DLA Environmental Services
an ERM Group company

ANNUAL GROUNDWATER MONITORING

SCONE WASTE FACILITY AREA

Noblet Road
Scone
NSW 2337

Upper Hunter Shire Council

DLH1186_H001594

February 2018

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ABBREVIATIONS

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Above-ground Storage Tank
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)Pyrene
BGL	Below Ground Level
BH	Borehole
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
DA	Development Application
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DLA	DLA Environmental Services
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
HIL	Health-Based Investigation Level
LOR	Limit of Reporting
MW	Monitoring Well
NATA	National Association of Testing Authorities, Australia
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
OEH	Office of Environmental and Heritage
OPP	Organophosphorus Pesticides
OH&S	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photo-Ionisation Detector
PQL	Practical Quantification Limit
QA/QC	Quality Assurance and Quality Control
RAP	Remedial Action Plan
RPD	Relative Percentage Difference
SAC	Site Acceptance Criteria
SAQP	Sampling Analysis and Quality Plan
SEPP	State Environmental Planning Policy
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WHS	Work Health Safety

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1.0 INTRODUCTION

1.1 General

DLA Environmental Services (DLA) was engaged by Upper Hunter Shire Council (the Client) to conduct annual and quarterly surface and groundwater monitoring of the following area:

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

The Groundwater Monitoring Report provides and overview of the current condition of groundwater at the Site in relation to the Site Criteria and satisfies the groundwater monitoring requirements of Environmental Protection Licence # 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 monitoring is undertaken in April, July and October with annual reporting undertaken in the January monitoring period.

Annual water monitoring was undertaken on 12th January 2018 by staff of DLA.

1.2 Scope of Works

The scope of work provided by Upper Hunter Shire Council indicates that annual and quarterly ground water 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. Site Acceptance Criteria are primarily sourced from Australian and New Zealand guidelines for fresh and marine water quality (ANZECC) 2000 95% trigger values and National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013.

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

Analytes	Units	Site Acceptance Criteria NEPM 2013 and 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[E]	Quarterly
Magnesium	mg/L	NA	Quarterly
Manganese	mg/L	1.9[D]	Quarterly
Organochlorine pesticides	mg/L	0.00001[F]	Quarterly
Potassium	mg/L	410[Q]	Quarterly
pH	pH	6.5 – 8	Quarterly
Sodium	mg/L	NA	Quarterly
Ammonia	mg/L	0.9[D]	Quarterly
Nitrate	mg/L	0.7	Quarterly
Sulfate	mg/L	NA	Quarterly
Total organic carbon	mg/L	4	Quarterly
Total phenolics	mg/L	0.32	Quarterly
Electrical conductivity (EC)	µS/cm	NA	Quarterly
Total dissolved solids	mg/L	NA	Yearly
Biochemical Oxygen	mg/L	NA	Yearly
Phosphate	mg/L	0.015[G]	Yearly
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	Yearly
Aluminium	mg/L	0.055 (pH> 6.5)	Yearly
Barium	mg/L	NA	Yearly
Cadmium	mg/L	0.0002	Yearly
Cobalt	mg/L	0.09[M]	Yearly
Copper	mg/L	0.0014	Yearly
Chromium VI	mg/L	0.001[D]	Yearly

Table 2a: Analytes, Criteria and Monitoring Frequency for Groundwater Monitoring Wells (cont…)

Sampling Parameter	Units	SAC - NEPM 2013 and ANZECC 2000 Fresh Water	Monitoring Frequency
Chromium (total)	mg/L	0.001	Yearly
Lead	mg/L	0.0034	Yearly
Mercury	mg/L	0.0006	Yearly
Zinc	mg/L	0.008[D]	Yearly
TPH	mg/L	0.6[I]	Yearly
Benzene	mg/L	0.95	Yearly
Toluene	mg/L	0.18[L]	Yearly
Ethylbenzene	mg/L	0.08[L]	Yearly
CVCs/VOCCs:			
- **Total**	mg/L	NA	Yearly
- **Tetrachlorethene (TCE)**	mg/L	NA	Yearly
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	Yearly
- **Tetrachloroethene (PCE)**	mg/L	0.05[N]	Yearly
- **1,2-Dichloroethene**	mg/L	0.03[P]	Yearly
Vinyl Chloride	mg/L	0.0003[N]	Yearly
PCBs	mg/L	0.00003[A]	Yearly
PAHs	mg/L	0.016[B]	Yearly
OPPs	mg/L	0.00002[C]	Yearly

A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Interim working level, in absence of reliable trigger value
F - Trigger value for DDT used in absence of trigger value for total OCP
G - Filterable Reactive Phosphate
I - Dutch Intervention (2000) Mineral Oil Criteria
L – ANZECC 2000 Low reliability trigger value
M – ANZECC 2000 Moderate reliability trigger value
N - NEPM 2013 drinking water criteria
P - Australian Drinking Water Guidelines 2011
Q – Poor (acceptable) drinking water criteria, World Health Organisation Guidelines for Drinking-water Quality 2009

3.0 SAMPLING METHODOLOGY

3.1 Groundwater Sampling

Groundwater samples were collected from five well locations. Purging and sampling of monitoring wells was conducted in accordance with the NEPM (NEPC, 2013), the *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007) and the *Murray-Darling Basin Groundwater Quality Sampling Guidelines*.

Wells were purged with a low flow peristaltic pump or 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 a TPS 90 FLMV Water Quality Meter and a flow through cell. Stable conditions were indicated by monitoring the following parameters for three consecutive readings of:

- PH ± 0.1 unit;
- EC± 5%;
- Temp ± 0.20;
- Redox ± 10%; and,
- Dissolved Oxygen ± 10%.

Refer to **Attachment 2 –** TPS 90 FLMV Water Quality Meter Calibration Certificate

Samples were obtained using a low-flow peristaltic pump with disposable Low Density Polyethelene Tubing (LDPE) tubing / samples were obtained using a disposable bailer.

Groundwater samples were collected into laboratory prepared sample containers for specific analytes, i.e. into a combination of plastic unpreserved, plastic preserved, glass amber unpreserved and preserved glass vials. All 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 for metals were lab filtered prior to testing. All samples were then placed immediately into a chilled esky to prevent the loss of potential volatile components.

Decontamination procedures between sampling events and sampling locations are outlined below.

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;
- Rinsing with deionised water; and,
- Disposable Teflon tubing was used with the low flow pump and was replaced between sample locations (Groundwater Sampling Only).

It is opinion of DLA that decontamination procedures were appropriate during groundwater sampling and that no cross contamination can be inferred.

4.0 RESULTS

All wells were sampled during the January 2018 ground water monitoring event, results are detailed below. Refer to **Table 4a to 4j** for results and **Figure 3** for sampling locations.

Table 4a – Annual Groundwater Results Comparison January 2017 - January 2018 (MWA)

Sampling Parameter	Units	SAC (mg/L)	MWA Jan 2017	MWA Apr 2017	MWA July 2017	MWA Oct 2017	MWA Jan 2018
Calcium	mg/L	NA	600	570	640	600	590
Alkalinity (total)	mg/L	NA	460	450	470	470	490
Chloride	mg/L	NA	8200	7700	7900	7600	7200
Fluoride	mg/L	NA	ND	0.14	0.12	0.14	0.13
Iron	mg/L	0.3[B]	ND	ND	ND	0.034	ND
Magnesium	mg/L	NA	1200	1100	1200	1100	1200
Manganese	mg/L	1.9[A]	0.004	0.006	0.007	0.014	0.010
OCP	mg/L	0.00001[C]	ND	ND	ND	ND	ND
Potassium	mg/L	410[D]	5.6	3.1	4.3	4.9	4.9
pH	pH	6.5 – 8	7.3	6.8	7.0	6.6	7.0
Sodium	mg/L	NA	2100	2200	2200	2000	2000
Ammonia	mg/L	0.9[D]	0.13	0.14	0.07	0.42	0.12
Nitrate	mg/L	0.7	0.13	0.24	0.24	0.41	ND
Sulfate	mg/L	NA	38	39	42	43	40
Total Organic Carbon	mg/L	4	3.9	**6.4**	**8.0**	**5.0**	**5.6**
Total phenolics	mg/L	0.32	0.02	0.16	ND	ND	ND
EC	µS/cm	NA	19000	21000	21000	20000	20000

Samples highlighted in **Bold** exceed SAC
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

Table 4b – Annual Groundwater Results Comparison January 2018 (MWA) Yearly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWA Jan 2017	MWA Jan 2018
Total dissolved solids	mg/L	NA	14000	18000
Biochemical Oxygen Demand (BOD)	mg/L	NA	ND	ND
Phosphate	mg/L	0.015[E]	**0.059**	**0.06**
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	0.001	0.001
Aluminium	mg/L	0.055 (pH> 6.5)	ND	ND
Barium	mg/L	NA	0.59	0.62
Cadmium	mg/L	0.0002	ND	0.0002
Cobalt	mg/L	0.09[H]	ND	ND
Copper	mg/L	0.0014	ND	ND
Chromium VI	mg/L	0.001[D]	**0.005**	**0.006**
Chromium (total)	mg/L	0.001	0.001	**0.002**
Lead	mg/L	0.0034	ND	ND
Mercury	mg/L	0.0006	ND	ND
Zinc	mg/L	0.008[D]	0.008	**0.009**
TPH	mg/L	0.6[F]	ND	ND
Benzene	mg/L	0.95	ND	ND
Toluene	mg/L	0.18[G]	ND	ND
Ethylbenzene	mg/L	0.08[G]	ND	ND
CVCs/VOCCs:				
- **Total**	mg/L	NA	ND	ND
- **Tetrachlorethene (TCE)**	mg/L	NA	ND	ND
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	ND	ND
- **Tetrachloroethene (PCE)**	mg/L	0.05[I]	ND	ND
- **1,2-Dichloroethene**	mg/L	0.03[J]	ND	ND
Vinyl Chloride		0.0003[I]	ND	ND
PCBs	mg/L	0.00003[A]	ND	ND
PAHs	mg/L	0.016[B]	ND	ND
OPPs	mg/L	0.00002[C]	ND	ND

Samples highlighted in **Bold** exceed Site Acceptance Criteria
ND = No Detection above Laboratory LOR
A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Filterable Reactive Phosphate
F - Dutch Intervention (2000) Mineral Oil Criteria
G – ANZECC 2000 Low reliability trigger value
H – ANZECC 2000 Moderate reliability trigger value
I - NEPM 2013 drinking water criteria
J - Australian Drinking Water Guidelines 2011

Table 4c – Annual Groundwater Results Comparison January 2018 (MWB) Quarterly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWB Jan 2017	MWB Apr 2017	MWB July 2017	MWB Oct 2017	MWB Jan 2018
Calcium	mg/L	NA	590	580	640	610	600
Alkalinity (total)	mg/L	NA	380	360	390	380	420
Chloride	mg/L	NA	6300	6000	6000	6000	5400
Fluoride	mg/L	NA	ND	0.27	0.26	0.26	0.24
Iron	mg/L	0.3[B]	ND	ND	ND	0.005	ND
Magnesium	mg/L	NA	850	760	820	790	810
Manganese	mg/L	1.9[A]	ND	0.009	0.01	0.009	0.005
OCP	mg/L	0.00001[C]	ND	ND	ND	ND	<0.1
Potassium	mg/L	410[D]	5	2.8	4.0	4.1	3.6
pH	pH	6.5 – 8	7.2	6.6	7.0	6.7	7.0
Sodium	mg/L	NA	1700	1700	1800	1600	1700
Ammonia	mg/L	0.9[D]	0.10	0.09	0.21	0.09	0.09
Nitrate	mg/L	0.7	0.59	**0.71**	**0.83**	**0.75**	ND
Sulfate	mg/L	NA	70	77	75	70	66
Total Organic Carbon (TOC)	mg/L	4	**5**	**6.8**	**8.2**	**6.3**	**6.2**
Total phenolics	mg/L	0.32	0.04	0.02	ND	ND	ND
EC	µS/cm	NA	16000	17000	16000	16000	16000

Samples highlighted in **Bold** exceed SAC

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

Table 4d – Annual Groundwater Results Comparison January 2018 (MWC) Quarterly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWB Jan 2017	MWB Jan 2018
Total dissolved solids	mg/L	NA	13000	14000
Biochemical Oxygen Demand (BOD)	mg/L	NA	ND	ND
Phosphate	mg/L	0.015[E]	**0.017**	ND
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	0.002	0.001
Aluminium	mg/L	0.055 (pH> 6.5)	ND	ND
Barium	mg/L	NA	0.55	0.54
Cadmium	mg/L	0.0002	ND	ND
Cobalt	mg/L	0.09[H]	ND	ND
Copper	mg/L	0.0014	ND	ND
Chromium VI	mg/L	0.001[D]	ND	**0.004**
Chromium (total)	mg/L	0.001	0.001	**0.002**
Lead	mg/L	0.0034	ND	ND
Mercury	mg/L	0.0006	ND	ND
Zinc	mg/L	0.008[D]	0.007	ND
TPH	mg/L	0.6[F]	ND	ND
Benzene	mg/L	0.95	ND	ND
Toluene	mg/L	0.18[G]	ND	ND
Ethylbenzene	mg/L	0.08[G]	ND	ND
CVCs/VOCCs:				
- **Total**	mg/L	NA	ND	ND
- **Tetrachlorethene (TCE)**	mg/L	NA	ND	ND
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	ND	ND
- **Tetrachloroethene (PCE)**	mg/L	0.05[I]	ND	ND
- **1,2-Dichloroethene**	mg/L	0.03[J]	ND	ND
Vinyl Chloride		0.0003[I]	ND	ND
PCBs	mg/L	0.00003[A]	ND	ND
PAHs	mg/L	0.016[B]	ND	ND
OPPs	mg/L	0.00002[C]	ND	ND

Samples highlighted in **Bold** exceed Site Acceptance Criteria
ND = No Detection above Laboratory LOR
A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Filterable Reactive Phosphate
F - Dutch Intervention (2000) Mineral Oil Criteria
G – ANZECC 2000 Low reliability trigger value
H – ANZECC 2000 Moderate reliability trigger value
I - NEPM 2013 drinking water criteria
J - Australian Drinking Water Guidelines 2011

Table 4e – Annual Groundwater Results Comparison January 2018 (MWC) Quarterly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWC Jan 2017	MWC Apr 2017	MWC July 2017	MWC Oct 2018	MWC Jan 2018
Calcium	mg/L	NA	44	34	26	35	200
Alkalinity (total)	mg/L	NA	830	670	640	720	580
Chloride	mg/L	NA	880	520	370	500	2400
Fluoride	mg/L	NA	0.13	0.44	0.46	0.41	0.26
Iron	mg/L	0.3[B]	ND	ND	0.008	ND	ND
Magnesium	mg/L	NA	89	68	52	73	330
Manganese	mg/L	1.9[A]	**7.8**	**7.3**	**4.6**	**4.6**	**12**
OCP	mg/L	0.00001[C]	ND	ND	ND	ND	ND
Potassium	mg/L	410[D]	2	0.9	0.8	0.9	1.8
pH	pH	6.5 – 8	7.6	7.1	7.2	7.1	6.9
Sodium	mg/L	NA	510	540	430	490	1100
Ammonia	mg/L	0.9[D]	0.12	0.06	0.33	0.41	0.16
Nitrate	mg/L	0.7	ND	ND	0.005	ND	**1.7**
Sulfate	mg/L	NA	200	120	90	110	110
Total Organic Carbon (TOC)	mg/L	4	**21**	**23**	**23**	**19**	**12**
Total phenolics	mg/L	0.32	ND	ND	ND	ND	ND
EC	µS/c	NA	4200	2900	2400	3000	8700

Samples highlighted in **Bold** exceed SAC
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

Table 4f – Annual Groundwater Results Comparison January 2018 (MWC) Yearly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWC Jan 2017	MWC Jan 2018
Total dissolved solids	mg/L	NA	2400	5300
Biochemical Oxygen Demand (BOD)	mg/L	NA	ND	ND
Phosphate	mg/L	0.015[E]	**0.017**	ND
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	NA	ND
Aluminium	mg/L	0.055 (pH> 6.5)	**6**	0.01
Barium	mg/L	NA	0.05	0.27
Cadmium	mg/L	0.0002	ND	ND
Cobalt	mg/L	0.09[H]	0.013	0.024
Copper	mg/L	0.0014	ND	**0.004**
Chromium VI	mg/L	0.001[D]	ND	ND
Chromium (total)	mg/L	0.001	ND	ND
Lead	mg/L	0.0034	ND	ND
Mercury	mg/L	0.0006	ND	ND
Zinc	mg/L	0.008[D]	ND	ND
TPH	mg/L	0.6[F]	ND	ND
Benzene	mg/L	0.95	ND	ND
Toluene	mg/L	0.18[G]	ND	ND
Ethylbenzene	mg/L	0.08[G]	ND	ND
CVCs/VOCCs:				
- **Total**	mg/L	NA	ND	ND
- **Tetrachlorethene (TCE)**	mg/L	NA	ND	ND
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	ND	ND
- **Tetrachloroethene (PCE)**	mg/L	0.05[I]	ND	ND
- **1,2-Dichloroethene**	mg/L	0.03[J]	ND	ND
Vinyl Chloride		0.0003[I]	ND	ND
PCBs	mg/L	0.00003[A]	ND	ND
PAHs	mg/L	0.016[B]	ND	ND
OPPs	mg/L	0.00002[C]	ND	ND

Samples highlighted in **Bold** exceed Site Acceptance Criteria
ND = No Detection above Laboratory LOR
A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Filterable Reactive Phosphate
F - Dutch Intervention (2000) Mineral Oil Criteria
G – ANZECC 2000 Low reliability trigger value
H – ANZECC 2000 Moderate reliability trigger value
I - NEPM 2013 drinking water criteria
J - Australian Drinking Water Guidelines 2011

Table 4g – Annual Groundwater Results Comparison January 2018 (MWD) Quarterly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWD (leachate) Jan 2017	MWD (leachate) Apr 2017	MWD (leachate) July 2017	MWD (leachate) Oct 2017	MWD (leachate) Jan 2018
Calcium	mg/L	NA	260	260	150	190	160
Alkalinity (total)	mg/L	NA	2300	1500	2500	2500	2400
Chloride	mg/L	NA	2800	2200	2800	3700	3100
Fluoride	mg/L	NA	ND	0.28	0.35	0.32	0.30
Iron	mg/L	0.3[B]	**1.1**	**0.920**	**1.6**	0.3	**1.1**
Magnesium	mg/L	NA	230	190	230	260	270
Manganese	mg/L	1.9[A]	0.850	0.780	0.42	0.28	0.29
OCP	mg/L	0.00001[C]	ND	ND	ND	ND	ND
Potassium	mg/L	410[D]	210	130	180	210	220
pH	pH	6.5 – 8	7.5	7.3	7.5	7.2	7.7
Sodium	mg/L	NA	1400	1200	1700	1800	1900
Ammonia	mg/L	0.9[D]	**250**	**210**	**310**	**350**	**330**
Nitrate	mg/L	0.7	ND	ND	ND	ND	ND
Sulfate	mg/L	NA	330	310	100	240	93
Total Organic Carbon (TOC)	mg/L	4	**270**	**150**	**320**	**320**	**340**
Total phenolics	mg/L	0.32	0.04	0.19	0.05	0.03	0.03
EC	µS/c	NA	11000	9400	12000	13000	13000

Samples highlighted in **Bold** exceed SAC
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

Table 4h – Annual Groundwater Results Comparison January 2018 (MWD-Leachate) Yearly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWD Jan 2017	MWD Jan 2018
Total dissolved solids	mg/L	NA	6200	7100
Biochemical Oxygen Demand (BOD)	mg/L	NA	170	29
Phosphate	mg/L	0.015[E]	**0.89**	**0.06**
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	0.012	0.01
Aluminium	mg/L	0.055 (pH> 6.5)	**14**	ND
Barium	mg/L	NA	0.91	1.10
Cadmium	mg/L	0.0002	ND	ND
Cobalt	mg/L	0.09[H]	0.017	0.032
Copper	mg/L	0.0014	ND	ND
Chromium VI	mg/L	0.001[D]	ND	**0.006**
Chromium (total)	mg/L	0.001	**0.03**	**0.050**
Lead	mg/L	0.0034	ND	ND
Mercury	mg/L	0.0006	ND	ND
Zinc	mg/L	0.008[D]	**0.035**	**0.012**
TPH	mg/L	0.6[F]	**3**	0.006
Benzene	mg/L	0.95	0.002	0.0035
Toluene	mg/L	0.18[G]	0.0009	0.0012
Ethylbenzene	mg/L	0.08[G]	0.0034	0.027
CVCs/VOCCs:				
- **Total**	mg/L	NA	0.042	0.097
- **Tetrachlorethene (TCE)**	mg/L	NA	ND	ND
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	ND	ND
- **Tetrachloroethene (PCE)**	mg/L	0.05[I]	ND	ND
- **1,2-Dichloroethene**	mg/L	0.03[J]	ND	ND
Vinyl Chloride		0.0003[I]	**0.0004**	ND
PCBs	mg/L	0.00003[A]	ND	ND
PAHs	mg/L	0.016[B]	**0.017**	0.006
OPPs	mg/L	0.00002[C]	ND	ND

Samples highlighted in **Bold** exceed Site Acceptance Criteria
ND = No Detection above Laboratory LOR
A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Filterable Reactive Phosphate
F - Dutch Intervention (2000) Mineral Oil Criteria
G – ANZECC 2000 Low reliability trigger value
H – ANZECC 2000 Moderate reliability trigger value
I - NEPM 2013 drinking water criteria
J - Australian Drinking Water Guidelines 2011

As MWD is within the perched landfill leachate water table, the SAC are only applicable as indicators of general water quality for comparison to the wells surrounding the landfill. Exceedances of the Site Acceptance Criteria for MWD are expected due to the location of the monitoring well and do not indicate contamination is leaving the site.

Table 4i – Annual Groundwater Results Comparison January 2018 (MWE) Quarterly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWE Jan 2017	MWE Apr 2017	MWE July 2017	MWE Oct 2017	MWE Jan 2018
Calcium	mg/	NA	70	34	60	56	56
Alkalinity (total)	mg/	NA	1100	1100	1200	1100	1200
Chloride	mg/	NA	580	360	340	310	280
Fluoride	mg/	NA	0.18	0.52	0.5	0.51	0.47
Iron	mg/	0.3[B]	0.021	0.006	0.077	0.015	0.01
Magnesium	mg/	NA	76	67	65	55	55
Manganese	mg/	1.9[A]	0.27	**7.3**	0.14	0.055	0.24
OCP	mg/	0.00001[C]	ND	ND	ND	ND	ND
Potassium	mg/	410[D]	1.8	0.9	1.5	1.4	1.6
pH	pH	6.5 – 8	7.8	7.3	7.5	7.4	7.4
Sodium	mg/	NA	610	530	570	520	520
Ammonia	mg/	0.9[D]	0.04	0.07	0.1	0.38	0.04
Nitrate	mg/	0.7	ND	ND	ND	ND	ND
Sulfate	mg/	NA	130	110	99	110	91
Total Organic Carbon (TOC)	mg/	4	**13**	**20**	**26**	**17**	**15**
Total phenolics	mg/	0.32	ND	ND	ND	ND	ND
EC	µS/c	NA	3500	3200	3100	3000	3000

Samples highlighted in **Bold** exceed SAC
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

Table 4j – Annual Groundwater Results Comparison January 2017 (MWE) Yearly Analytes

Sampling Parameter	Units	SAC (mg/L)	MWE Jan 2017	MWE Jan 2018
Total dissolved solids	mg/L	NA	2100	1700
Biochemical Oxygen Demand (BOD)	mg/L	NA	ND	ND
Phosphate	mg/L	0.015[E]	0.07	**0.11**
Arsenic III & V	mg/L	0.024 (III), 0.013 (V)	0.004	0.006
Aluminium	mg/L	0.055 (pH> 6.5)	ND	ND
Barium	mg/L	NA	0.054	0.04
Cadmium	mg/L	0.0002	ND	0.0002
Cobalt	mg/L	0.09[H]	0.004	0.008
Copper	mg/L	0.0014	0.001	**0.004**
Chromium VI	mg/L	0.001[D]	ND	ND
Chromium (total)	mg/L	0.001	ND	ND
Lead	mg/L	0.0034	ND	ND
Mercury	mg/L	0.0006	ND	ND
Zinc	mg/L	0.008[D]	**0.013**	ND
TPH	mg/L	0.6[F]	ND	ND
Benzene	mg/L	0.95	ND	ND
Toluene	mg/L	0.18[G]	ND	ND
Ethylbenzene	mg/L	0.08[G]	ND	ND
CVCs/VOCCs:				
- **Total**	mg/L	NA	ND	ND
- **Tetrachlorethene (TCE)**	mg/L	NA	ND	ND
- **1,1,1-Trichloroethane (TCA)**	mg/L	6500 (1,1,2 TCA)	ND	ND
- **Tetrachloroethene (PCE)**	mg/L	0.05[I]	ND	ND
- **1,2-Dichloroethene**	mg/L	0.03[J]	ND	ND
Vinyl Chloride		0.0003[I]	ND	ND
PCBs	mg/L	0.00003[A]	ND	ND
PAHs	mg/L	0.016[B]	ND	ND
OPPs	mg/L	0.00002[C]	ND	ND

Samples highlighted in **Bold** exceed Site Acceptance Criteria
ND = No Detection above Laboratory LOR
A - Trigger value for Aroclor 1254 used in absence of trigger value for total PCBs
B - Trigger value for Naphthalene used in absence of reliable trigger value for total PAHs
C - Trigger value of Azinphos methyl used in absence of reliable trigger value for total OPP
D – Trigger value may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance
E - Filterable Reactive Phosphate
F - Dutch Intervention (2000) Mineral Oil Criteria
G – ANZECC 2000 Low reliability trigger value
H – ANZECC 2000 Moderate reliability trigger value
I - NEPM 2013 drinking water criteria
J - Australian Drinking Water Guidelines 2011

5.0 DISCUSSION

Due to the topography of the Site, 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 perched landfill water table, being the leachate within the landfill.

The water sampled from well MWD is landfill leachate and as such the Site Acceptance Criteria (SAC) is not used as a comparison, only as an indicator of current conditions. 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 January 2018 sampling event in relation to the SAC. Key increasing or decreasing trends and exceedances of the SAC are shown:

MWA

- MWA had no exceedances of the SAC other than a concentration of Hexavalent Chromium (0.006 mg/L) exceeding the SAC (0.001 mg/L). Hexavalent Chromium was detected above SAC in 2017 annual monitoring evet at a slightly lower concentration. Hexavalent Chromium was not detected in MWA before the last two annual sampling events (2017-2018);
- MWA was reported to contain a concentration of Zinc at 0.009 just above the SAC (0.008 mg/L), decreasing from the January 2016 reading of 0.009 mg/L.
- A concentration of TOC (5.6 mg/L) was reported in MWA exceeding the SAC (4 mg/L). TOC has exceeded criteria in MWA since April 2017 sampling event; and is steadily declining.
- Phosphate in MWA recorded an exceedance of 0.06 mg/L slightly higher than the SAC of 0.015 mg/L, this exceedance is not dissimilar to the annual 2017 recorded concentration of 0.05 mg/L.

All other analytes reported concentrations consistent with previous monitoring data.

Refer to **Attachment 4:** Graph 1 – Analyte Trend MWA

MWB

- MWB presented a reduction for TOC, Potassium and Nitrate when comparing to the Jan 2017 annual sampling event where all these contaminants were recorded exceedances of SAC; and,
- Hexavalent Chromium (0.004 mg/L) exceeded the Site Acceptance Criteria (0.001 mg/L).
- MWA had no other exceedances of the Site Acceptance Criteria reported for the 2018 annual ground water monitoring event.

All other analytes reported concentrations consistent with previous monitoring data.

MWC

- A concentration of Manganese (12 mg/L) was reported in MWC exceeding the SAC (1.9 mg/L), representing an increasing trend in concentration, this is the highest recorded concentration over the past 12 months.
- A concentration of TOC (12 mg/L) was reported in MWC exceeding the SAC (1.9 mg/L), which is a reduction from previous reported concentrations. This well has exceeded the SAC for TOC all of the past six sampling events;
- A concentration of Nitrate (1.7 mg/L) was reported in MWC slightly exceeding the SAC (0.7 mg/L). This is the first recorded exceedance of Nitrate in this well in the last 12 months of monitoring; and,
- A concentration of Copper (0.004 mg/L) was reported in MWC slightly exceeding the SAC (0.001 mg/L).

All other analytes reported concentrations consistent with previous monitoring data.
Refer to **Attachment 4:** Graph 2 – Analyte Trend MWC

MWD

- Well MWD was reported to contain no detection of Nitrate, giving no indication that the Nitrate in the affected wells is sourced from the landfill being that this well is into the leachate aquifer. The Nitrate may be migrating onto the site from the farmland to the north through the local ground water.

The following changes in monitoring parameter concentrations have occurred in the landfill leachate well MWD during the January 2018 monitoring event;

- Ammonia has increased from 250 mg/L in Jan 2017 to a concentration of 330 mg/L (Jan 2018) and is substantially higher than in the other wells;

Refer to **Attachment 4:** Graph 5A – Analyte Trend Ammonia MWD

- Iron concentration of 1.1 mg/L has remained consistently high and is substantially higher than in the other wells;
- TOC has increased to 340 mg/L, this well has reported exceedances for TOC since monitoring commenced in 2015. TOC is substantially higher in MWD than in the other wells;
- Hexavalent Chromium is included in the yearly set of analytes and has presented this event with an exceedance in concentration of 0.006 mg/L. Hexavalent Chromium has not been detected in this well since monitoring commenced in 2015.
- Zinc concentrations exceeded Site Acceptance criteria with a result of 0.12 mg/L but experienced a steep decline from the 2017 annual sampling event (0.35 mg/L).
- Phosphate in MWA recorded an exceedance of 0.06 mg/L slightly higher than the adopted criteria of 0.015 mg/L. This exceedance is much lower than the annual 2017 recorded concentration of 0.89 mg/L.
- Iron in MWD exceeded Site Acceptance criteria (0.3 mg/L) with a recorded concentration of 1.1 mg/L, this exceedance is not uncommon as iron has displayed similar concentrations over the past 10 monitoring events with the exception of Oct 2016 and Oct 2017 where iron was reported below SAC.

Refer to **Attachment 4:** Graph 6 – Iron Analyte Trend MWD

There were no other recorded exceedances of the SAC in MWD during this annual sampling event.

MWE

- A concentration of TOC (15 mg/L) was reported in MWE exceeding the SAC (1.9 mg/L), which is consistent with previous reported concentrations. Concentrations have been reported between 7-16 mg/L in the previous four sampling events. This well has exceeded the SAC for TOC all of the past seven sampling events. The TOC concentration in MWE indicates that TOC is likely to be elevated in the local groundwater;
- A concentration of Copper (0.004 mg/L) was reported in MWE slightly exceeding the SAC (0.001 mg/L);
- A concentration of Alkalinity (1,200 mg/L) was reported in MWE representing an increasing trend in concentration. No SAC has been established at the Site for Alkalinity at the Site; and,
- A concentration of Chloride (280 mg/L) was reported in MWE representing a decreasing trend in concentration. No SAC has been established at the Site for Alkalinity at the Site.

Refer to **Attachment 4-** Graph 3 to view the established trend for this location.

All other analytes reported concentrations consistent with previous monitoring data.

Summary – All Monitoring Locations

The SAC used for TOC is intended for drinking water, not groundwater. Due to the magnitude of the exceedances and the intention of the SAC used, these exceedances are regarded as minor.

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

The following analytes exceeded the SAC during the January 2018 sampling events; Hexavalent Chromium in MWA and MWB, TOC in MWA, MWB, MWC and MWE, Manganese in MWC, Zinc in MWA, Nitrate in MWC, Copper in MWC and MWE and Phosphate in MWA. The data trends will become more established as more results become available.

Refer to **Attachment 3** – Data Log

6.0 CONCLUSIONS

The results of laboratory analysis of the samples collected from the Scone Waste Landfill during the January 2018 annual sampling event confirmed several exceedances of the Site Acceptance Criteria in the wells external to the landfill. The Site Acceptance 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 Site Acceptance Criteria during the January 2018 sampling events; Hexavalent Chromium in MWA and MWB, TOC in MWA, MWB, MWC and MWE, Manganese in MWC, Zinc in MWA, Nitrate in MWC, Copper in MWC and MWE and Phosphate in MWA.

The majority of exceedances are explained by local conditions or regarded as minor. Trending of these analytes over time may indicate a seasonal fluctuation of regional groundwater conditions.

The concentrations reported in MWD are substantially higher than other wells. This indicates that it is unlikely that major releases of landfill leachate into the local groundwater are occurring.

The elevated concentrations of Manganese, Nitrate, Copper, Phosphate, Alkalinity and Zinc in the landfill external wells does not indicate the concentrations are due to the landfill leachate, future testing and trending of data will allow for appropriate comparisons.

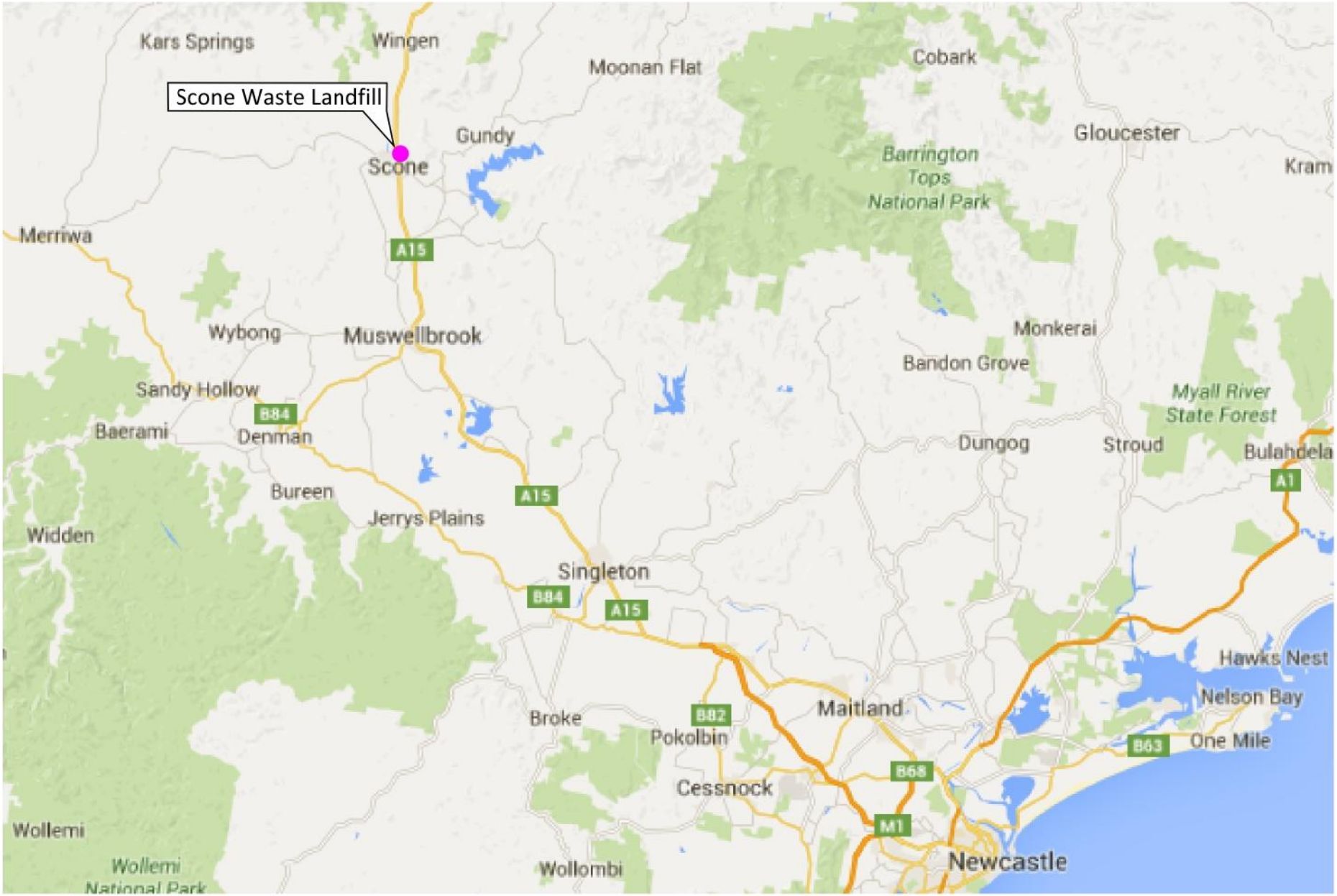
There were no other exceedances of the Site Acceptance Criteria, Further monitoring may reveal the source and extent of elevated concentrations of particular analytes. As more data becomes available, it will become clearer which analytes are consistently elevated and may allow for determining the source of contamination.

The next water sampling event will be the quarterly monitoring which will be undertaken in April 2018.

7.0 REFERENCES

- *Australian and New Zealand Guidelines for the Management of Contaminated Sites* (ANZECC/NHMRC 1992);
- *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000);
- *Australian Drinking Water Guidelines, National Water Quality Management Strategy* 2011;
- Chapman, G A, Murphy, C L, Tille, P J, Atkinson, G and Morse, R J, *Sydney Soil Landscapes Map*, Series 9130 (1989);
- *Contaminated Land Management Act 1997* (NSW);
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA 2011);
- *Contaminated Sites: Guidelines on Duty to Report Contamination under the Contamination Land Management Act 1997* (NSW DECC, 2009);
- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007);
- *Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report* (NSW EPA 1999);
- *Contaminated Sites: Sampling Design Guidelines* (NSW EPA 1995);
- *Environmental Guidelines: Solid Waste Landfills* (NSW EPA, 1996);
- *Health - Based Soil Investigation Levels, Imray, P & Langley, A, National Environmental Health Forum Monographs, Soil Series No. 2 (2nd Ed), South Australian Health Commission* (NEHF 1998b);
- *National Environment Protection (Assessment of Site Contamination) Measure (No.1)* (NEPC, 2013);
- *Storage and Handling of Dangerous Goods Code of Practice 2005*;
- *Work Health and Safety Act 2011* (NSW) and associated regulations.
- R.W. Young *and others*, Ferruginous weathering under cool temperate climates during the Late Pleistocene in southeastern Australia, *Zeitschrift fur Geomorphologie*, 38(1), 1994;
- *Quality Criteria for Water*, U.S. Environmental Protection Agency, July 1976;
- *Potassium in Drinking-water Background document for development of WHO Guidelines for Drinking-water Quality*, World Health Organization, 2009;
- *Ambient Water Quality Guidelines for Organic Carbon*, Ministry of Environment, Lands and Parks, British Columbia, Canada 2001.

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

DLA Environmental Services
A Pacific Environment company

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

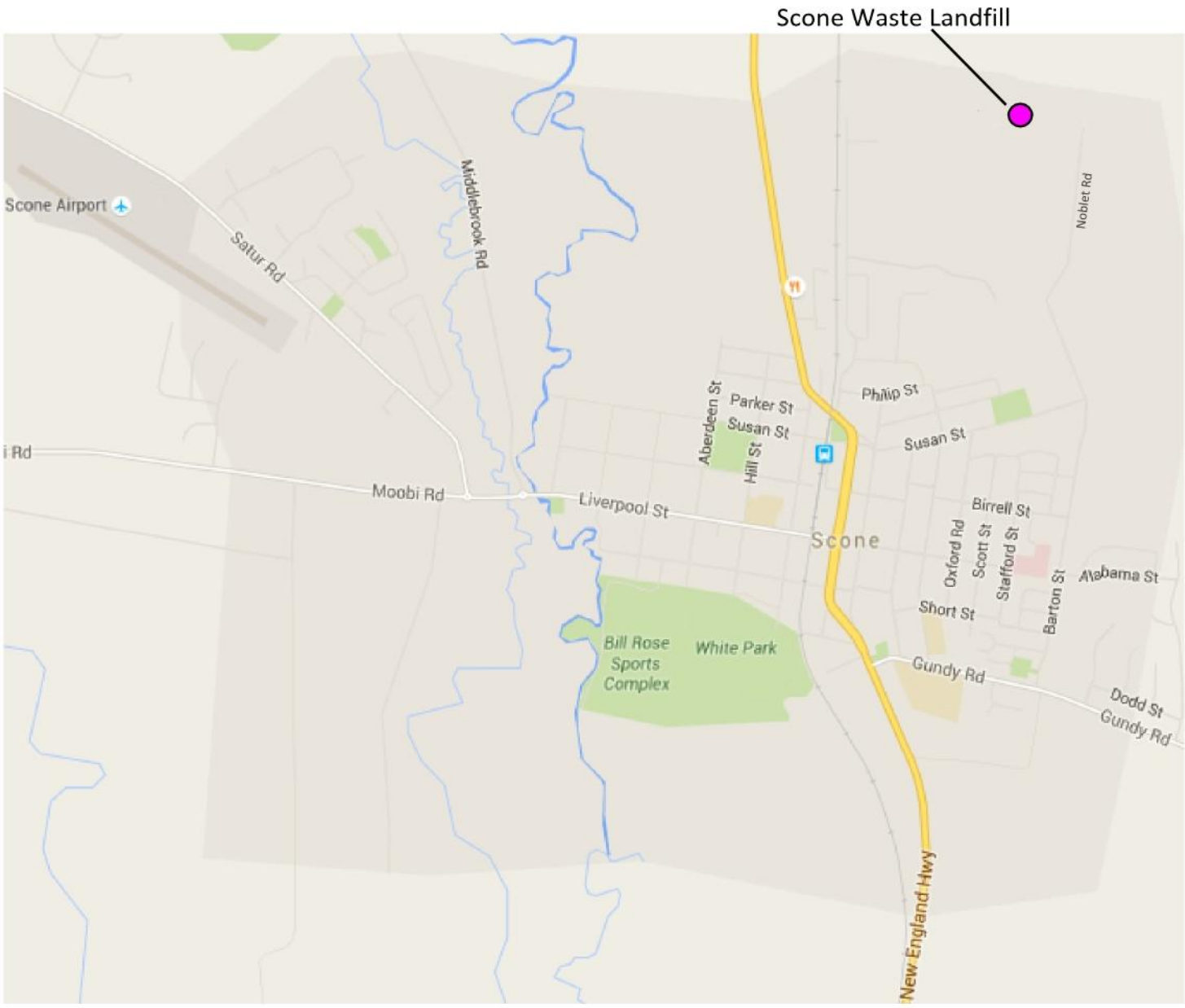
Maitland Office
Phone (02) 4933 0001

Title: Site location regional

Client	Project No.	Figure No	Date
Upper Hunter Shire Council	DLH1186	1	3/11/2015
	Scale: As Shown	Compiled: BF	Revision: R01

FIGURE 2 – SITE LOCATION LOCAL

N



Legend

Site Location - Noblet Rd, Scone

Approximate Scale

0 km 0.5 km 1 km

DLA Environmental Services
A Pacific Environment company

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	3/11/2015

Project No.	Scale	Compiled	Revision
DLH1186	As Shown	BF	R01

FIGURE 3 - SITE LAYOUT WITH SAMPLE LOCATIONS

Legend

- Groundwater well location

N

Approximate Scale

0m 50m 100m

DLA Environmental Services
A Pacific Environment company

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	16/10/2015
	Scale: As Shown	Compiled: BF	Revision: R01

ATTACHMENT 1 – NATA CERTIFIED ANALYTICAL RESULTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Kathrine Skeen
Client	DLA ENVIRONMENTAL SERVICES PTY LTD
Address	Level 4 ERM 45 Watt Street Newcastle NSW 2300
Telephone	61 2 4933 0001
Facsimile	61 2 98700999
Email	kathrine.skeen@dlaenvironmental.com.au
Project	**DLH1186 Scone Landfill**
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	**SE174394 R0**
Date Received	16/1/2018
Date Reported	24/1/2018

COMMENTS

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

PAH - # 4: The Limit of Reporting (LOR) has been raised due to interferences from the sample matrix.

SIGNATORIES

Bennet Lo
Senior Organic Chemist/Metals Chemist

Dong Liang
Metals/Inorganics Team Leader

Ly Kim Ha
Organic Section Head

Teresa Nguyen
Organic Chemist

VOCs in Water [AN433] Tested: 19/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	**3.5**	<0.5
Toluene	µg/L	0.5	<0.5	<0.5	<0.5	**1.2**	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	**27**	<0.5
m/p-xylene	µg/L	1	<1	<1	<1	**1**	<1
o-xylene	µg/L	0.5	<0.5	<0.5	<0.5	**1.1**	<0.5
Total Xylenes	µg/L	1.5	<1.5	<1.5	<1.5	**2.3**	<1.5
Total BTEX	µg/L	3	<3	<3	<3	**34**	<3
Naphthalene	µg/L	0.5	<0.5	<0.5	<0.5	**34**	<0.5
Dichlorodifluoromethane (CFC-12)	µg/L	5	<5	<5	<5	<5	<5
Chloromethane	µg/L	5	<5	<5	<5	<5	<5
Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Bromomethane	µg/L	10	<10	<10	<10	<10	<10
Chloroethane	µg/L	5	<5	<5	<5	<5	<5
Trichlorofluoromethane	µg/L	1	<1	<1	<1	<1	<1
Acetone (2-propanone)	µg/L	10	<10	<10	<10	**13**	<10
Iodomethane	µg/L	5	<5	<5	<5	<5	<5
1,1-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acrylonitrile	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloromethane (Methylene chloride)	µg/L	5	<5	<5	<5	<5	<5
Allyl chloride	µg/L	2	<2	<2	<2	<2	<2
Carbon disulfide	µg/L	2	<2	<2	<2	**15**	<2
trans-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MtBE (Methyl-tert-butyl ether)	µg/L	2	<2	<2	<2	<2	<2
1,1-dichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl acetate	µg/L	10	<10	<10	<10	<10	<10
MEK (2-butanone)	µg/L	10	<10	<10	<10	<10	<10
cis-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromochloromethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,2-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-trichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-nitropropane	µg/L	100	<100	<100	<100	<100	<100
Bromodichloromethane (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MIBK (4-methyl-2-pentanone)	µg/L	5	<5	<5	<5	<5	<5
cis-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-trichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-hexanone (MBK)	µg/L	5	<5	<5	<5	<5	<5
1,2-dibromoethane (EDB)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform (THM)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,4-dichloro-2-butene	µg/L	1	<1	<1	<1	<1	<1
Styrene (Vinyl benzene)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-trichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,4-dichloro-2-butene	µg/L	1	<1	<1	<1	<1	<1

VOCs in Water [AN433] Tested: 19/1/2018 (continued)

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	<0.5	<0.5	**1.1**	<0.5
Bromobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
n-propylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	**1.1**	<0.5
2-chlorotoluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-chlorotoluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3,5-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
tert-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
sec-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-dichlorobenzene	µg/L	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
p-isopropyltoluene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
n-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total VOC	µg/L	10	<10	<10	<10	**97**	<10

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 19/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
TRH C6-C9	µg/L	40	<40	<40	<40	**61**	<40
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	**3.5**	<0.5
TRH C6-C10	µg/L	50	<50	<50	<50	**83**	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
TRH C10-C14	µg/L	50	<50	<50	<50	**940**	<50
TRH C15-C28	µg/L	200	<200	<200	<200	**3100**	<200
TRH C29-C36	µg/L	200	<200	<200	<200	**580**	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200	<200
TRH >C10-C16 (F2)	µg/L	60	<60	<60	<60	**1200**	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	**3400**	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500	<500
TRH C10-C36	µg/L	450	<450	<450	<450	**4600**	<450
TRH C10-C40	µg/L	650	<650	<650	<650	**4600**	<650
TRH >C10-C16 (F2) - Naphthalene	µg/L	60	<60	<60	<60	**1200**	<60

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	**5.7**	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.4↑	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.2↑	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.2↑	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.2↑	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1	<1	**6**	<1

OC Pesticides in Water [AN420] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	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
Lindane (gamma 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	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
Heptachlor epoxide	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
Alpha Endosulfan	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
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
Beta Endosulfan	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
p,p'-DDD	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
o,p'-DDT	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
Endrin ketone	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
trans-Nonachlor	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
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

OP Pesticides in Water [AN420] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Dichlorvos	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

PCBs in Water [AN420] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Arochlor 1016	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1221	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1232	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1242	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1248	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1254	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1260	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1262	µg/L	1	<1	<1	<1	<1	<1
Arochlor 1268	µg/L	1	<1	<1	<1	<1	<1
Total Arochlors*	µg/L	5	<5	<5	<5	<5	<5

Total Phenolics in Water [AN289] Tested: 18/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Total Phenols	mg/L	0.01	<0.01	<0.01	<0.01	**0.03**	<0.01

Anions by Ion Chromatography in Water [AN245] Tested: 18/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Fluoride	mg/L	0.1	**0.13**	**0.24**	**0.26**	**0.30**	**0.47**
Chloride	mg/L	1	**7200**	**5400**	**2400**	**3100**	**280**
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.10↑	<0.10↑	**1.7**	<0.050↑	<0.005
Sulfate, SO4	mg/L	1	**40**	**66**	**110**	**93**	**91**

Alkalinity [AN135] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Total Alkalinity as CaCO3	mg/L	5	490	420	580	2400	1200

pH in water [AN101] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
pH**	No unit	-	**7.0**	**7.0**	**6.9**	**7.7**	**7.4**

Conductivity and TDS by Calculation - Water [AN106] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Conductivity @ 25 C	µS/cm	2	20000	16000	8700	13000	3000

Forms of Carbon [AN190] Tested: 22/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Total Organic Carbon as NPOC	mg/L	0.2	**5.6**	**6.2**	**12**	**340**	**15**

Total Dissolved Solids (TDS) in water [AN113] Tested: 19/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Total Dissolved Solids Dried at 175-185°C	mg/L	10	18000	14000	5300	7100	1700

BOD5 [AN183] Tested: 18/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Biochemical Oxygen Demand (BOD5)	mg/L	5	<5	<5	<5	**29**	<5

Ammonia Nitrogen by Discrete Analyser (Aquakem) [AN291] Tested: 17/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.12**	**0.09**	**0.16**	**330**	**0.04**

Hexavalent Chromium in water by Discrete Analyser [AN283] Tested: 23/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Hexavalent Chromium, Cr6+	mg/L	0.004	**0.006**	**0.004**	<0.004	**0.006**	<0.004

Filterable Reactive Phosphorus (FRP) [AN278] Tested: 19/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Filterable Reactive Phosphorus	mg/L	0.005	**0.052**	**0.010**	<0.005	**0.50**	**0.086**

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 22/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Calcium, Ca	mg/L	0.1	590	600	200	160	56
Magnesium, Mg	mg/L	0.1	1200	810	330	270	55
Potassium, K	mg/L	0.2	4.9	3.6	1.8	220	1.6
Sodium, Na	mg/L	0.1	2000	1700	1100	1900	520

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 19/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Iron, Fe	µg/L	5	<5	<5	<5	1100	10
Manganese, Mn	µg/L	1	10	5	12000	290	240
Arsenic, As	µg/L	1	1	1	<1	10	6
Aluminium, Al	µg/L	5	<5	<5	11	<5	<5
Barium, Ba	µg/L	1	620	540	270	1100	42
Cadmium, Cd	µg/L	0.1	0.2	<0.1	<0.1	<0.1	0.2
Cobalt, Co	µg/L	1	<1	<1	24	32	8
Copper, Cu	µg/L	1	<1	<1	4	<1	4
Chromium, Cr	µg/L	1	2	2	<1	50	<1
Lead, Pb	µg/L	1	<1	<1	<1	<1	<1
Zinc, Zn	µg/L	5	9	<5	<5	12	<5

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 22/1/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394.001	MWB WATER - 12/1/2018 SE174394.002	MWC WATER - 12/1/2018 SE174394.003	MWD WATER - 12/1/2018 SE174394.004	MWE WATER - 12/1/2018 SE174394.005
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

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.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
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
AN183	BOD: Serial dilutions of the sample are firstly combined with various reagents to aid bacterial growth and the sample is incubated for 5 days at 20°C. The difference between the initial and final oxygen contents of the sample is the amount of oxygen consumed by the bacteria. This is related to the organic loading of the sample therefore cBOD is the measure of the digestibility or bioavailability of organic matter in the sample. Reference APHA 5210 B. Internal Reference AN183
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
AN278	Filterable Reactive Phosphorus by DA (determined on filtered sample): Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
AN283	Hexavalent Chromium via Aquakem DA: Soluble hexavalent chromium forms a red/violet colour with diphenylcarbazide in acidic solution. This procedure is very sensitive and nearly specific for Cr 6+. If total chromium is also measured the trivalent form of chromium Cr3+ can be calculated from the difference (Total Cr - Cr6+). Reference APHA3500CrB.
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.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
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.

AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
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).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
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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ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Email	tobias.scheid@dlaenvironmental.com.au
Project	**DLH1186 Scone Landfill Additional**
Order Number	(Not specified)
Samples	5

LABORATORY DETAILS

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SGS Reference	**SE174394A R0**
Date Received	30/1/2018
Date Reported	1/2/2018

COMMENTS

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

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Anions by Ion Chromatography in Water [AN245] Tested: 1/2/2018

PARAMETER	UOM	LOR	MWA WATER - 12/1/2018 SE174394A.001	MWB WATER - 12/1/2018 SE174394A.002	MWC WATER - 12/1/2018 SE174394A.003	MWD WATER - 12/1/2018 SE174394A.004	MWE WATER - 12/1/2018 SE174394A.005
ortho Phosphate as P	mg/L	0.05	**0.06**	<0.05	<0.05	**0.06**	**0.11**

METHOD	METHODOLOGY SUMMARY
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

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

ATTACHMENT 2 – YSI WATER QUALITY METER CALIBRATION CERTIFICATE

ThermoFisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 7.00 / pH 4.00	7.00 pH	4.00 pH	310933/309016	☑
Conductivity	12.88mS/cm	0.00 mS/cm	12.88 mS/cm	309852	☑
TDS	36 ppk	0 ppk	36 ppk	309444	☑
Dissolved Oxygen	Sodium Sulphite / Air	0 ppm in Sodium Sulphite	9.04 ppm Saturation in Air	5656(ss) 306207(DI)	☑

Check only

Redox (ORP) *	Electrode operability test	240mV +/- 10%	235 mV	311901(A) 308904(B)	☑

* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading.

☑ Battery Status 8.0 (min 7.2V)
☑ Electrical Safety Tag attached (AS/NZS 3760)

☑ Temperature 20.4 °C
☑ Electrodes Cleaned and checked

Tag No: 000983

Valid to: 17/01/2018

Date: 10/01/2018

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	90FLMV Unit. Ops check/Battery status: 8.0
☑	☐	pH sensor with wetting cap, 5m
☑	☐	Conductivity/TDS/Temperature K=10 sensor, 5m
☑	☐	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
☑	☐	Redox (ORP) sensor with wetting cap, 5m
☑	☐	Power supply 240V to 12V DC 200mA
☑	☐	Instruction Manual
☑	☐	Quick Guide
☑	☐	Syringe with storage solution for pH and ORP sensors
☑	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)

Date: 10/01/2018

Signed: [signature]

TFS Reference	S008132	Return Date:	/ /
Customer Reference		Return Time:	
Equipment ID	90FLMVSN	Condition on return:	
Equipment Serial No.	435.39		

ATTACHMENT 3 – DATA LOG

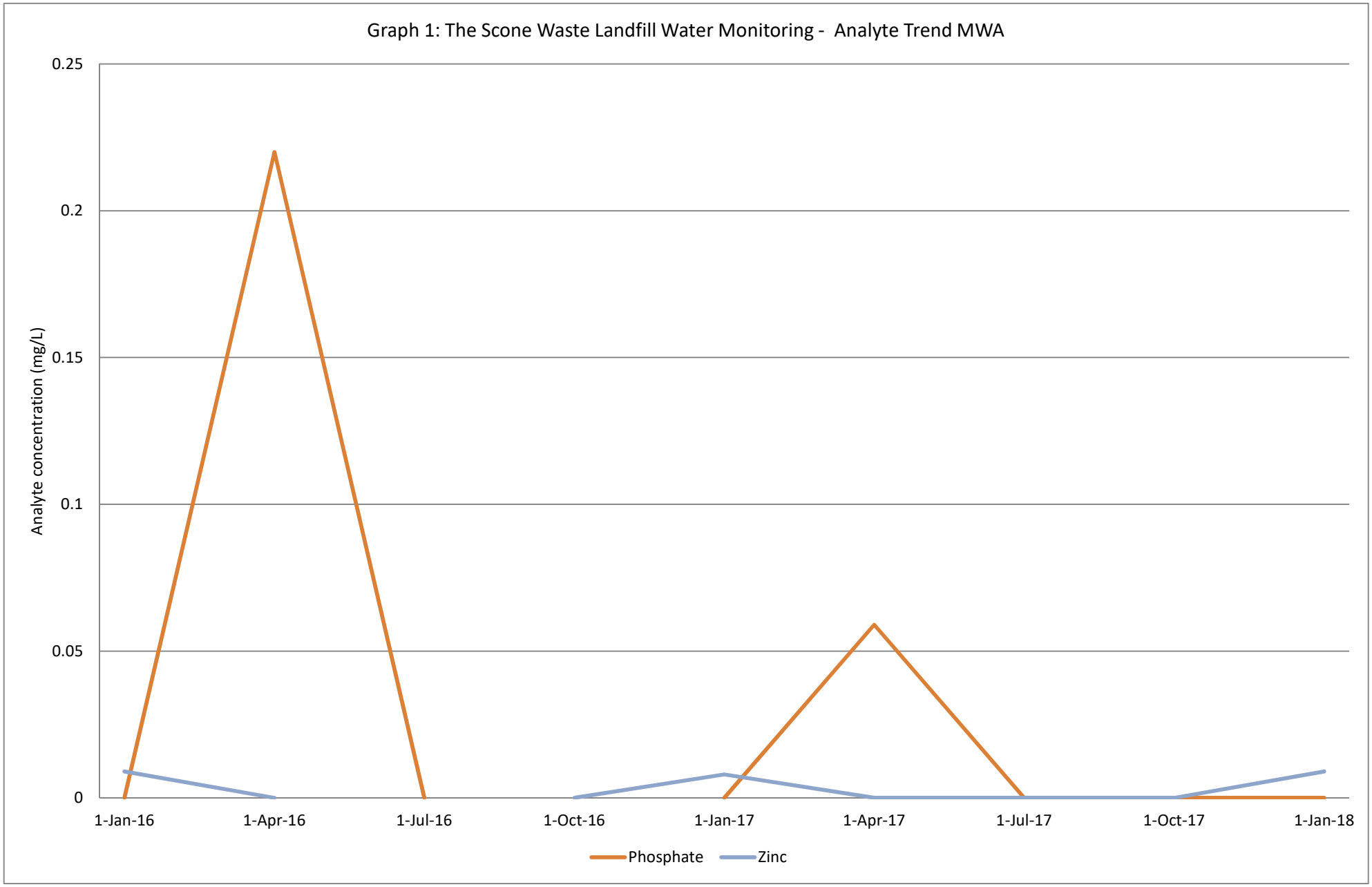
GROUNDWATER MONITORING DATA LOG
THE SCONE WASTE LANDFILL

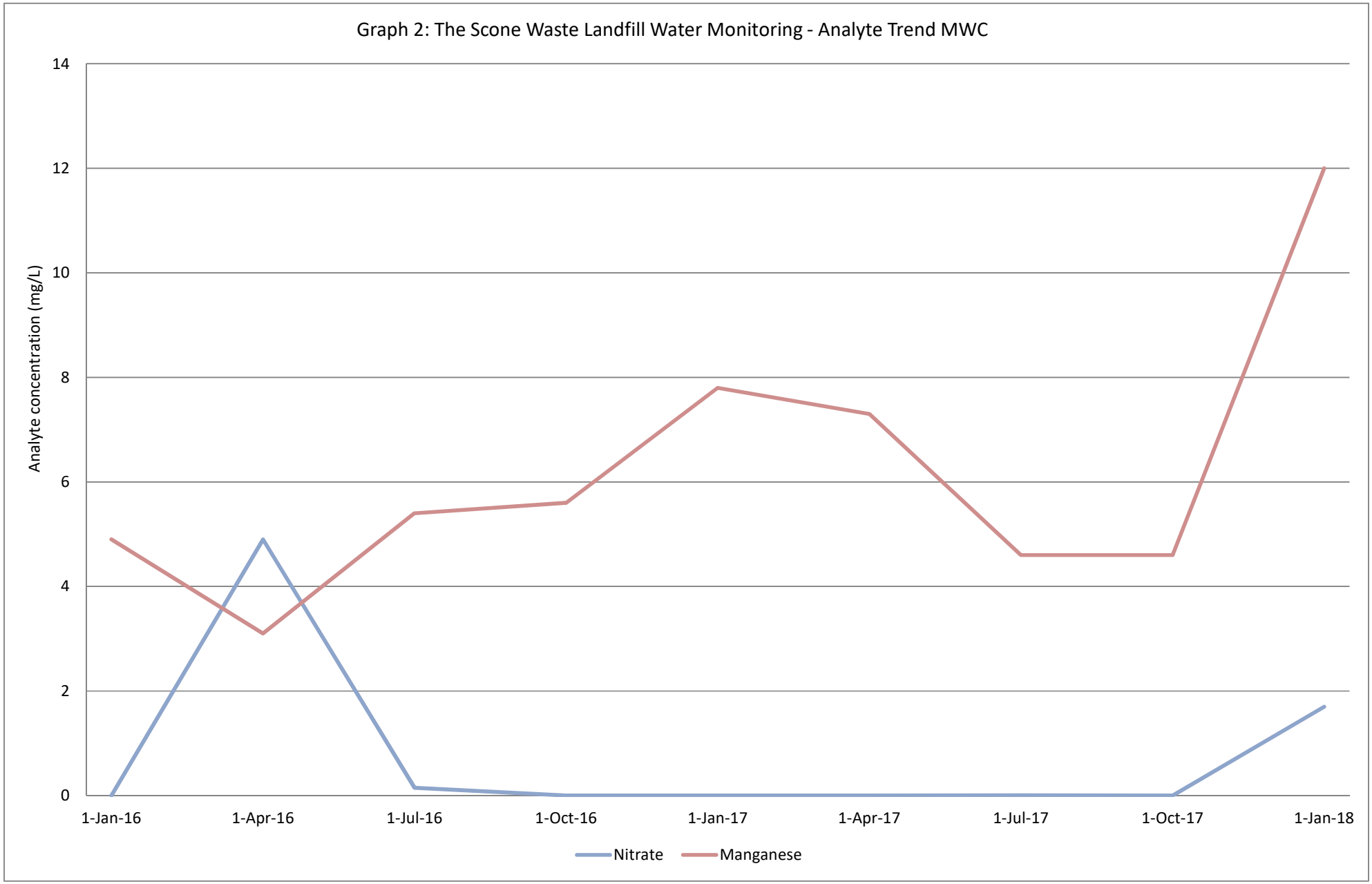
DLA Environmental Services
an ERM Group company

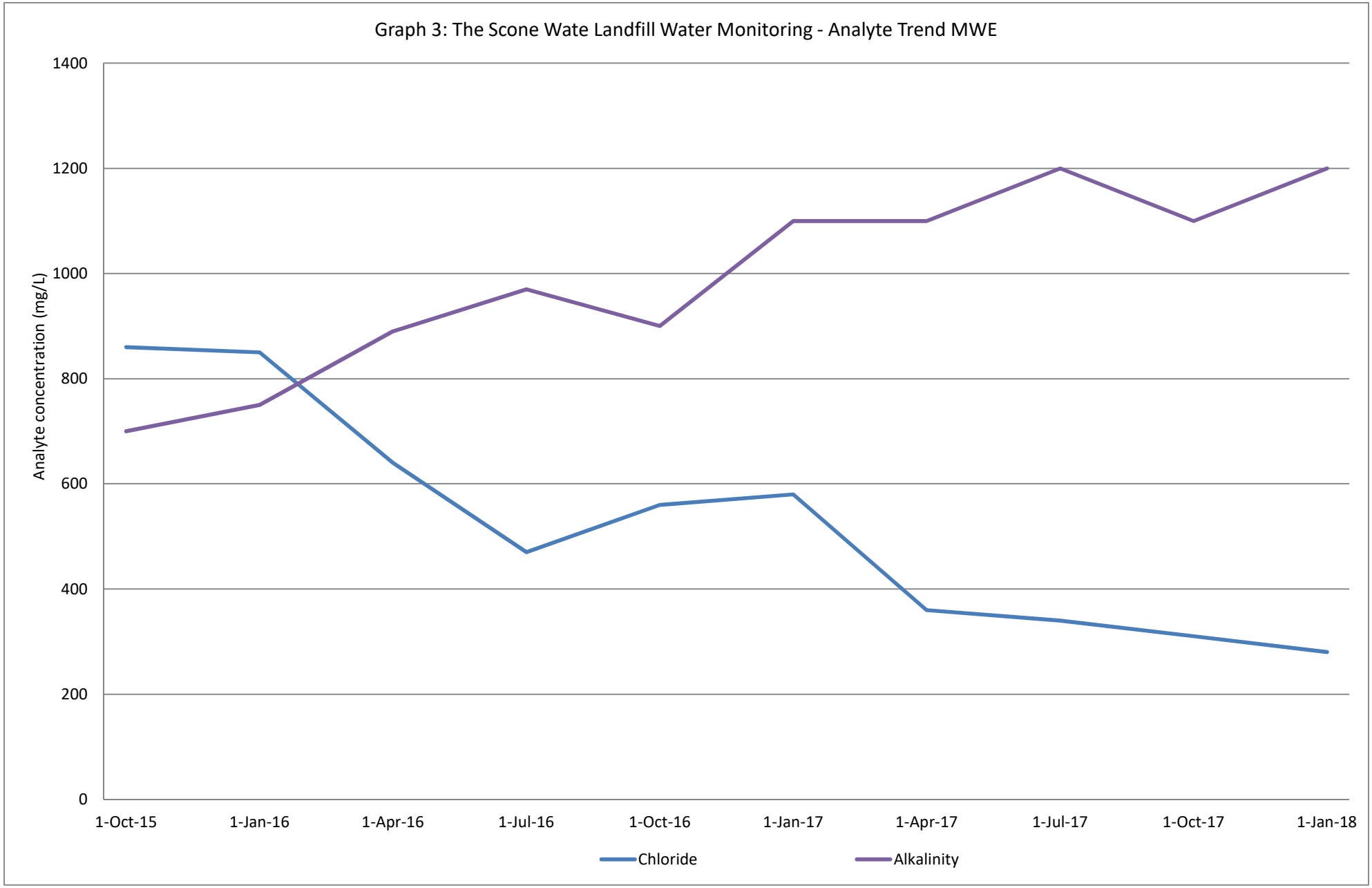
Monitoring Well	Chemical Report	Date Sampled	Comment	Threshold Criteria	NA	NA	NA	NA	0.3	NA	1.9	0.00001	NA	6.5–8	NA	0.9	0.7	NA	4	0.32	NA	NA	NA	0.015	0.024 (III) 0.013 (V)	0.055 (pH> 6.5)	NA	0.0002	0.09	0.0014	0.001	NA	0.0034	0.0006	0.008	0.26	0.95	0.18	0.08	NA	NA	6500	0.05	0.03	0.0003	0.00003	0.016	0.00002
				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	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	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	ND	0.001	ND	ND	**0.012**	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	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	ND	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	ND	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	ND
MWD	SE174394	12/1/2018	leachate	160	2400	3100	0.30	**1.100**	270	0.290	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	ND	ND
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**	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	ND

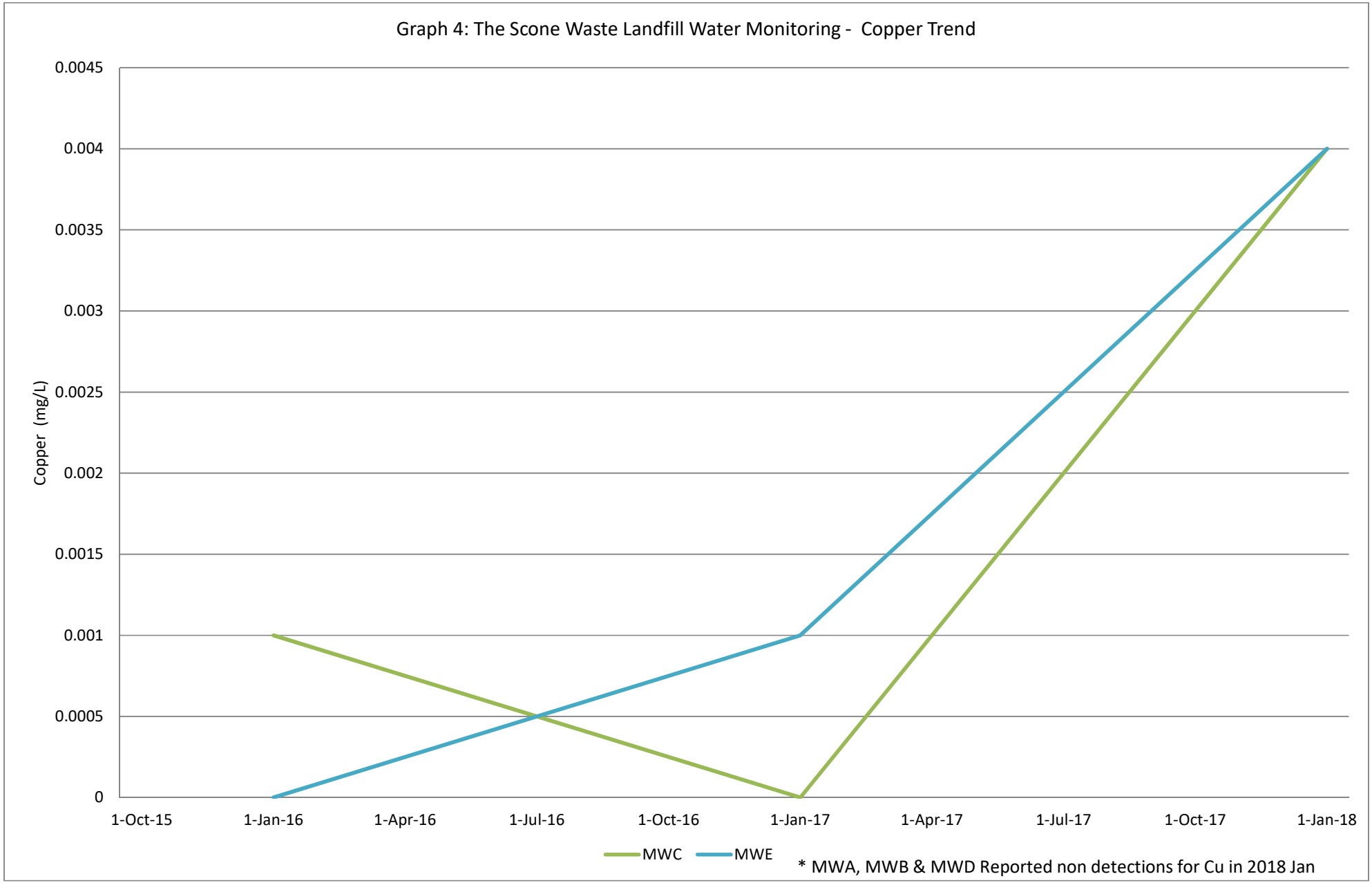
***As MWD is within the perched landfill leachate water table, the Threshold Criteria are only applicable as indicators of general water quality for comparison to the wells surrounding the landfill. Exceedances of the Threshold Criteria for MWD are expected and do not indicate contamination is leaving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

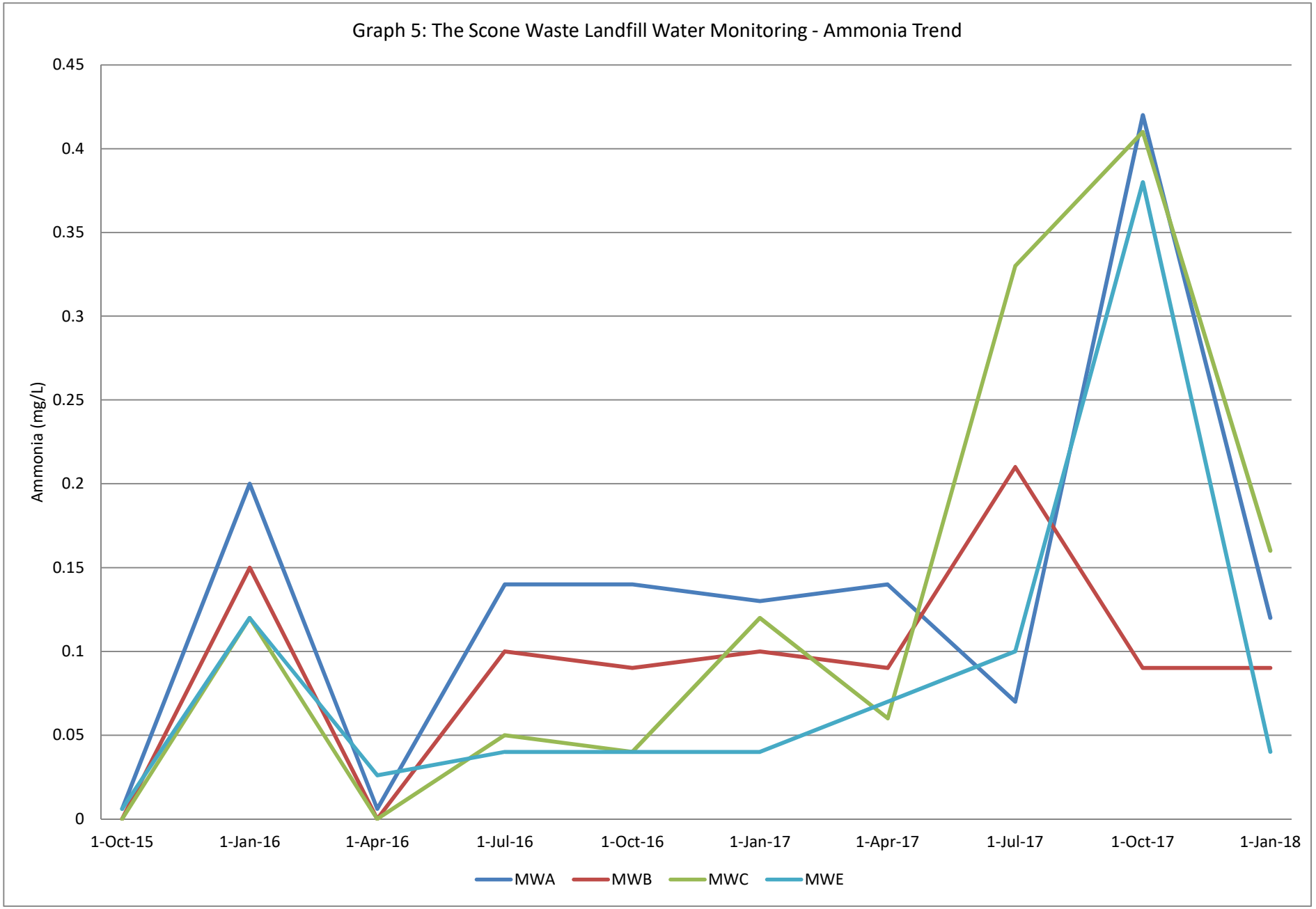
ATTACHMENT 4 – ANALYTE TREND GRAPHS

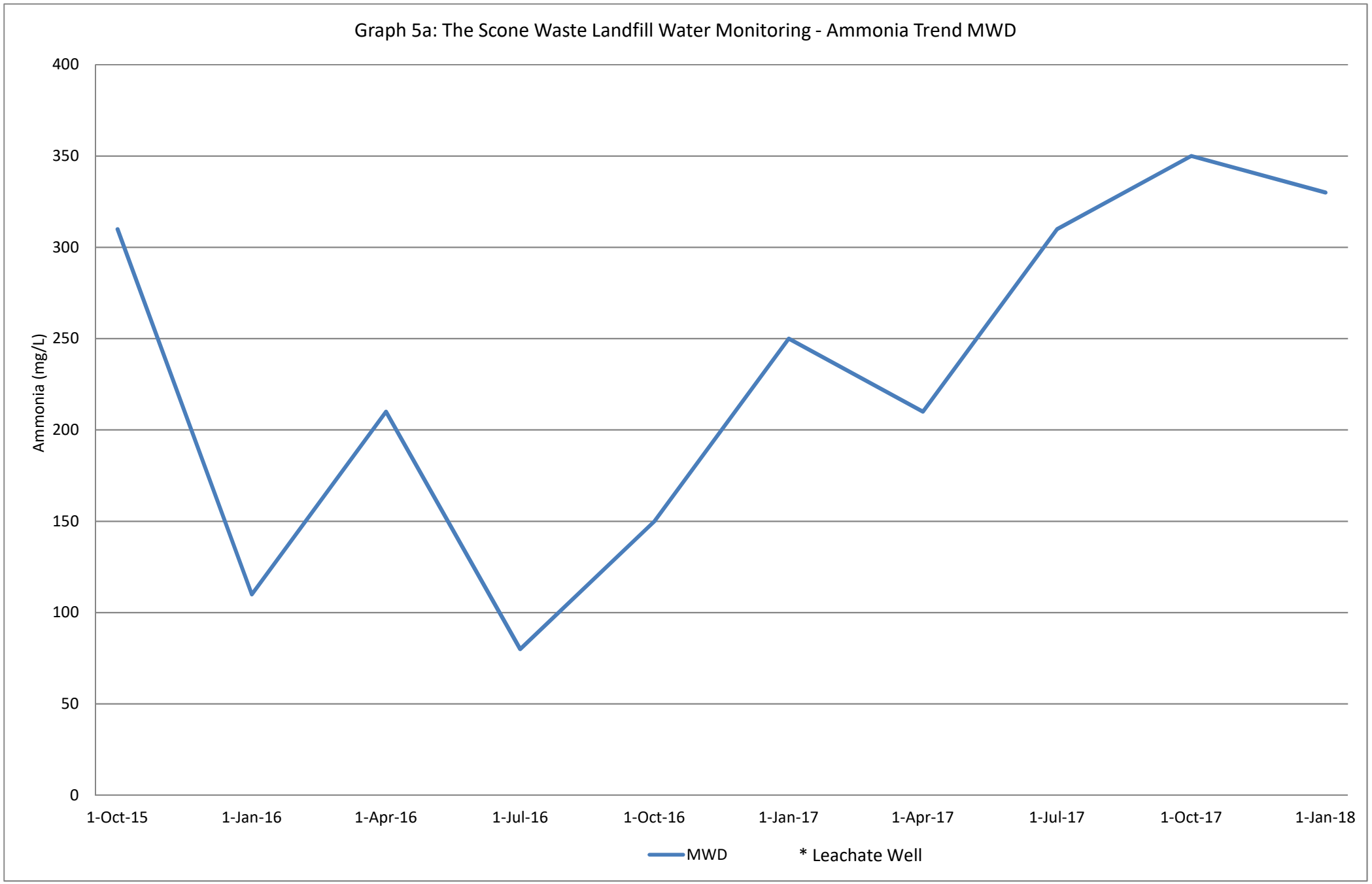

Graph 1: The Scone Waste Landfill Water Monitoring - Analyte Trend MWA
Analyte concentration (mg/L)
0.25
0.2
0.15
0.1
0.05
0
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
Phosphate
Zinc

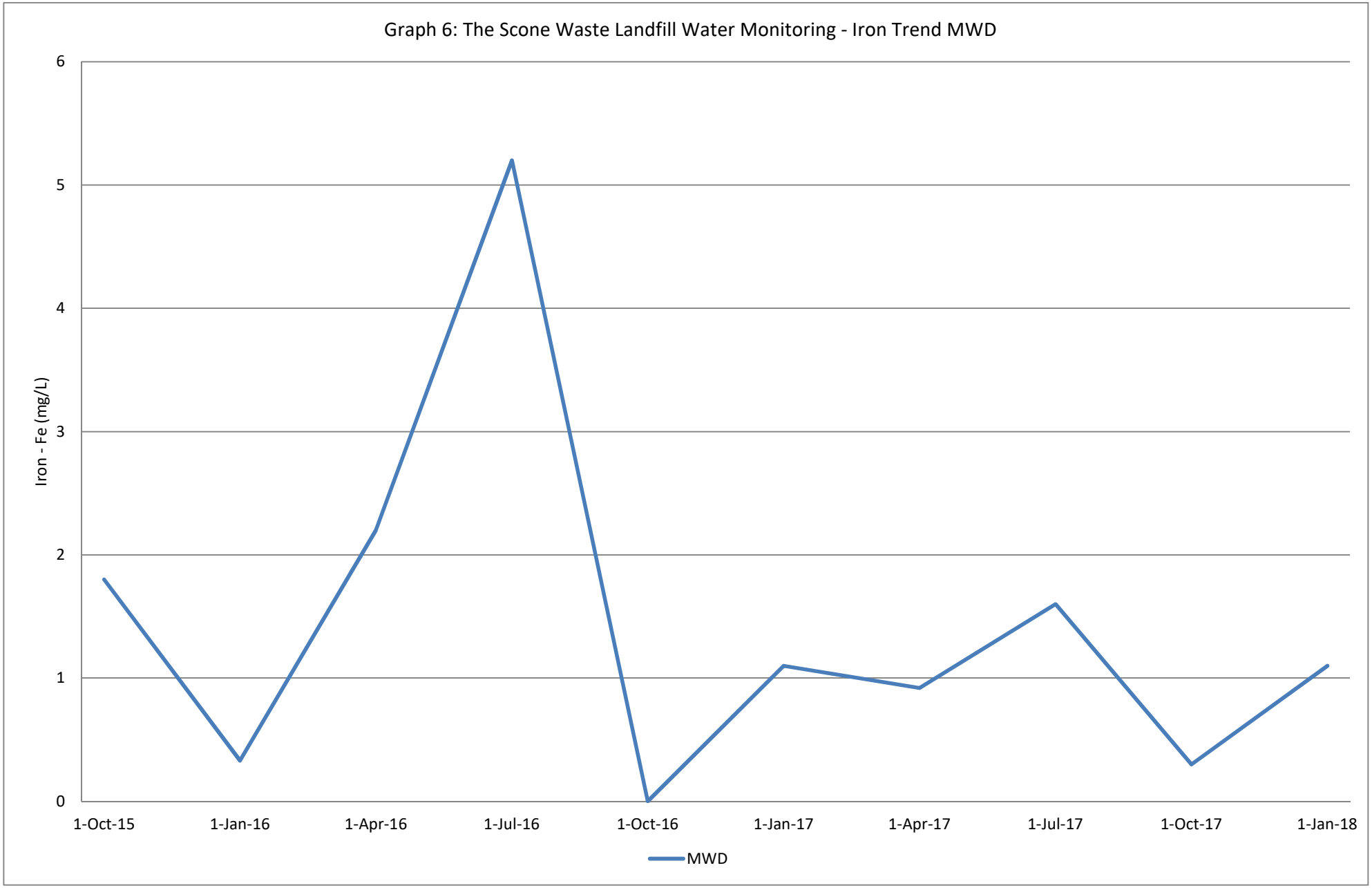

Graph 2: The Scone Waste Landfill Water Monitoring - Analyte Trend MWC
Analyte concentration (mg/L)
14
12
10
8
6
4
2
0
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
Nitrate
Manganese


Graph 3: The Scone Wate Landfill Water Monitoring - Analyte Trend MWE
Analyte concentration (mg/L)
1400
1200
1000
800
600
400
200
0
1-Oct-15
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
Chloride
Alkalinity


Graph 4: The Scone Waste Landfill Water Monitoring - Copper Trend
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Copper (mg/L)
1-Oct-15
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
MWC
MWE
* MWA, MWB & MWD Reported non detections for Cu in 2018 Jan


Graph 5: The Scone Waste Landfill Water Monitoring - Ammonia Trend
Ammonia (mg/L)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1-Oct-15
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
MWA
MWB
MWC
MWE


Graph 5a: The Scone Waste Landfill Water Monitoring - Ammonia Trend MWD
Ammonia (mg/L)
400
350
300
250
200
150
100
50
0
1-Oct-15
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
MWD
* Leachate Well


Graph 6: The Scone Waste Landfill Water Monitoring - Iron Trend MWD
Iron - Fe (mg/L)
6
5
4
3
2
1
0
1-Oct-15
1-Jan-16
1-Apr-16
1-Jul-16
1-Oct-16
1-Jan-17
1-Apr-17
1-Jul-17
1-Oct-17
1-Jan-18
MWD

ATTACHMENT 5 – GROUNDWATER FIELD DATA

DLA environmental

GROUNDWATER FIELD DATA SHEET

DLA Project Code: DLH1186	**Sample ID:** A
Project: The Scone Waste Landfill	**Well Collar RL:**
Client: [redacted] Upper Hunter Shire Council	**Sampler(s):** KS
Address: Noblet Rd, Scone NSW 2289	**Signature:**
BH ID: MWA	**Date:** 15-1-18

Well Status

Monument damaged:	(YES) / NO / N/A	Well ID visible:	(YES) / NO / N/A
Locked well casing:	YES / (NO) / N/A	Cap on PVC casing:	(YES) / NO / N/A
Cement footing damaged:	YES / (NO) / N/A	Water in monument casing:	YES / (NO) / N/A
Standing water/vegetation around monument:	(YES) / NO / N/A	Internal obstruction in casing:	YES / (NO) / N/A
Well Damaged:	YES / (NO) / N/A	Odours from groundwater:	YES / (NO) / N/A

Nearby works: .....

Comments: Rusted Monument

Casing above ground: 0.75 m agl

Standing water level: ~~6.53~~ (5.78) m bgl

Total well depth: ~~15.83~~ (15.08) m bgl

Initial well volume: L

Water level after purging: ..... m bgl

Volume of water purged: 6.5 L

Water level at time of sampling: ..... m bgl

Well purged dry: YES / (NO)

Purging equipment: Bailer

Sample equipment:

Weather Conditions:

Temperature: 15-20 ☐ 20-25 ☒ 25-30 ☐ >30 ☐

Clear ☐ Partly cloudy ☑ Overcast ☐

Calm ☐ Slight breeze ☒ Moderate breeze ☐ Windy ☐

Fine ☒ Showers ☐ Rain ☐

Note: 50mm internal diameter pipe = 1.96 L/m. All measurements below well collar

Water Quality Details: ppm mS

Time am / pm	DO ~~(mg/L⁻¹)~~	EC ~~(µS cm⁻¹)~~	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
9.57	9.07	8.31	3.9	238	21.0	—	
10.00	9.03	8.10	3.9	241	21.1	—	
10.02	8.97	7.99	3.9	243	21.2		

Additional Comments:

Clear, fine white sed.

DLA environmental

GROUNDWATER FIELD DATA SHEET

DLA Project Code: DLH1186	**Sample ID:** MWB
Project: The Scone Waste Landfill	**Well Collar RL:**
Client: Upper Hunter Shire Council	**Sampler(s):** K. S
Address: Noblet Rd, Scone NSW 2289	**Signature:**
BH ID: MWB	**Date:** 15.1.18

Well Status

Monument damaged:	YES / (NO) / N/A	Well ID visible:	(YES) / NO / N/A
Locked well casing:	YES / (NO) / N/A	Cap on PVC casing:	(YES) / NO / N/A
Cement footing damaged:	(YES) / NO / N/A	Water in monument casing:	YES / (NO) / N/A
Standing water/vegetation around monument:	(YES) / NO / N/A	Internal obstruction in casing:	YES / (NO) / N/A
Well Damaged:	YES / (NO) / N/A	Odours from groundwater:	YES / (NO) / N/A

Nearby works: .....

Comments: Monument bunded / cement footing cracked

Casing above ground: 0.83	m agl	**Weather Conditions:**	
Standing water level: ~~6.62~~ 6.67 (5.79)	m bgl	Temperature 15-20 ☐	20-25 ☑
Total well depth: ~~16.24~~ (15.47)	m bgl	25-30 ☐	>30 ☐
Initial well volume:	L		
Water level after purging: 7.5	m bgl	Clear ☐ Partly cloudy ☑	Overcast ☐
Volume of water purged:	L		
Water level at time of sampling:	m bgl	Calm ☐ Slight breeze ☑	Moderate breeze ☐
Well purged dry:	YES / (NO)	Windy ☐	
Purging equipment:			
Sample equipment: Bailer		Fine ☑ Showers ☐	Rain ☐

Note: 50mm internal diameter pipe = 1.96 L/m. All measurements below well collar

Water Quality Details: PPm MS

Time am / pm	DO (~~mg/L^{-1}~~)	EC (~~µS cm^{-1}~~)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
10.31	9.31	7.40	3.90	266	21.3	—	
10.34	9.14	7.71	3.90	269	21.9		
10.36	9.04	6.81	3.89	272	22.2		

Additional Comments:

Clear & fine material

DLA environmental

GROUNDWATER FIELD DATA SHEET

DLA Project Code: DLH1186	**Sample ID:**
Project: The Scone Waste Landfill	**Well Collar RL:**
Client: Upper Hunter Shire Council	**Sampler(s):**
Address: Noblet Rd, Scone NSW 2289	**Signature:**
BH ID: MWC	**Date:**

Well Status

Monument damaged:	(YES) / NO / N/A	Well ID visible:	(YES) / NO / N/A
Locked well casing:	YES / (NO) / N/A	Cap on PVC casing:	(YES) / NO / N/A
Cement footing damaged:	YES / (NO) / N/A	Water in monument casing:	YES / (NO) / N/A
Standing water, vegetation around monument:	(YES) / NO / N/A	Internal obstruction in casing:	YES / (NO) / N/A
Well Damaged:	YES / (NO) / N/A	Odours from groundwater:	(YES) / (NO) / N/A

Nearby works: .....

.....

Comments: Monument slight rusting

.....

Casing above ground: 0.67 m agl

Standing water level: 5.35 (4.68) m bgl

Total well depth: 12.88 (11.68) m bgl

Initial well volume: L

Water level after purging: ..... m bgl

Volume of water purged: 5 L

Water level at time of sampling: ..... m bgl

Well purged dry: YES / (NO)

Purging equipment:

Sample equipment: Bailer

Weather Conditions:

Temperature: 15-20 ☐ 20-25 ☑ 25-30 ☐ >30 ☐

Clear ☐ Partly cloudy ☑ Overcast ☐

Calm ☐ Slight breeze ☑ Moderate breeze ☐ Windy ☐

Fine ☑ Showers ☐ Rain ☐

Note: 50mm internal diameter pipe = 1.96 L/m. All measurements below well collar

Water Quality Details: ppm MS

Time am / pm	DO (mg/L⁻¹)	EC (µS cm⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
11.01	6.61	5.75	3.80	244	21.4	—	
11.03	6.81	5.84	3.61	241	21.8		
11.05	8.83	5.83	3.83	240	22.3		

Additional Comments:

Cloudy, light brown (colour) earthy odour (fine seds)

DLA environmental

GROUNDWATER FIELD DATA SHEET

DLA Project Code: DLH1186	**Sample ID:** MWD
Project: The Scone Waste Landfill	**Well Collar RL:**
Client: [redacted] Upper Hunter Shire Council	**Sampler(s):** K.S
Address: Noblet Rd, Scone NSW 2289	**Signature:**
BH ID: MWD	**Date:** 15-7-18

Well Status

Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A

Nearby works: .....

.....

Comments: .....

.....

Casing above ground: —	m agl	Weather Conditions:			
Standing water level: 9.55	m bgl	Temperature	15-20 ☐	20-25 ☑	
Total well depth: 10.7	m bgl		25-30 ☐	>30 ☐	
Initial well volume:	L				
Water level after purging:	m bgl	Clear ☐	Partly cloudy ☑	Overcast	☐
Volume of water purged: N/A	L				
Water level at time of sampling:	m bgl	Calm ☐	Slight breeze ☑	Moderate breeze	☐
Well purged dry:	YES / NO		Windy ☐		
Purging equipment:					
Sample equipment: Bailer		Fine ☑	Showers ☐	Rain	☐

Note: 50mm internal diameter pipe = 1.96 L/m. All measurements below well collar

Water Quality Details: PQM MS

Time am / pm	DO ~~(mg/L^{-1})~~	EC ~~(µS cm^{-1})~~	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
12.15	7.45	11.32	3.92	244	28.9	—	
12.18	7.44	11.33	3.90	244	28.6		
12.30	7.45	11.32	3.89	244	28.4		

Additional Comments:

water not purged due to low level

Yellow with fine black seeds, odorous

DLA environmental

GROUNDWATER FIELD DATA SHEET

DLA Project Code: DLH1186	**Sample ID:** MWE
Project: The Scone Waste Landfill	**Well Collar RL:**
Client: Upper Hunter Shire Council	**Sampler(s):**
Address: Noblet Rd, Scone NSW 2289	**Signature:**
BH ID: MWE	**Date:**

Well Status

Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / NO / N/A	Cap on PVC casing:	YES / NO / N/A
Cement footing damaged:	YES / NO / N/A	Water in monument casing:	YES / NO / N/A
Standing water, vegetation around monument:	YES / NO / N/A	Internal obstruction in casing:	YES / NO / N/A
Well Damaged:	YES / NO / N/A	Odours from groundwater:	YES / NO / N/A

Nearby works: .....

Comments: Slightly rusted

Casing above ground: 0.67 m agl

Standing water level: 3.9 (3.23) m bgl

Total well depth: 9.69 (9.02) m bgl

Initial well volume: L

Water level after purging: ..... m bgl

Volume of water purged: 3.5 L

Water level at time of sampling: ..... m bgl

Well purged dry: YES / NO

Purging equipment: Bailer

Sample equipment:

Weather Conditions:

Temperature: 15-20 ☐ 20-25 ☑ 25-30 ☐ >30 ☐

Clear ☐ Partly cloudy ☑ Overcast ☐

Calm ☐ Slight breeze ☐ Moderate breeze ☑ Windy ☐

Fine ☑ Showers ☐ Rain ☐

Note: 50mm internal diameter pipe = 1.96 L/m. All measurements below well collar

Water Quality Details: (DO: ppm; EC: µS)

Time am / pm	DO (mg/L⁻¹)	EC (µS cm⁻¹)	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
11.45	8.65	1477	3.81	260	20.8	–	
11.47	8.83	1437	3.81	260	21.4		
11.49	8.83	1424	3.82	261	21.7		

Additional Comments:

Fine roots in water

clear fine white/light brown sed.