan	µg/L	0.1	<0.1
	p,p'-DDD	µg/L	0.1	<0.1
	p,p'-DDT	µg/L	0.1	<0.1
	Endosulfan sulphate	µg/L	0.1	<0.1
	Endrin aldehyde	µg/L	0.1	<0.1
	Methoxychlor	µg/L	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

OC Pesticides in Water (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB163334.001		Endrin ketone	µg/L	0.1	<0.1
		Isodrin	µg/L	0.1	<0.1
		Mirex	µg/L	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	92

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Number	Parameter	Units	LOR	Result
LB163323.001	Total Phenols	mg/L	0.05	<0.05

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB163266.001	Iron, Fe	µg/L	5	<5
	Manganese, Mn	µg/L	1	<1

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Acidity and Free CO2

Method: ME-(AU)-[ENV]AN140

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187247.005	LB163497.008	Acidity to pH 8.3	mg CaCO3/L	5	38	38	28	0

Alkalinity

Method: ME-(AU)-[ENV]AN135

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187347.004	LB163537.013	Bicarbonate Alkalinity as CaCO3	mg/L	5	608.68448	602.16216	16	1
		Carbonate Alkalinity as CaCO3	mg/L	1	0	0	200	0
		Total Alkalinity as CaCO3	mg/L	5	608.68448	602.16216	16	1
SE187385.006	LB163537.015	Bicarbonate Alkalinity as CaCO3	mg/L	5	128.9752	120.6384	19	7
		Carbonate Alkalinity as CaCO3	mg/L	1	0	0	200	0
		Total Alkalinity as CaCO3	mg/L	5	128.9752	120.6384	19	7

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187246.003	LB163276.014	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	0.18	0.19	20	2

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187249.005	LB163332.013	Sulfate, SO4	mg/L	1	1800	1800	15	1
SE187249.012	LB163332.021	Sulfate, SO4	mg/L	1	50	50	17	1

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187247.001	LB163287.023	Conductivity @ 25 C	µS/cm	2	20000	19631.32	15	1
		Total Dissolved Solids (by calculation)	mg/L	2	12000	11778.792	15	1
SE187247.002	LB163287.024	Conductivity @ 25 C	µS/cm	2	15000	15418.03	15	1
		Total Dissolved Solids (by calculation)	mg/L	2	9100	9250.818	15	1

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187239.008	LB163424.014	Total Organic Carbon as NPOC	mg/L	0.2	8.2	8.3	17	2

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187247.005	LB163267.010	Sodium, Na	mg/L	0.1	550	540	15	1

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187201.001	LB163323.004	Total Phenols	mg/L	0.05	0.25	0.23	36	10

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE187222.003	LB163266.014	Manganese, Mn	µg/L	1	36.024	35.798	18	1
SE187247.005	LB163266.020	Iron, Fe	µg/L	5	8	8	75	1
		Manganese, Mn	µg/L	1	<1	<1	158	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163537.002	Total Alkalinity as CaCO3	mg/L	5	61	59.5	76 - 124	103

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163276.002	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	2.4	2.5	80 - 120	97

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163332.002	Fluoride	mg/L	0.1	1.9	2	80 - 120	97
	Chloride	mg/L	1	20	20	80 - 120	98
	Nitrate Nitrogen, NO3-N	mg/L	0.005	2.0	2	80 - 120	100
	Sulfate, SO4	mg/L	1	19	20	80 - 120	96

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163287.002	Conductivity @ 25 C	µS/cm	2	310	303	90 - 110	101
	Total Dissolved Solids (by calculation)	mg/L	2	180	181	85 - 115	101

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163424.002	Total Organic Carbon as NPOC	mg/L	0.2	19	20	80 - 120	95
LB163424.026	Total Organic Carbon as NPOC	mg/L	0.2	20	20	80 - 120	98

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163267.002	Calcium, Ca	mg/L	0.1	2.0	2	80 - 120	99
	Magnesium, Mg	mg/L	0.1	2.0	2	80 - 120	100
	Potassium, K	mg/L	0.2	19	20	80 - 120	95
	Sodium, Na	mg/L	0.1	1.9	2	80 - 120	97

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163334.002		Heptachlor	µg/L	0.1	0.2	0.2	60 - 140	89
		Aldrin	µg/L	0.1	0.2	0.2	60 - 140	89
		Delta BHC	µg/L	0.1	0.2	0.2	60 - 140	89
		Dieldrin	µg/L	0.1	0.2	0.2	60 - 140	93
		Endrin	µg/L	0.1	0.2	0.2	60 - 140	93
		p,p'-DDT	µg/L	0.1	0.2	0.2	60 - 140	88
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	µg/L	-	0.10	0.15	40 - 130	69

pH in water

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163287.003	pH**	No unit	-	7.4	7.415	98 - 102	100

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163323.002	Total Phenols	mg/L	0.05	0.26	0.25	80 - 120	103

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB163266.002	Iron, Fe	µg/L	5	21	20	80 - 120	105
	Manganese, Mn	µg/L	1	20	20	80 - 120	99

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Ammonia Nitrogen by Discrete Analyser (Aquakem)

Method: ME-(AU)-[ENV]AN291

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187213A.00	LB163276.004	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	5.1	2.9	2.5	89

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187109A.00	LB163424.004	Total Organic Carbon as NPOC	mg/L	0.2	70	17	50	105

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187261.001	LB163323.013	Total Phenols	mg/L	0.05	0.25	0.00586	0.25	96

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE187133.001	LB163266.004	Iron, Fe	µg/L	5	35	16	20	93

MATRIX SPIKE DUPLICATES

SE187247 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

ATTACHMENT 2 – WATER QUALITY METER CALIBRATION CERTIFICATE

In-Situ

Innovations in Water Monitoring

Calibration Report

Instrument Details:

Instrument Model:	SMARTROLL™ MP
Full Scale Pressure Range:	0 - 250 ft (0 - 76 m)
Serial Number:	588881
Manufacture Date:	2018-05-17

Calibration Details:

Calibration Result:	PASS
Calibration Date:	2018-05-03
Nominal Range of Applied Temperature:	0 C to +50 C
Temperature Accuracy Specification:	+/-0.1 C from 0 C to +50 C
Nominal Range of Applied Pressure:	0 - 250 feet
Pressure Accuracy Specification:	+/-0.3% FS
Conductivity Calibration:	Pass with a cell constant of 1.00.
Rugged Dissolved Oxygen Calibration:	Pass with an optical phase difference of +/- 2 degrees.
pH/ORP Check:	Pass with mV readings of +/- 5 mV.

Post-Calibration Check:

Parameter	Applied (PSI)	Reported (PSI)	Deviation (PSI)
Pressure	7	7.002	-0.002
Pressure	65	65.025	-0.025
Pressure	123	123.029	-0.029
Pressure	84.334	84.369	-0.035
Pressure	45.667	45.695	-0.028
Pressure	7	7.025	-0.025

Calibration Procedures and Equipment Used:

Automated calibration procedures used.
Calibrated in 900, 9000, & 90000 µS/cm conductivity standards.
Manu MENSOR Model 8100 Serial No 570135
Manu HART Model 1504 Serial No B42917
Manu Fluke Model 5665 Serial No B431401

Notes:

1. Standards used in the calibration are traceable to the National Institute of Standards and Technology.
2. This calibration report shall not be reproduced, except in full, without the written approval of In-Situ, Inc.
3. A calibration interval of 12 to 18 months is recommended.
4. The post-calibration data is collected at nominal +15C.
5. 1.0 PSI = 6.894757 kPa.

ATTACHMENT 3 – DATA LOG

GROUNDWATER MONITORING DATA LOG
THE SCONE WASTE LANDFILL

Monitoring Well	Chemical Report	Date Sampled	Comment	Threshold Criteria	NA	NA	NA	NA	0.3	NA	1.9	0.00001	NA	6.5–8	NA	0.9	0.7	NA	4	0.32	NA	NA	NA	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	NA	0.0002	0.09	0.0014	0.001	NA	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	NA	NA	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2 Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
				Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
																																											CVCs/VOCCs						
MWA	135493	6/10/2015		620	440	7700	0.1	ND	1200	0.028	ND	3.2	6.8	2400	0.006	**0.76**	66	4	ND	19000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	135493	6/10/2015		650	370	6300	0.3	ND	840	0.008	ND	2.6	6.9	1900	ND	**1.3**	100	**5**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	135493	6/10/2015		62	730	690	0.4	ND	130	**2.2**	ND	0.6	7.1	670	ND	0.17	350	**18**	ND	3900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	135493	6/10/2015	leachate	150	2400	2800	0.3	**1.8**	220	0.46	ND	170	7.6	1700	**310**	ND	66	**330**	ND	11000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	135493	6/10/2015		75	700	860	0.5	0.015	89	0.44	ND	1.7	7.4	730	0.006	ND	140	**8**	ND	4000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE148082	14/01/2016		630	430	7800	ND	ND	1100	0.01	ND	4	7	2200	0.2	**0.24**	34	**4.2**	0.25	23000	16000	ND	**0.22**	0.001	ND	0.77	ND	ND	ND	ND	ND	ND	ND	0.009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	SE148082	14/01/2016		650	370	6000	ND	ND	810	0.012	ND	3.5	7	1700	0.15	**1.3**	69	**7**	0.31	18000	15000	ND	**0.13**	0.002	ND	0.62	ND	ND	ND	ND	0.001	ND	ND	**0.012**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	SE148082	14/01/2016		56	750	630	0.34	ND	110	**4.9**	ND	0.9	7.2	590	0.12	ND	300	**21**	ND	4300	2400	ND	**0.19**	0.003	ND	0.047	ND	0.011	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWD	SE148082	14/01/2016	leachate	170	1200	1000	0.32	**0.33**	110	0.87	ND	110	7.3	690	**110**	ND	18	**140**	**0.47**	5800	2500	48	**0.13**	0.017	ND	0.49	ND	0.004	ND	ND	0.031	ND	ND	**0.026**	**34**	0.0028	0.0034	0.023	0.0351	ND	ND	ND	ND	0.0059	ND	0.004	ND
MWE	SE148082	14/01/2016		80	750	850	0.35	0.019	79	0.23	ND	1.1	7.4	690	0.12	ND	200	**10**	0.02	4600	2200	ND	**0.25**	0.005	ND	0.048	ND	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	144481	7/04/2016		700	460	7300	0.1	ND	1300	0.009	ND	3.1	7	2800	0.006	**0.62**	43	3	ND	18000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	144481	7/04/2016		720	380	6300	0.3	0.02	880	0.007	ND	2.6	7.1	2300	ND	**1.3**	61	4	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	144481	7/04/2016		290	660	3700	0.3	0.038	420	**3.1**	ND	1.4	7.2	1900	ND	**4.9**	220	**9**	ND	9600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	144481	7/04/2016	leachate	160	2200	2600	0.3	**2.2**	230	0.45	ND	180	7.7	1900	**210**	ND	35	**290**	ND	9600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	144481	7/04/2016		67	890	640	0.5	0.034	72	0.24	ND	0.9	7.6	840	0.026	0.01	160	**7**	ND	3200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE154534	6/07/2016		620	460	7900	0.12	0.021	1200	0.021	ND	3.7	7.1	2200	0.14	0.36	35	**6.1**	0.03	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE154534	6/07/2016		650	390	6100	0.24	0.008	820	0.008	ND	3.1	7.1	1700	0.10	**0.95**	69	**7.6**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE154534	6/07/2016		55	730	610	0.24	0.006	93	**5.400**	ND	1.0	7.4	580	0.05	0.15	220	**24**	ND	3300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE154534	6/07/2016	leachate	250	1200	1000	0.14	**0.520**	120	0.960	ND	120	7.3	630	80	ND	140	**140**	0.01	5200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE154534	6/07/2016		57	970	470	0.30	0.021	66	0.430	ND	1.6	7.6	610	0.04	ND	110	**16**	ND	3100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE157863	6/10/2016		580	430	7400	0.15	ND	1100	0.020	ND	4.4	6.8	2100	0.14	0.50	37	**6.2**	0.22	21000	12000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MWB	SE157863	6/10/2016		600	360	6000	0.22	0.006	830	0.008	ND	3.6	6.9	1800	0.09	**1.1**	69	**6.6**	0.14	17000	10000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MWC	SE157863	6/10/2016		67	630	770	0.34	ND	120	5.600	ND	1.1	7.1	620	0.04	ND	180	**24**	ND	3900	2400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MWD	SE157863	6/10/2016	leachate	210	1600	1600	0.27	0.001	150	0.600	ND	140	7.3	1000	**150**	ND	110	**200**	0.07	7800	4700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MWE	SE157863	6/10/2016		61	900	560	0.41	0.012	67	0.110	ND	1.3	7.3	650	0.04	ND	120	**16**	0.01	3600	2100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MWA	SE160904	12/1/2017		600	460	8200	ND	ND	1200	0.004	ND	6	7.3	2100	0.13	0.13	38	**4**	0.02	19000	14000	ND	0.059	NA	ND	0.59	ND	ND	ND	**0.005**	0.001	ND	ND	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	SE160904	12/1/2017		590	380	6300	ND	ND	850	ND	ND	5	7.2	1700	0.10	0.59	70	**5**	0.04	16000	13000	ND	0.017	NA	ND	0.55	ND	ND	ND	ND	0.001	ND	ND	0.007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	SE160904	12/1/2017		44	830	880	0.13	ND	89	7.800	ND	2	7.6	510	0.12	ND	200	**21**	ND	4200	2400	ND	0.017	NA	0.006	0.05	ND	0.013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWD	SE160904	12/1/2017	leachate	260	2300	2800	ND	1.100	230	0.850	ND	210	7.5	1400	**250**	ND	330	**270**	0.04	11000	6200	170	0.89	NA	0.014	0.91	ND	0.017	ND	ND	0.03	ND	ND	**0.035**	3	0.002	0.0009	0.0034	0.042	ND	ND	ND	ND	0.0004	ND	0.017	ND
MWE	SE160904	12/1/2017		70	1100	580	0.18	0.021	76	0.27	ND	1.8	7.8	610	0.04	ND	130	13	ND	3500	2100	ND	0.07	NA	ND	0.054	ND	0.004	0.001	ND	ND	ND	ND	**0.013**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	SE164082	6/4/2017		570	450	7700	0.14	ND	1100	0.006	ND	3.1	6.8	2200	0.14	0.24	39	**6.4**	0.16	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE164082	6/4/2017		580	360	6000	0.27	ND	760	0.009	ND	2.8	6.6	1700	0.09	**0.71**	77	**6.8**	0.02	17000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE164082	6/4/2017		34	670	520	0.44	ND	68	**7.300**	ND	0.9	7.1	540	0.06	ND	120	**23**	ND	2900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE164082	6/4/2017	leachate	260	1500	2200	0.28	**0.920**	190	0.780	ND	130	7.3	1200	**210**	ND	310	**150**	0.19	9400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE164082	6/4/2017		34	1100	360	0.52	0.006	67	**7.300**	ND	0.9	7.3	530	0.07	ND	110	**20**	ND	3200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE167897	6/7/2017		640	470	7900	0.12	ND	1200	0.007	ND	4.3	7	2200	0.07	0.24	42	**8**	ND	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE167897	6/7/2017		640	390	6000	0.26	ND	820	0.01	ND	4	7	1800	0.21	**0.83**	75	**8.2**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE167897	6/7/2017		26	640	370	0.46	0.008	52	**4.6**	ND	0.8	7.2	430	0.33	0.005	90	**23**	ND	2400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE167897	6/7/2017	leachate	150	2500	2800	0.35	**1.6**	230	0.42	ND	180	7.5	1700	**310**	ND	100	**320**	0.05	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE167897	6/7/2017		60	1200	340	0.5	0.077	65	0.14	ND	1.5	7.5	570	0.1	ND	99	**26**	ND	3100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE171359	6/10/2017		600	470	7600	0.14	0.034	1100	0.14	ND	4.9	6.6	2000	0.42	0.41	43	**5**	ND	20000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE171359	6/10/2017		610	380	6000	0.26	0.005	790	0.01	ND	4.1	6.7	1600	0.09	**0.75**	70	**6**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE171359	6/10/2017		35	720	500	0.41	ND	73	**4.60**	ND	0.9	7.1	490	0.41	ND	110	**19**	ND	3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE171359	6/10/2017	leachate	190	2500	3700	0.32	0.300	260	0.28	ND	210.0	7.2	1800	**350**	ND	240	**320**	0.03	13000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE171359	6/10/2017		56	1100	310	0.51	0.015	55	0.55	ND	1.4	7.4	520	0.38	ND	110	**17**	ND	3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE174394	12/1/2018		590	490	7200	0.13	ND	1200	0.010	ND	4.9	7.0	2000	0.12	ND	40	**5.6**	<0.01	20000	18000	ND	**0.06**	0.001	ND	0.62	0.0002	ND	ND	**0.006**	0.002	ND	ND	**0.009**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	SE174394	12/1/2018		600	420	5400	0.24	ND	810	0.005	ND	3.6	7.0	1700	0.09	**ND**	66	**6.2**	<0.01	16000	14000	ND	ND	0.001	ND	0.54	ND	ND	ND	**0.004**	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	SE174394	12/1/2018		200	580	2400	0.26	ND	330	**12**	ND	1.8	6.9	1100	0.16	**1.7**	110	**12**	<0.01	8700	5300	ND	ND	ND	0.01	0.27	ND	0.024	**0.004**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWD	SE174394	12/1/2018	leachate	160	2400	3100	0.30	**1.100**	270	0.29	ND	220	7.7	1900	**330**	**ND**	93	**340**	0.03	13000	7100	29	**0.06**	0.01	ND	1.10	ND	0.032	ND	**0.006**	0.050	ND	ND	**0.012**	0.006	0.0035	0.0012	0.027	0.097	ND	ND	ND	ND	ND	ND	0.006	ND
MWE	SE174394	12/1/2018		56	1200	280	0.47	0.010	55	0.24	ND	1.6	7.4	520	0.04	ND	91	**15**	ND	3000	1700	ND	**0.11**	0.006	ND	0.04	0.0002	0.008	**0.004**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	SE177839	10/4/2018		640	490	7100	0.13	ND	1200	0.02	ND	4.4	6.9	2100	0.16	ND	41	3.6	0.02	21000	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE177839	10/4/2018		650	390	5700	0.28	ND	810	0.01	ND	3.6	7.2	1700	0.09	0.46	70	**4.8**	<0.01	16000	9900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE177839	10/4/2018		270	550	3200	0.31	ND	440	**15.00**	ND	1.8	6.9	1400	0.22	**2.5**	130	**9.0**	<0.01	11000	6500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE177839	10/4/2018	leachate	120	2500	3600	0.34	**1.100**	290	0.18	ND	200.0	7.7	1900	**320.00**	ND	110	**340.0**	0.05	14000	8500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE177839	10/4/2018		59	1200	280	0.56	ND	53	0.14	ND	1.2	7.4	550	0.07	ND	85	**7.9**	<0.01	3200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE181445	12/7/2018		590	480	7300	0.14	0.17	1100	0.01	ND	4.4	6.7	1900	0.16	ND	42	2.3	ND	19000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE181445	12/7/2018		590	400	5600	0.26	0.021	720	0.007	ND	3.6	6.9	1500	0.08	ND	74	3.5	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE181445	12/7/2018		350	590	4200	0.23	0.019	490	**9.1**	ND	2.6	6.7	1400	0.09	**0.95**	140	**6.5**	ND	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE181445	12/7/2018	leachate	96	2500	3300	0.28	**2**	220	0.18	ND	210	7.6	1700	**330**	ND	81	**320**	0.065	13000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE181445	12/7/2018		56	1200	270	0.51	0.015	53	0.16	ND	1.3	7.4	530	0.09	ND	92	**6**	ND	2900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE187247	6/12/2018		560	470	6600	0.14	ND	1100	0.01	ND	4.4	6.7	2000	0.02	0.25	49	2.6	ND	20000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE187247	6/12/2018		550	380	5500	0.27	ND	670	0.006	ND	3.6	6.9	1600	0.05	0.51	76	**4.2**	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE187247	6/12/2018		350	580	4200	0.22	ND	500	**6.5**	ND	2.4	6.7	1500	0.07	**2.2**	160	**8.8**	ND	13000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE187247	6/12/2018	leachate	120	2700	3400	0.28	**1.5**	240	0.19	ND	220	7.5	1900	**340**	ND	59	**340**	0.09	14000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE187247	6/12/2018		55	1200	300	0.52	0.008	55	ND	ND	0.7	7.3	550	0.22	ND	120	**6.5**	ND	3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

***As MWD is within the perched landfill leachate water table, the Threshold Criteria are only applicable as indicators of general water quality for comparison to the wells surrounding the landfill. Exceedances of the Threshold Criteria for MWD are expected and do not indicate contamination is leaving the site.**

Monitoring Well	Chemical Report	Date Sampled	Comment	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Threshold Criteria	-	-	-	-	0.3	-	1.9	0.00001	-	6.5–8	-	0.9	0.7	-	4	0.32	-	-	-	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	-	0.0002	0.09	0.0014	0.001	-	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	-	-	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
																																								CVCs/VOCCs							
MWA	135493	6/10/2015		620	440	7700	0.1	ND	1200	0.028	ND	3.2	6.8	2400	0.006	**0.76**	66	4	ND	19000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE148082	14/01/2016		630	430	7800	ND	ND	1100	0.01	ND	4	7	2200	0.2	**0.24**	34	**4.2**	0.25	23000	16000	ND	0.22	0.001	ND	0.77	ND	ND	ND	ND	ND	ND	0.009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	144481	7/04/2016		700	460	7300	0.1	ND	1300	0.009	ND	3.1	7	2800	0.006	**0.62**	43	3	ND	18000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE154534	6/07/2016		620	460	7900	0.12	0.021	1200	0.021	ND	3.7	7.1	2200	0.14	0.36	35	**6.1**	0.03	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE157863	6/10/2016		580	430	7400	0.15	ND	1100	0.020	ND	4.4	6.8	2100	0.14	0.50	37	**6.2**	0.22	21000	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE160904	12/01/2017		600	460	8200	ND	ND	1200	0.004	ND	5.6	7.3	2100	0.13	0.13	38	3.9	0.02	19000	14000	ND	0.059	NA	ND	0.59	ND	ND	ND	ND	**0.005**	0.001	ND	ND	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	SE164082	6/4/2017		570	450	7700	0.14	ND	1100	0.006	ND	3.1	6.8	2200	0.14	0.24	39	**6.4**	0.16	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE167897	6/7/2017		640	470	7900	0.12	ND	1200	0.007	ND	4.3	7	2200	0.07	0.24	42	**8**	ND	21000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE171359	6/10/2017		600	470	7600	0.14	0.034	1100	0.14	ND	4.9	6.6	2000	0.42	0.41	43	**5**	ND	20000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE174394	12/1/2018		590	490	7200	0.13	ND	1200	0.010	ND	4.9	7.0	2000	0.12	ND	40	**5.6**	ND	20000	18000	ND	**0.06**	NR	ND	0.62	0.0002	ND	ND	0.006	0.002	ND	ND	**0.009**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWA	SE177839	10/4/2018		640	490	7100	0.13	ND	1200	0.02	ND	4.4	6.9	2100	0.16	ND	41	3.6	0.02	21000	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE181445	12/7/2018		590	480	7300	0.14	0.17	1100	0.01	ND	4.4	6.7	1900	0.16	ND	42	2.3	ND	19000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWA	SE187247	6/12/2018		560	470	6600	0.14	ND	1100	0.01	ND	4.4	6.7	2000	0.02	0.25	49	2.6	ND	20000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Monitoring Well	Chemical Report	Date Sampled	Comment	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Threshold Criteria	-	-	-	-	0.3	-	1.9	0.00001	-	6.5–8	-	0.9	0.7	-	4	0.32	-	-	-	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	-	0.0002	0.09	0.0014	0.001	-	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	-	-	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
MWB	135493	6/10/2015		650	370	6300	0.3	ND	840	0.008	ND	2.6	6.9	1900	ND	**1.3**	100	**5**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE148082	14/01/2016		650	370	6000	ND	ND	810	0.012	ND	3.5	7	1700	0.15	**1.3**	69	**7**	0.31	18000	15000	ND	0.13	0.002	ND	0.62	ND	ND	ND	ND	0.001	ND	ND	0.012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	144481	7/04/2016		720	380	6300	0.3	0.02	880	0.007	ND	2.6	7.1	2300	ND	**1.3**	61	4	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE154534	6/07/2016		650	390	6100	0.24	0.008	820	0.008	ND	3.1	7.1	1700	0.10	**0.95**	69	**7.6**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE157864	6/10/2016		600	360	6000	0.22	0.006	830	0.008	ND	3.6	6.9	1800	0.09	**1.1**	69	**6.6**	0.14	17000	10000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE160904	12/01/2017		590	380	6300	ND	ND	850	ND	ND	5	7.2	1700	0.10	0.59	70	**5**	0.04	16000	13000	ND	0.017	NA	ND	0.55	ND	ND	ND	ND	0.001	ND	ND	0.007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	SE164082	6/4/2017		580	360	6000	0.27	ND	760	0.009	ND	2.8	6.6	1700	0.09	**0.71**	77	**6.8**	0.02	17000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE167897	6/7/2017		640	390	6000	0.26	ND	820	0.01	ND	4	7	1800	0.21	**0.83**	75	**8.2**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE171359	6/10/2017		610	380	6000	0.26	0.005	790	0.01	ND	4.1	6.7	1600	0.09	**0.75**	70	**6**	ND	16000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE174394	12/1/2018		600	420	5400	0.24	<5	810	0.005	<0.1	3.6	7.0	1700	0.09	<0.1	66	6.2	<0.01	16000	14000	ND	ND	NR	ND	0.54	ND	ND	ND	0.004	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWB	SE177839	10/4/2018		650	390	5700	0.28	ND	810	0.01	ND	3.6	7.2	1700	0.09	0.46	70	**4.8**	<0.01	16000	9900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE181445	12/7/2018		590	400	5600	0.26	0.021	720	0.007	ND	3.6	6.9	1500	0.08	ND	74	3.5	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWB	SE187247	6/12/2018		550	380	5500	0.27	ND	670	0.006	ND	3.6	6.9	1600	0.05	0.51	76	**4.2**	ND	15000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

ERM

Monitoring Well	Chemical Report	Date Sampled	Comment	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)
			Threshold Criteria	-	-	-	-	0.3	-	1.9	0.00001	-	6.5–8	-	0.9	0.7	-	4	0.32	-
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly
MWC	135493	6/10/2015		62	730	690	0.4	ND	130	**2.2**	ND	0.6	7.1	670	ND	0.17	350	**18**	ND	3900
MWC	SE148082	14/01/2016		56	750	630	0.34	ND	110	**4.9**	ND	0.9	7.2	590	0.12	ND	300	**21**	ND	4300
MWC	144481	7/04/2016		290	660	3700	0.3	0.038	420	**3.1**	ND	1.4	7.2	1900	ND	**4.9**	220	**9**	ND	9600
MWC	SE154534	6/07/2016		55	730	610	0.24	0.006	93	**5.4**	ND	1.0	7.4	580	0.05	0.15	220	**24**	ND	3300
MWC	SE157865	6/10/2016		67	630	770	0.34	ND	120	**5.6**	ND	1.1	7.1	620	0.04	ND	180	**24**	ND	3900
MWC	SE160904	12/01/2017		44	830	880	0.13	ND	89	**7.8**	ND	2	7.6	510	0.12	ND	200	**21**	ND	4200
MWC	SE164082	6/4/2017		34	670	520	0.44	ND	68	**7.3**	ND	0.9	7.1	540	0.06	ND	120	**23**	ND	2900
MWC	SE167897	6/7/2017		26	640	370	0.46	0.008	52	**4.6**	ND	0.8	7.2	430	0.33	0.005	90	**23**	ND	2400
MWC	SE171359	6/10/2017		35	720	500	0.41	ND	73	**4.60**	ND	0.9	7.1	490	0.41	ND	110	**19**	ND	3000
MWC	SE174394	12/1/2018		200	580	2400	0.26	ND	330	12	ND	1.8	6.9	1100	0.16	**1.7**	110	12	ND	8700
MWC	SE177839	10/4/2018		270	550	3200	0.31	ND	440	**15.00**	ND	1.8	6.9	1400	0.22	**2.5**	130	**9.0**	ND	11000
MWC	SE181445	12/7/2018		350	590	4200	0.23	0.019	490	**9.1**	ND	2.6	6.7	1400	0.09	**0.95**	140	**6.5**	ND	12000
MWC	SE187247	6/12/2018		350	580	4200	0.22	ND	500	**6.5**	ND	2.4	6.7	1500	0.07	**2.2**	160	**8.8**	ND	13000

Monitoring Well	Chemical Report	Date Sampled	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
		Threshold Criteria	-	-	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	-	0.0002	0.09	0.0014	0.001	-	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	-	-	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		Monitoring frequency	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
																							CVCs/VOCCs						
MWC	135493	6/10/2015	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE148082	14/01/2016	2400	ND	**0.19**	0.003	ND	0.047	ND	0.011	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	144481	7/04/2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE154534	6/07/2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE157865	6/10/2016	2400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE160904	12/01/2017	2400	ND	**0.017**	NA	0.006	0.05	ND	0.013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	SE164082	6/4/2017	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE167897	6/7/2017	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE171359	6/10/2017	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE174394	12/1/2018	5300	ND	ND	NR	0.01	0.27	ND	0.024	0.004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWC	SE177839	10/4/2018	6500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE181445	12/7/2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWC	SE187247	6/12/2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Monitoring Well	Chemical Report	Date Sampled	Comment	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachlorethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Threshold Criteria	-	-	-	-	0.3	-	1.9	0.00001	-	6.5–8	-	0.9	0.7	-	4	0.32	-	-	-	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	-	0.0002	0.09	0.0014	0.001	-	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	-	-	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
																																								CVCs/VOCCs								
MWD	135493	6/10/2015	leachate	150	2400	2800	0.3	**1.8**	220	0.46	ND	170	7.6	1700	**310**	ND	66	**330**	ND	11000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE148082	14/01/2016	leachate	170	1200	1000	0.32	**0.33**	110	0.87	ND	110	7.3	690	**110**	ND	18	**140**	0.47	5800	2500	48	0.13	0.017	ND	0.49	ND	0.004	ND	ND	0.031	ND	ND	**0.026**	34	0.0028	0.0034	0.023	0.0351	ND	ND	ND	ND	0.0059	ND	0.004	ND
MWD	144481	7/04/2016	leachate	160	2200	2600	0.3	**2.2**	230	0.45	ND	180	7.7	1900	**210**	ND	35	**290**	ND	9600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE154534	6/07/2016	leachate	250	1200	1000	0.14	**5.2**	120	0.96	ND	120	7.3	630	**80**	ND	140	**140**	0.01	5200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE157866	6/10/2016	leachate	210	1600	1600	0.27	0.001	150	0.600	ND	140	7.3	1000	**150**	ND	110	**200**	0.07	7800	4700	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE160904	12/01/2017	leachate	260	2300	2800	ND	**1.100**	230	0.850	ND	210	7.5	1400	**250**	ND	330	**270**	0.04	11000	6200	170	**0.89**	NA	0.014	0.91	ND	0.017	ND	ND	0.03	ND	ND	**0.035**	**3**	0.002	0.0009	0.0034	0.042	ND	ND	ND	ND	**0.0004**	ND	**0.017**	ND
MWD	SE164082	6/4/2017	leachate	260	1500	2200	0.28	**0.920**	190	0.780	ND	130	7.3	1200	**210**	ND	310	**150**	0.19	9400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE167897	6/7/2017	leachate	150	2500	2800	0.35	**1.6**	230	0.42	ND	180	7.5	1700	**310**	ND	100	**320**	0.05	12000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE171359	6/10/2017	leachate	190	2500	3700	0.32	0.300	260	0.28	ND	210.0	7.2	1800	**350**	ND	240	**320**	0.03	13000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE174394	12/1/2018	leachate	160	2400	3100	0.30	1.100	270	0.290	<0.1	220	7.7	1900	330	<0.05	93	340	0.03	13000	7100	29	**0.06**	NR	ND	1.10	ND	0.032	ND	0.006	0.050	ND	ND	0.012	0.006	0.0035	0.0012	0.027	0.097	ND	ND	ND	ND	ND	ND	0.006	ND
MWD	SE177839	10/4/2018	leachate	120	2500	3600	0.34	**1.100**	290	0.18	ND	200.0	7.7	1900	**320.00**	ND	110	**340.0**	0.05	14000	8500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE181445	12/7/2018	leachate	96	2500	3300	0.28	**2**	220	0.18	ND	210	7.6	1700	**330**	ND	81	**320**	0.065	13000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWD	SE187247	6/12/2018	leachate	120	2700	3400	0.28	**1.5**	240	0.19	ND	220	7.5	1900	**340**	ND	59	**340**	0.09	14000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

***As MWD is within the perched landfill leachate water table, the Threshold Criteria are only applicable as indicators of general water quality for comparison to the wells surrounding the landfill. Exceedances of the Threshold Criteria for MWD are expected and do not indicate contamination is leaving the site.**

Monitoring Well	Chemical Report	Date Sampled	Comment	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Threshold Criteria	-	-	-	-	0.3	-	1.9	0.00001	-	6.5–8	-	0.9	0.7	-	4	0.32	-	-	-	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	-	0.0002	0.09	0.0014	0.001	-	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	-	-	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			Analytes	Calcium	Alkalinity	Chloride	Fluoride	Iron	Magnesium	Manganese	Organochlorine pesticides (OCP)	Potassium	pH	Sodium	Ammonia	Nitrate	Sulfate	Total organic carbon	Total phenolics	Electrical conductivity (EC)	Total dissolved solids	Biochemical oxygen demand	Phosphate	Arsenic III & V	Aluminium	Barium	Cadmium	Cobalt	Copper	Chromium VI	Chromium (total)	Lead	Mercury	Zinc	TPH	Benzene	Toluene	Ethylbenzene	total	Tetrachloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Tetrachloroethene (PCE)	1,2-Dichloroethene	Vinyl Chloride	PCBs	PAHs	OPPs
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
																																							CVCs/VOCCs								
MWE	135493	6/10/2015		75	700	860	0.5	0.015	89	0.44	ND	1.7	7.4	730	0.006	ND	140	**8**	ND	4000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE148082	14/01/2016		80	750	850	0.35	0.019	79	0.23	ND	1.1	7.4	690	0.12	ND	200	**10**	0.02	4600	2200	ND	**0.25**	0.005	ND	0.048	ND	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWE	144481	7/04/2016		67	890	640	0.5	0.034	72	0.24	ND	0.9	7.6	840	0.026	0.01	160	**7**	ND	3200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE154534	6/07/2016		57	970	470	0.30	0.021	66	0.43	ND	1.6	7.6	610	0.04	ND	110	**16**	ND	3100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE157867	6/10/2016		61	900	560	0.41	0.012	67	0.110	ND	1.3	7.3	650	0.04	ND	120	**16**	0.01	3600	2100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE160904	12/01/2017		70	1100	580	0.18	0.021	76	0.27	ND	1.8	7.8	610	0.04	ND	130	**13**	ND	3500	2100	ND	**0.07**	NA	ND	0.054	ND	0.004	0.0010	ND	ND	ND	ND	**0.013**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWE	SE164082	6/4/2017		34	1100	360	0.52	0.006	67	**7.3**	ND	0.9	7.3	530	0.07	ND	110	**20**	ND	3200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE167897	6/7/2017		60	1200	340	0.5	0.077	65	0.14	ND	1.5	7.5	570	0.1	ND	99	**26**	ND	3100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE171359	6/10/2017		56	1100	310	0.51	0.015	55	0.55	ND	1.4	7.4	520	0.38	ND	110	**17**	ND	3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE174394	12/1/2018		56	1200	280	0.47	0.010	55	0.240	ND	1.6	7.4	520	0.04	ND	91	**15**	ND	3000	1700	ND	**0.11**	NR	ND	0.04	0.0002	0.008	**0.004**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWE	SE177839	10/4/2018		59	1200	280	0.56	ND	53	0.14	ND	1.2	7.4	550	0.07	ND	85	**7.9**	<0.01	3200	1900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE181445	12/7/2018		56	1200	270	0.51	0.015	53	0.16	ND	1.3	7.4	530	0.09	ND	92	**6**	ND	2900	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MWE	SE187247	6/12/2018		55	1200	300	0.52	0.008	55	ND	ND	0.7	7.3	550	0.22	ND	120	**6.5**	ND	3000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

ATTACHMENT 4 – GROUNDWATER FIELD DATA SHEETS

Groundwater - Well Sampling Data Form

ERM

Job Information			
Date:	6/12/18	Time: arrive	1000 depart 1400.
Project Name:	UHSC - Scone Waste	Project Number:	0450054
Site Location:	Noblet Road, Scone	Sampler:	SC
Well ID:	MW4	Weather:	Fine

Equipment						
Water quality equipment description:	Bailer	In-Situ	Interface probe number:	Solinst 122 3.2015		
Purging equipment: (please circle)	Bailer type:	(Plastic)	Teflon			
	Pump type:	Peristaltic	Submersible	Micro-purge	Amazon	Other:

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	(1.96)	7.85	31.4	49.1	70.7	125.7	196.3

Volume of water in well / V
= Pr x r x h
V = volume in litres
P = 3.14159
r = radius in cm
h = height of water column in cm

Total Well Depth (-) Water level (=) Water Column
15.90 m (-) 6.70 m (=) 9.2 m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
9.2 m (x) 1.96 (=) 18 L

Depth to product: — m Product Thickness: — m Verified with Bailer: Y | N

Water Quality Parameters

Beginning purge time: Ending purge time:

Litres	Time	PH	Temp °C	Cond mS/cm	DO mg/L	Redox mV	Drawdown <10cm	Comments
2.0		–	22.1	19.72	1.92	71.3		
4.0		–	22.1	19.71	2.01	72.5		
6.0		–	22.1	19.71	1.97	72.6		
								Clear, no colour, no odour

*pH, temp, cond readings not necessary if well is purged dry

Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour / drawdown depth

18 **Total Well Volume** Actual amount of water prior to sampling Sample time _____ Containers used 6

N/A **Flow rate** mL/minute Did field parameters stabilise? (Y) N NA Was the well dry purged? Y (N)

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N		
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N		
Was documentation of equipment conducted?	(Y)	N	NA	
Were air bubbles present in vials at time of collection?	Y	(N)	NA	
Was sample for metals field filtered prior to preservations?	Y	(N)	NA	
Duplicate sample collected?	Y	(N)		Duplicate sample ID _____
Rinsate blank collected?	Y	(N)		Rinsate blank ID _____

Groundwater - Well Sampling Data Form

ERM

Job Information			
Date:	6/12/18	Time: arrive	1000 depart 1400
Project Name:	Scone Waste facility	Project Number:	0450054
Site Location:	Noblet Rd Scone	Sampler:	SC
Well ID:	MWB	Weather:	fine

Equipment

Water quality equipment description: In-situ Interface probe number: Solinst 122 3/2015

Purging equipment (please circle): Bailer type: (Plastic) Teflon

Pump type: Peristaltic Submersible Micro-purge Amazon Other:

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	(50mm)	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

Volume of water in well / V
= Pr x r x h
V = volume in litres
P = 3.14159
r = radius in cm
h = height of water column in cm

Total Well Depth (-) Water level (=) Water Column

15.95 m (-) 6.20 m (=) 9.75 m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume

9.75 m (x) 1.96 (=) 190 L

Depth to product: — m Product Thickness: — m Verified with Bailer: Y (N)

Water Quality Parameters

Beginning purge time: Ending purge time:

Litres	Time	PH	Temp °C	Cond mS/cm	DO mg/L	Redox mV	Drawdown <10cm	Comments
2.0		6.98	21.9	16.01	3.47	77.8		
4.0		7.01	21.9	16.01	3.51	79.1		
6.0		7.01	21.9	16.01	3.50	78.8		
								Clear, no odour, no odour.

*pH, temp, cond readings not necessary if well is purged dry

Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour / drawdown depth

19L **Total Well Volume** Actual amount of water prior to sampling

Sample time — Containers used 6.

N/A **Flow rate** mL/minute

Did field parameters stabilise? (Y) N NA

Was the well dry purged? Y (N)

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N	
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	
Was documentation of equipment conducted?	(Y)	N	NA
Were air bubbles present in vials at time of collection?	Y	(N)	NA
Was sample for metals field filtered prior to preservations?	Y	(N)	NA
Duplicate sample collected?	Y	(N)	Duplicate sample ID —
Rinsate blank collected?	Y	(N)	Rinsate blank ID —

Groundwater - Well Sampling Data Form

ERM

Job Information

Date:	7.12.18	Time: arrive	1000 depart 1400
Project Name:	Scone Water facility	Project Number:	0450054
Site Location:	Noblet Rd, Scone	Sampler:	SC
Well ID:	MWC	Weather:	fine

Equipment

Water quality equipment description: In-Situ Interface probe number: Solinst 122 3/2015

Purging equipment (please cirlce)

Bailer type: (Plastic) Teflon

Pump type: Peristaltic Submersible Micro-purge Amazon Other:

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	(50mm)	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

Volume of water in well / V = Pr x r x h
V = volume in litres
P = 3.14159
r = radius in cm
h = height of water column in cm

Total Well Depth (-) Water level (=) Water Column

11.80 m (-) 4.6 m (=) 7.2 m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume

7.2 m (x) 1.96 (=) 14.1 L

Depth to product: — m Product Thickness: — m Verified with Bailer: Y / N

Water Quality Parameters

Beginning purge time: Ending purge time:

Litres	Time	PH	Temp °C	Cond mS/cm	DO mg/L	Redox mV	Drawdown <10cm	Comments
2.0		7.48	21.1	3.91	1.96	71.8		
4.0		7.20	21.1	3.90	2.12	77.1		
6.0		7.20	21.1	3.92	2.10	77.3		
8.0		7.21	21.1	3.92	2.11	77.2		
10.0		7.20	21.1	3.92	2.10	77.1		

*pH, temp, cond readings not necessary if well is purged dry

Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour / drawdown depth

14.1 L **Total Well Volume** Actual amount of water prior to sampling

N/A **Flow rate** mL/minute

Sample time _____ Containers used 6

Did field parameters stabilise? (Y) N NA

Was the well dry purged? Y (N)

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N	
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	
Was documentation of equipment conducted?	(Y)	N	NA
Were air bubbles present in vials at time of collection?	Y	(N)	NA
Was sample for metals field filtered prior to preservations?	Y	(N)	NA
Duplicate sample collected?	Y	(N)	Duplicate sample ID _____
Rinsate blank collected?	Y	(N)	Rinsate blank ID _____

Groundwater - Well Sampling Data Form

ERM

Job Information			
Date:	6.12.18	Time: arrive 1000 depart 1400	
Project Name:	Scone Waste Facility	Project Number:	0450054
Site Location:	Noblet Rd, Scone	Sampler:	SC
Well ID: MW1 – Leachate		Weather:	fine

Equipment						
Water quality equipment description:	Ln - Solu			Interface probe number:	Solinst 122	3120 15
Purging equipment: (please circle)	Bailer type:	(Plastic)	Teflon			
	Pump type:	Peristaltic	Submersible	Micro-purge	Amazon	Other:

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	100mm.	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	(1.96)	7.85	31.4	49.1	70.7	125.7	196.3

Volume of water in well / V = Pr x r x h
V = volume in litres
P = 3.14159
r = radius in cm
h = height of water column in cm

Total Well Depth (-) Water level (=) Water Column
— m (-) 6.8 m (=) _____ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
_____ m (x) _____ (=) _____ L

Depth to product: _____ m Product Thickness: _____ m Verified with Bailer: Y | N

Water Quality Parameters

Beginning purge time: Ending purge time:

Litres	Time	PH	Temp °C	Cond mS/cm	DO mg/L	Redox mV	Drawdown <10cm	Comments

Leachate

*pH, temp, cond readings not necessary if well is purged dry

Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour / drawdown depth

Total Well Volume
Actual amount of water prior to sampling

Flow rate
mL/minute

Sample time _____ Containers used 6

Did field parameters stabilise? Y | N | (NA) Was the well dry purged? Y | (N)

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N	
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	
Was documentation of equipment conducted?	(Y)	N	NA
Were air bubbles present in vials at time of collection?	Y	(N)	NA
Was sample for metals field filtered prior to preservations?	(Y)	N	NA
Duplicate sample collected?	Y	(N)	Duplicate sample ID _____
Rinsate blank collected?	Y	(N)	Rinsate blank ID _____

Groundwater - Well Sampling Data Form

ERM

Job Information			
Date:	6.12.18	Time: arrive	1000 depart 1400
Project Name:	Scone Waste Facility	Project Number:	0450054
Site Location:	Noble Rd, Scone.	Sampler:	SC
Well ID:	MW8	Weather:	fine

Equipment						
Water quality equipment description:	In-situ			Interface probe number:	Solinst 122 312015.	
Purging equipment: (please cirlce)	Bailer type:	(Plastic)	Teflon			
	Pump type:	Peristaltic	Submersible	Micro-purge	Amazon	Other:

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	(50mm)	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

Volume of water in well / V = Pr x r x h
V = volume in litres
P = 3.14159
r = radius in cm
h = height of water column in cm

Total Well Depth (-) Water level (=) Water Column
9.30 m (-) 4.30 m (=) _____ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
_____ m (x) _____ (=) _____ L

Depth to product: _____ m Product Thickness: _____ m Verified with Bailer: Y / N

Water Quality Parameters

Beginning purge time: Ending purge time:

Litres	Time	PH	Temp °C	Cond mS/cm	DO mg/L	Redox mV	Drawdown <10cm	Comments
2.0		7.7	21.9	3.01	2.91	202		
4.0		7.65	21.8	2.98	2.90	205		
6.0		7.65	21.8	2.98	2.90	206		

*pH, temp, cond readings not necessary if well is purged dry

Example Comments: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour / drawdown depth

Total Well Volume
Actual amount of water prior to sampling

Flow rate
mL/minute

Sample time _____ Containers used _____

Did field parameters stabilise? (Y) N NA Was the well dry purged? Y (N)

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N	
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	
Was documentation of equipment conducted?	(Y)	N	NA
Were air bubbles present in vials at time of collection?	Y	(N)	NA
Was sample for metals field filtered prior to preservations?	Y	(N)	NA
Duplicate sample collected?	Y	(N)	Duplicate sample ID _____
Rinsate blank collected?	Y	(N)	Rinsate blank ID _____