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**GROUNDWATER  
MONITORING**

**SCONE WASTE  
FACILITY  
NOBLET ROAD  
SCONE NSW**



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## **ABBREVIATIONS**

The following is a list of common abbreviations used in the Contamination Sector within environmental reports.

<b>B(a)P</b>	Benzo(a)Pyrene
<b>BGL</b>	Below Ground Level
<b>BTEX</b>	Benzene, Toluene, Ethyl Benzene, Xylene
<b>CLM</b>	Contaminated Land Management
<b>CSM</b>	Conceptual Site Model
<b>DA</b>	Development Application
<b>DP</b>	Deposited Plan
<b>DQI</b>	Data Quality Indicator
<b>DQO</b>	Data Quality Objective
<b>EIL</b>	Ecological Investigation Level
<b>EPA</b>	Environment Protection Authority (NSW)
<b>EPL</b>	Environmental Protection License
<b>ESL</b>	Ecological Screening Level
<b>LOR</b>	Limit of Reporting
<b>LOT</b>	Allotment
<b>MW</b>	Monitoring Well
<b>NATA</b>	National Association of Testing Authorities
<b>NEPC</b>	National Environment Protection Council
<b>NEPM</b>	National Environment Protection Measure
<b>NSW</b>	New South Wales
<b>OCP</b>	Organochlorine Pesticides
<b>OEH</b>	Office of Environmental and Heritage
<b>OPP</b>	Organophosphorus Pesticides
<b>PAH</b>	Polycyclic Aromatic Hydrocarbons
<b>PCOC</b>	Potential Contaminant of Concern
<b>PCB</b>	Polychlorinated Biphenyls
<b>QA/QC</b>	Quality Assurance and Quality Control
<b>SAC</b>	Site Acceptance Criteria
<b>SEPP</b>	State Environmental Planning Policy
<b>SWL</b>	Standing Water Level
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>TRH</b>	Total Recoverable Hydrocarbons
<b>UHSC</b>	Upper Hunter Shire Council
<b>VOC</b>	Volatile Organic Compounds
<b>WHS</b>	Work Health Safety





TABLE OF CONTENTS

**1.0 INTRODUCTION..... 1**

**General..... 1**

**Briefing..... 1**

**2.0 SITE CRITERIA AND SAMPLING FREQUENCY..... 2**

**3.0 SAMPLING METHODOLOGY ..... 3**

**Groundwater Sampling..... 3**

**4.0 RESULTS ..... 4**

**5.0 DISCUSSION ..... 9**

**MWA..... 9**

**MWB..... 9**

**MWC..... 9**

**MWD ..... 10**

**MWE..... 10**

**Site and Maintenance ..... 10**

**6.0 CONCLUSIONS..... 12**

**REFERENCES ..... 13**

FIGURES

**Figure 1**                      Site layout with sample locations

ATTACHMENTS

**Attachment 1**                      NATA Accredited Laboratory Results

**Attachment 2**                      YSI water quality meter calibration certificate

**Attachment 3**                      Data log

**Attachment 4**                      Groundwater Field Data Sheets

## 1.0 INTRODUCTION

### General

Under the requirements of the NSW EPA Environmental Protection Licence (EPL) 5863, Upper Hunter Shire Council (UHSC) is required to conduct quarterly and annual groundwater monitoring of the Scone Waste Facility located on Noblet Road, Scone, NSW, 2337.

The Quarterly Groundwater Monitoring Report provides a snapshot of the groundwater conditions at the Site in relation to the current Site Criteria and satisfies the groundwater monitoring requirements of the EPL.

The Scone Waste Facility is an active landfill, it has the potential to be a polluting activity or to adversely impact the groundwater within the immediate vicinity and down hydraulic gradient of the site if there was a leak within the landfill.

Engage Environmental Services (Engage) was commissioned by UHSC to undertake this quarterly round of groundwater monitoring at the site. The quarterly groundwater monitoring was carried out on 11<sup>th</sup> June 2020.

This report has been prepared utilising information supplied by the client, publicly accessible information, information obtained as part of the onsite fieldwork and analysis, information from Government bodies and from experience, knowledge, and current industry practice.

### Briefing

The briefing provided by Upper Hunter Shire Council and contained within EPL 5863 indicates that quarterly groundwater monitoring is required at five locations on the site, monitoring wells A to E (MWA-MWE). Monitoring Well D is located within the landfill and the monitoring well accesses the perched water table (leachate) within the landfill. Comparisons against established criteria and historical data allow for trending of data. Trending of data can highlight seasonal variations, increases in analyte concentrations, decreases in analyte concentrations and fluctuations within the dataset. Over a time period the dataset can reveal increasing/decreasing trends highlighting potential site issues.

Refer to **Figure 1: Site Layout with Sample Locations**

## 2.0 SITE CRITERIA AND SAMPLING FREQUENCY

The groundwater analytical suite and sampling frequency were provided by UHSC and the EPL. Each of the wells have the same sampling regime and analytical suite for sample analysis. The site criterion are sourced from the Australian and New Zealand guidelines for fresh and marine water quality (ANZW 2018) 95% trigger values and National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013, unless otherwise stated.

**Table 1: Analytes, Site Criteria and Sampling Frequency for Groundwater Monitoring Wells - Quarterly.**

	Analytes/Pollutant	Units	Site Criteria NEPM	Sampling Frequency
			2013 and ANZW 2018 Fresh Water 95%	
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	Quarterly
	<b>Alkalinity (total)</b>	mg/L	NA	Quarterly
	<b>Chloride</b>	mg/L	NA	Quarterly
	<b>Fluoride</b>	mg/L	NA	Quarterly
	<b>Potassium<sup>1</sup></b>	mg/L	410	Quarterly
	<b>Magnesium</b>	mg/L	NA	Quarterly
	<b>Sulphate</b>	mg/L	NA	Quarterly
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	Quarterly
	<b>Manganese</b>	mg/L	1.9	Quarterly
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	Quarterly
<b>OCP</b>	<b>Organochlorine Pesticide<sup>3</sup> (OCP)</b>	mg/L	0.00001	Quarterly
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	Quarterly
	<b>Sodium</b>	mg/L	NA	Quarterly
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	Quarterly
	<b>Nitrate</b>	mg/L	50	Quarterly
	<b>Total organic carbon</b>	mg/L	4	Quarterly
	<b>Electrical conductivity</b>	µS/cm	NA	Quarterly

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

### **3.0 SAMPLING METHODOLOGY**

#### **Groundwater Sampling**

The five well locations were identified on the site. The site map was cross-referenced to the markings on the monitoring wells to ensure the correct wells were being sampled. Purging and sampling of monitoring wells was conducted in accordance with the NEPM (NEPC, 2013) and the *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DECC, 2007).

Purging is the process of removing stagnant water from a well, immediately prior to sampling, causing its replacement by groundwater from the adjacent formation that is representative of actual aquifer conditions. In order to determine when a well has been adequately purged, the physical parameters (pH  $\pm$  0.1 unit, electrical conductivity  $\pm$  5%, temperature  $\pm$  0.20, reduction-oxidation (redox)  $\pm$  10%; and dissolved oxygen  $\pm$  10%.) are monitored while the groundwater is removed during purging.

The physical parameters were measured at regular intervals using a YSI Quatro Pro Plus Water Quality Meter. Stable conditions were indicated by monitoring for three consecutive readings of the physical parameters.

Collection of samples were direct into laboratory issued sampling containers for specific analytes. Samples were obtained using a disposable bailer. Care was taken so the bailer did not contact the sample container. All samples were collected and filled into the correct sample containers, a meniscus was formed on each sampling container prior to sealing to reduce or eliminate head space. The samples were placed immediately into a chilled esky to prevent the loss of potential volatile components.

Decontamination procedures between sampling events and sampling locations was undertaken. Sampling equipment was cleaned before and after sampling to prevent cross contamination. The cleaning procedure included:

- New nitrile disposable gloves for each well;
- Washing and wipe down with phosphate free laboratory grade detergent;
- Rinsing of brush before using brush on equipment;
- Using a brush on equipment if necessary;
- Rinsing with deionised water and wipe down with new wipe if necessary; and,
- New disposable bailer used for each well.

Appropriate decontamination procedures were appropriate during groundwater sampling.

## 4.0 RESULTS

The five groundwater monitoring wells were sampled during the June 2020 sampling event, results are detailed in **Tables 2 to 6**. Comparisons have been made to the previous round of monitoring (March 2020). Refer to **Attachment 1** – NATA Accredited Laboratory Results and **Attachment 3** – Data Log.

There were no exceedances of the site criteria for June in MWA. **Refer to Table 2.**

**Table 2 – Quarterly Groundwater Results and Comparison Mar 2020–June 2020 (MWA)**

	Analytes	Units	Site Criteria (mg/L)	MWA Mar 2020	MWA June 2020
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	570	440
	<b>Alkalinity (total)</b>	mg/L	NA	500	500
	<b>Chloride</b>	mg/L	NA	7700	6700
	<b>Fluoride</b>	mg/L	NA	0.1	0.1
	<b>Potassium<sup>1</sup></b>	mg/L	410	2.4	2.8
	<b>Magnesium</b>	mg/L	NA	1100	940
	<b>Sulphate</b>	mg/L	NA	47	42
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	<LOR
	<b>Manganese</b>	mg/L	1.9	0.01	0.024
<b>Phenols</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR
<b>OCPs</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	6.7	6.8
	<b>Sodium</b>	mg/L	NA	2000	1700
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	<LOR	<LOR
	<b>Nitrate</b>	mg/L	0.7	0.56	0.57
	<b>Total Organic Carbon</b>	mg/L	4	4	4
	<b>EC</b>	µS/cm	NA	19000	19000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

There was one exceedance of the site criteria for June in MWB, TOC at a concentration of 5mg/L.

**Refer to Table 3.**

**Table 3 – Quarterly Groundwater Results and Comparison Mar 2020–June 2020 (MWB)**

	Analytes	Units	Site Criteria (mg/L)	MWB Mar 2020	MWB June 2020
<b>IONS</b>	Calcium	mg/L	NA	520	390
	Alkalinity (total)	mg/L	NA	420	410
	Chloride	mg/L	NA	5700	4800
	Fluoride	mg/L	NA	0.3	0.2
	Potassium <sup>1</sup>	mg/L	410	2	2.3
	Magnesium	mg/L	NA	670	560
	Sulphate	mg/L	NA	88	72
<b>HEAVY METALS</b>	Iron	mg/L	0.3	<LOR	<LOR
	Manganese	mg/L	1.9	0.01	0.01
<b>OCP</b>	OCP <sup>3</sup>	mg/L	0.00001	<LOR	<LOR
<b>PHENOLS</b>	Total phenolics	mg/L	0.32	<LOR	<LOR
<b>MISC. INORGANICS</b>	pH	pH	6.5 – 8	6.9	7
	Sodium	mg/L	NA	1500	1200
	Ammonia <sup>2</sup>	mg/L	0.9	0.015	0.016
	Nitrate	mg/L	0.7	0.51	0.55
	Total Organic Carbon (TOC)	mg/L	4	<b>6</b>	<b>5</b>
	EC	µS/cm	NA	14000	14000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

There were two exceedances of the site criteria for June in MWC; Manganese and TOC at concentrations of 2.9mg/L and 8mg/L respectively. **Refer to Table 4.**

**Table 4 – Quarterly Groundwater Results and Comparison Mar 2020–June 2020 (MWC)**

	Analytes	Units	Site Criteria (mg/L)	MWC Mar 2020	MWC June 2020
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	390	300
	<b>Alkalinity (total)</b>	mg/L	NA	680	750
	<b>Chloride</b>	mg/L	NA	5200	4400
	<b>Fluoride</b>	mg/L	NA	0.2	0.2
	<b>Potassium<sup>1</sup></b>	mg/L	410	1.8	2
	<b>Magnesium</b>	mg/L	NA	570	470
	<b>Sulphate</b>	mg/L	NA	150	110
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<LOR	<LOR
	<b>Manganese</b>	mg/L	1.9	<b>6</b>	<b>2.9</b>
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	6.8	6.8
	<b>Sodium</b>	mg/L	NA	1700	1400
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.018	<LOR
	<b>Nitrate</b>	mg/L	0.7	<b>1.2</b>	0.67
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	<b>8</b>	<b>8</b>
	<b>EC</b>	µS/cm	NA	13000	14000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.

MWD is a leachate monitoring well which provides access to the perched landfill leachate water table. The Site Criteria for this particular well is only used as a general indicator of the leachate water quality. Refer to Table 5.

**Table 5 – Quarterly Groundwater Results and Comparison Mar 2020–June 2020 (MWD)**

	Analytes	Units	Site	MWD	MWD
			Criteria (mg/L)	(leachate) Mar 2020	(leachate) June 2020
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	130	94
	<b>Alkalinity (total)</b>	mg/L	NA	2300	2800
	<b>Chloride</b>	mg/L	NA	2600	240
	<b>Fluoride</b>	mg/L	NA	0.3	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	160	150
	<b>Magnesium</b>	mg/L	NA	250	220
	<b>Sulphate</b>	mg/L	NA	160	3
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	1.5	1
	<b>Manganese</b>	mg/L	1.9	0.25	0.17
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.5	7.6
	<b>Sodium</b>	mg/L	NA	1500	1200
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	260	250
	<b>Nitrate</b>	mg/L	0.7	<LOR	<LOR
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	250	270
	<b>EC</b>	µS/cm	NA	11000	11000

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

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2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs.



There was one exceedance of the site criteria for June in MWE, TOC at concentrations of 5 mg/L.

**Refer to Table 6.**

**Table 6 –Quarterly Groundwater Results and Comparison Mar 2020-June 2020 (MWE)**

	Analytes	Units	Threshold Criteria (mg/L)	MWE Mar 2020	MWE June 2020
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	60	57
	<b>Alkalinity (total)</b>	mg/L	NA	1100	1000
	<b>Chloride</b>	mg/L	NA	520	640
	<b>Fluoride</b>	mg/L	NA	0.5	0.5
	<b>Potassium<sup>1</sup></b>	mg/L	410	0.6	0.6
	<b>Magnesium</b>	mg/L	NA	63	65
	<b>Sulphate</b>	mg/L	NA	130	130
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	0.018	<LOR
	<b>Manganese</b>	mg/L	1.9	0.24	0.32
<b>PHENOLS</b>	<b>Total phenolics</b>	mg/L	0.32	<LOR	<LOR
<b>OCP</b>	<b>OCP<sup>3</sup></b>	mg/L	0.00001	<LOR	<LOR
<b>MISC. INORGANICS</b>	<b>pH</b>	pH	6.5 – 8	7.3	7.2
	<b>Sodium</b>	mg/L	NA	720	700
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	<LOR	0.018
	<b>Nitrate</b>	mg/L	0.7	0.006	<LOR
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	<b>6</b>	<b>5</b>
	<b>EC</b>	µS/c	NA	3400	3800

Highlighted results exceed site criteria

<LOR = No Detection. Analyte is below the Laboratory LOR

1 - World Health Organisation Guidelines for Drinking-water Quality 2009, Poor (acceptable) drinking water criteria.

2 - Criteria value may not protect key species from chronic toxicity, refer to ANZW 2018 for further guidance.

3 - A Trigger value for DDT is used in the absence of a criteria value for Total OCP. DDT has the lowest criteria of OCPs

## 5.0 DISCUSSION

The inferred hydraulic gradient for the site is a down gradient towards Parsons Gully to the west. The location of the four wells surrounding the landfill place wells MWA, MWB and MWC down-hydraulic gradient and well MWE up-hydraulic gradient of the landfill. Well MWD is located within the perched landfill water table, this enables access to the leachate within the landfill.

The following is a summary of the significant results for June 2020 in relation to the Site Criteria. Key increasing trends, decreasing trends and exceedances of the threshold criteria are indicated.

### **MWA**

MWA is located in the north west section of the site and is considered to be a down-hydraulic gradient monitoring well. There is farmland adjoining to the north and west of this location.

All analytes reported concentrations consistent with previous monitoring data

### **MWB**

MWB is located in the south west section of the site and is considered to be a down-hydraulic gradient monitoring well. There is farmland to the south and west of this location. The well has remained relatively stable. There is one exceedance of the site criteria:

- A concentration of TOC (5 mg/L) was reported in MWB exceeding the Site Criteria (4 mg/L). This is a reduction from the previous reporting period.

All other analytes reported concentrations consistent with previous monitoring data.

### **MWC**

MWC is located on the southern boundary of the site, down hydraulic gradient of the landfill and onsite dam. There is farmland to the south of well, along with a stand of vegetation immediately south of the well. This well has shown increased turbidity compared to other wells with sedimentation in observations from the field. There were three concentrations which exceeded the site criteria. The following changes have occurred in the water quality of MWC:

- A concentration of Manganese (2.9 mg/L) was reported in MWB exceeding the Site Criteria (1.9 mg/L). This is a significant decrease from the previous reporting period (6 mg/L);
- A concentration of TOC (8 mg/L) was reported in MWC exceeding the Site Criteria (1.9 mg/L), which is the same as the previous reported concentration in March 2020.

- Nitrate has decreased from a concentration of 1.2 mg/L to 0.67mg/L, just below the site criteria of 0.7mg/L

Ammonia has reduced in MWC. All other analytes reported concentrations consistent with previous monitoring data.

### **MWD**

The water collected and analysed from well MWD is landfill leachate and as such the Site Criteria is not used to compare the results against. The results of MWD are used as an indicator of current conditions within the landfill with trends and seasonal variations apparent. MWD is also to be used as a comparison to the external monitoring wells.

The following changes occurred in the water quality of the landfill leachate well MWD:

- Ammonia has decreased to a concentration of 250 mg/L;
- Iron concentration of 1 mg/L has decreased since March 2020 concentration of 1.5 mg/L; and,
- TOC has increased from 250 mg/L to a concentration of 270 mg/L.

### **MWE**

MWE is located on the eastern boundary of the site and is considered to be an up-gradient groundwater monitoring well. There are a series of dams to the east of the well. The following changes have occurred in the water quality of MWC:

- A concentration of TOC (5 mg/L) was reported in MWE decreasing from previous testing (6 mg/L), however still exceeding site criteria.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the June 2020 sampling event, excluding the Leachate Monitoring well (MWD); TOC in MWB, MWC and MWE and Manganese in MWC. Refer to **Attachment 3** – Data Log.

### **Site and Maintenance**

The concrete surrounding the base of several of the wells are cracked. These can be easily maintained, which would also reset a barrier for surface migrating into the groundwater. There was additional waste on the western side of the landfill, more than normal.



## **6.0 CONCLUSIONS**

There are seasonal fluctuations observed with regional groundwater conditions. The recent weather conditions of rain may have influenced the groundwater conditions. Trending of these analytes over time may indicate a seasonal fluctuation, an anomaly or highlight an issue on the site (or surrounding area). The trending of analytes occurs in the annual groundwater monitoring report with a running comparison in the quarterly monitoring reports.

The increase in turbidity of MWC that has been noticed. The fluctuations in the monitoring wells in past two monitoring events may be attributed to a stabilisation of weather patterns given that last monitoring period was defined by a transition from drought to heavy rain.

The results and discussion of the laboratory sample analysis from the Scone Waste Facility during the June 2020 quarterly sampling event displayed several ongoing exceedances of the Site Criteria from the previous monitoring period in the form of TOC and manganese. There was a reduction in the nitrate concentration of monitoring wells.

The following analytes exceeded the Site Criteria for the June 2020 sampling event; TOC in MWB, MWC and MWE and Manganese in MWC

Continued sampling and data collection will allow robust trending and statistical analysis of data to occur.

The next water sampling event will be a quarterly monitoring event which will be undertaken in September 2020.

## 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* (ANZW, 2018);
- *Australian Drinking Water Guidelines, National Water Quality Management Strategy 2011*;
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- *Environmental Guidelines Solid Waste Landfills* Second edition, (NSW EPA 2016);
- *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 1998);
- *National Environment Protection (Assessment of Site Contamination) Measure (No.1)* (NEPM, 2013) as amended;
- *Storage and Handling of Dangerous Goods Code of Practice 2005*;
- *Work Health and Safety Act 2011* (NSW) and associated regulations.

**FIGURE 1**  
**SITE LAYOUT AND**  
**SAMPLING LOCATIONS**



**Legend**

● Monitoring Well Location

Image: Google Maps 2019



ENGAGE Environmental  
 Services Pty Limited  
 113 Reservoir Rd  
 Glendale NSW 2285  
 0478 362005

Title **Figure 1 - Site Layout and Well Locations**

Client	Project No.	Figure No	Date
UHSC	E04-0619	1	17/6/2019
admin@engage-es.com.au	Scale NA	Compiled SC	Revision 3



**ATTACHMENT 1**  
**NATA ACCREDITED LABORATORY RESULTS**



## CERTIFICATE OF ANALYSIS 244736

### Client Details

<b>Client</b>	Engage Environmental Services
<b>Attention</b>	Stephen Challinor
<b>Address</b>	113 Reservoir Rd, GLENDALE, NSW, 2285

### Sample Details

<b>Your Reference</b>	<u>E04-UHSC</u>
<b>Number of Samples</b>	5 Water
<b>Date samples received</b>	12/06/2020
<b>Date completed instructions received</b>	12/06/2020

### Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.  
Samples were analysed as received from the client. Results relate specifically to the samples as received.  
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.  
**Please refer to the last page of this report for any comments relating to the results.**

### Report Details

<b>Date results requested by</b>	19/06/2020
<b>Date of Issue</b>	19/06/2020

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with \***

#### Results Approved By

Diego Bigolin, Team Leader, Inorganics  
Dragana Tomas, Senior Chemist  
Loren Bardwell, Senior Chemist  
Priya Samarawickrama, Senior Chemist

#### Authorised By

Nancy Zhang, Laboratory Manager

Organochlorine Pesticides in Water						
Our Reference		244736-1	244736-2	244736-3	244736-4	244736-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		11/06/2020	11/06/2020	11/06/2020	11/06/2020	11/06/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	16/06/2020	16/06/2020	16/06/2020	16/06/2020	16/06/2020
Date analysed	-	16/06/2020	16/06/2020	16/06/2020	16/06/2020	16/06/2020
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	71	85	76	75	98

Total Phenolics in Water						
Our Reference		244736-1	244736-2	244736-3	244736-4	244736-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		11/06/2020	11/06/2020	11/06/2020	11/06/2020	11/06/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	15/06/2020	15/06/2020	15/06/2020	15/06/2020	15/06/2020
Date analysed	-	15/06/2020	15/06/2020	15/06/2020	15/06/2020	15/06/2020
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Ion Balance						
Our Reference		244736-1	244736-2	244736-3	244736-4	244736-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		11/06/2020	11/06/2020	11/06/2020	11/06/2020	11/06/2020
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	12/06/2020	12/06/2020	12/06/2020	12/06/2020	12/06/2020
Date analysed	-	12/06/2020	12/06/2020	12/06/2020	12/06/2020	12/06/2020
Calcium - Dissolved	mg/L	440	390	300	94	57
Potassium - Dissolved	mg/L	2.8	2.3	2.0	150	0.6
Sodium - Dissolved	mg/L	1,700	1,200	1,400	1,200	700
Magnesium - Dissolved	mg/L	940	560	470	220	65
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	500	410	750	2,800	1,000
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	500	410	750	2,800	1,000
Sulphate, SO <sub>4</sub>	mg/L	42	72	110	3	130
Chloride, Cl	mg/L	6,700	4,800	4,400	240	640
Ionic Balance	%	-8.0	-10	-10	13	-4.0

HM in water - dissolved						
Our Reference		244736-1	244736-2	244736-3	244736-4	244736-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		11/06/2020	11/06/2020	11/06/2020	11/06/2020	11/06/2020
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	16/06/2020	16/06/2020	16/06/2020	16/06/2020	16/06/2020
Date analysed	-	16/06/2020	16/06/2020	16/06/2020	16/06/2020	16/06/2020
Iron-Dissolved	µg/L	<10	<10	<10	1,000	<10
Manganese-Dissolved	µg/L	24	10	2,900	170	320

Miscellaneous Inorganics						
Our Reference		244736-1	244736-2	244736-3	244736-4	244736-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		11/06/2020	11/06/2020	11/06/2020	11/06/2020	11/06/2020
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	12/06/2020	12/06/2020	12/06/2020	12/06/2020	12/06/2020
Date analysed	-	12/06/2020	12/06/2020	12/06/2020	12/06/2020	12/06/2020
pH	pH Units	6.8	7.0	6.8	7.6	7.2
Electrical Conductivity	µS/cm	19,000	14,000	14,000	11,000	3,800
Ammonia as N in water	mg/L	<0.005	0.016	<0.005	250	0.018
Fluoride, F	mg/L	0.1	0.2	0.2	0.3	0.5
Total Organic Carbon	mg/L	4	5	8	270	5
Nitrate as N in water	mg/L	0.57	0.55	0.67	<0.050	<0.005

Method ID	Methodology Summary
<b>Inorg-001</b>	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
<b>Inorg-002</b>	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
<b>Inorg-006</b>	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
<b>Inorg-026</b>	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
<b>Inorg-031</b>	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
<b>Inorg-040</b>	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
<b>Inorg-055</b>	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
<b>Inorg-057</b>	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
<b>Inorg-079</b>	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
<b>Inorg-081</b>	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-022</b>	Determination of various metals by ICP-MS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.



Client Reference: E04-UHSC

QUALITY CONTROL: Organochlorine Pesticides in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			16/06/2020	1	16/06/2020	16/06/2020		16/06/2020	[NT]
Date analysed	-			16/06/2020	1	16/06/2020	16/06/2020		16/06/2020	[NT]
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	118	[NT]
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	110	[NT]
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	114	[NT]
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	128	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	126	[NT]
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	122	[NT]
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	124	[NT]
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	110	[NT]
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	110	[NT]
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	122	[NT]
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	100	1	71	64	10	94	[NT]

Client Reference: E04-UHSC

QUALITY CONTROL: Total Phenolics in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	244736-2
Date extracted	-			15/06/2020	1	15/06/2020	15/06/2020		15/06/2020	15/06/2020
Date analysed	-			15/06/2020	1	15/06/2020	15/06/2020		15/06/2020	15/06/2020
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	103	92

Client Reference: E04-UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	244736-2
Date prepared	-			12/06/2020	1	12/06/2020	12/06/2020		12/06/2020	12/06/2020
Date analysed	-			12/06/2020	1	12/06/2020	12/06/2020		12/06/2020	12/06/2020
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	440	450	2	93	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2.8	2.8	0	98	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1700	1600	6	104	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	940	940	0	100	[NT]
Hydroxide Alkalinity (OH <sup>-</sup> ) as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	500	490	2	[NT]	[NT]
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	Inorg-006	<5	1	500	490	2	98	[NT]
Sulphate, SO <sub>4</sub>	mg/L	1	Inorg-081	<1	1	42	41	2	109	96
Chloride, Cl	mg/L	1	Inorg-081	<1	1	6700	6700	0	83	#
Ionic Balance	%		Inorg-040	[NT]	1	-8.0	-8.0	0	[NT]	[NT]

Client Reference: E04-UHSC

QUALITY CONTROL: HM in water - dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			16/06/2020	[NT]	[NT]	[NT]	[NT]	16/06/2020	[NT]
Date analysed	-			16/06/2020	[NT]	[NT]	[NT]	[NT]	16/06/2020	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	100	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	93	[NT]

Client Reference: E04-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	244736-2
Date prepared	-			12/06/2020	1	12/06/2020	12/06/2020		12/06/2020	12/06/2020
Date analysed	-			12/06/2020	1	12/06/2020	12/06/2020		12/06/2020	12/06/2020
pH	pH Units		Inorg-001	[NT]	1	6.8	6.8	0	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	19000	19000	0	96	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	<0.005	<0.005	0	104	110
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.1	0.1	0	94	82
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	4	4	0	93	96
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.57	0.59	3	104	107

Result Definitions	
<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

## Quality Control Definitions

<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

## Report Comments

MISC\_INORG: Nitrate as N PQL has been raised due to matrix interferences. Samples were diluted and reanalysed however same results were achieved.

MISC\_INORG: # Chloride Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.

Note: there is a possibility some elements may be underestimated.

Ion Balance - Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab. Note: there is a possibility some elements may be underestimated.



**ATTACHMENT 2**  
**CALIBRATION CERTIFICATE**

## Multi Parameter Water Meter



Instrument YSI Quatro Pro Plus  
Serial No. 18G103121

Air-Met Scientific Pty Ltd  
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

### Certificate of post-sampling bump test

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		352607	pH 9.57
2. pH 7.00		pH 7.00		330737	pH 6.70
3. pH 4.00		pH 4.00		330734	pH 3.74
4. mV		231.8mV		346052/342074	231.8mV
5. EC		2.76mS		333787	2.75mS
6. D.O		0.00ppm		1904288592	0.00ppm
7. Temp		21.4°C		MultiTherm	20.7°C

Calibrated by: Sarah Lian

Calibration date: 10/06/2020

Next calibration due: 10/07/2020

**ATTACHMENT 3**  
**DATA LOG**

ENGAGE ENVIRONMENTAL SERVICES			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	
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
			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)	
			Monitoring frequency	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly
MWA	210422	11/06/2020		440	500	6700	0.1	<0.010	940	0.024	<0.0002	2.8	6.8	1700	<0.005	0.57	42	4	<0.05	19000	
MWB	210422	11/06/2020		390	410	4800	0.2	<0.010	560	0.01	<0.0002	2.3	7	1200	0.016	0.55	72	5	<0.05	14000	
MWC	210422	11/06/2020		300	750	4400	0.2	<0.010	470	2.9	<0.0002	2	6.8	1400	<0.005	0.67	110	8	<0.05	14000	
MWD	210422	11/06/2020		94	2800	240	0.3	1	220	0.17	<0.0002	150	7.6	1200	250	<0.050	3	270	<0.05	11000	
MWE	210422	11/06/2020		57	1000	640	0.5	<0.010	65	0.32	<0.0002	0.6	7.2	700	0.018	<0.005	130	5	<0.05	3800	

**ATTACHMENT 4**  
**FIELD DATA SHEETS**



## GROUNDWATER FIELD DATA SHEET

Project: E04	Sample ID: MWA
Client:	Sampler: C.M
Site Address: <del>MWA</del> Scone Landfill	Date: 11-6-20

Well Information	
Monument damaged:	YES / <input checked="" type="radio"/> NO / N/A
Locked well casing:	YES / <input checked="" type="radio"/> NO / N/A
Cement footing damaged:	YES / <input checked="" type="radio"/> NO / N/A
Standing water, vegetation around monument:	YES / <input checked="" type="radio"/> NO / N/A
Well Damaged:	YES / <input checked="" type="radio"/> NO / N/A
Casing above ground: 0.75m	m agl
Standing water level: 1.8.3m	m bgl
Total well depth:	m bgl
Initial well volume:	L
Water level after purging: 9.17	m bgl
Volume of water purged: 4 barrels	L
Water level at time of sampling:	m bgl
Well purged dry:	YES / NO
Purging equipment:	
Sample equipment:	

  

Well ID visible:	<input checked="" type="radio"/> YES / NO / N/A
Cap on PVC casing:	<input checked="" type="radio"/> YES / NO / N/A
Water in monument casing:	YES / <input checked="" type="radio"/> NO / N/A
Internal obstruction in casing:	YES / <input checked="" type="radio"/> NO / N/A
Odours from groundwater:	YES / <input checked="" type="radio"/> NO / N/A

  

Weather Conditions:	
Temperature	15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>
	25-30 <input type="checkbox"/> >30 <input type="checkbox"/>
Clear <input type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input checked="" type="checkbox"/>
Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
	Windy <input type="checkbox"/>
Fine <input type="checkbox"/>	Showers <input checked="" type="checkbox"/> Rain <input type="checkbox"/>

Note: 50mm internal diameter pipe = 1.96 L/m.

### Water Quality Details:

Time (m) / pm	DO (mg/L <sup>-1</sup> )	EC ( $\mu$ S cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
8:26	6.18	17377	7.06	188.8	20.3		
	6.07	17456	6.56	180.5	20.3		
	6.35	17817	6.55	178.0	21		
	6.11	17067	6.59	177	20.9		

### Water Quality and General Comments:

Slightly cloudy - no odour

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## GROUNDWATER FIELD DATA SHEET

Project: E04	Sample ID: WE
Client:	Sampler: C.M
Site Address: Score landfill	Date: 11-6-20

<b>Well Information</b>			
Monument damaged:	YES / <input checked="" type="radio"/> NO / N/A	Well ID visible:	YES / <input checked="" type="radio"/> NO / N/A
Locked well casing:	YES / <input checked="" type="radio"/> NO / N/A	Cap on PVC casing:	<input checked="" type="radio"/> YES / NO / N/A
Cement footing damaged:	YES / <input checked="" type="radio"/> NO / N/A	Water in monument casing:	YES / <input checked="" type="radio"/> NO / N/A
Standing water, vegetation around monument:	YES / <input checked="" type="radio"/> NO / N/A	Internal obstruction in casing:	YES / <input checked="" type="radio"/> NO / N/A
Well Damaged:	YES / <input checked="" type="radio"/> NO / N/A	Odours from groundwater:	YES / <input checked="" type="radio"/> NO / N/A
Casing above ground: 0.66m	m agl	<b>Weather Conditions:</b>	
Standing water level: 2.61m	m bgl	Temperature 15-20 <input type="checkbox"/>	20-25 <input checked="" type="checkbox"/>
Total well depth: 2.61m	m bgl	25-30 <input type="checkbox"/>	>30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging: 5.95m	m bgl	Overcast <input checked="" type="checkbox"/>	
Volume of water purged: 3 bailers	L	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/>
Water level at time of sampling:	m bgl	Moderate breeze <input type="checkbox"/>	
Well purged dry:	YES / NO	Windy <input type="checkbox"/>	
Purging equipment:		Fine <input type="checkbox"/>	Showers <input checked="" type="checkbox"/>
Sample equipment:		Rain <input type="checkbox"/>	

Note: 50mm internal diameter pipe = 1.96 L/m.

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC ( $\mu$ S cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
11:30	3.35	3369	7.64	-109.4	21.1		
	3.07	3266	7.48	-122.9	21.1		
	3.52	3076	7.32	-118.1	21.1		
	3.45	3160	7.28	-123.6	21.1		

### Water Quality and General Comments:

slightly cloudy - no odour

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## GROUNDWATER FIELD DATA SHEET

Project: <u>E04</u>	Sample ID: <u>MWB</u>
Client:	Sampler: <u>CM</u>
Site Address: <u>Scene landfill</u>	Date: <u>11-6-20</u>

<b>Well Information</b>			
Monument damaged:	YES / <input checked="" type="radio"/> NO / N/A	Well ID visible:	YES / <input checked="" type="radio"/> NO / N/A
Locked well casing:	YES / <input checked="" type="radio"/> NO / N/A	Cap on PVC casing:	YES / <input checked="" type="radio"/> NO / N/A
Cement footing damaged: <u>(cracked)</u>	YES / <input checked="" type="radio"/> NO / N/A	Water in monument casing:	YES / <input checked="" type="radio"/> NO / N/A
Standing water, vegetation around monument:	YES / <input checked="" type="radio"/> NO / N/A	Internal obstruction in casing:	YES / <input checked="" type="radio"/> NO / N/A
Well Damaged:	YES / <input checked="" type="radio"/> NO / N/A	Odours from groundwater:	YES / <input checked="" type="radio"/> NO / N/A
Casing above ground: <u>0.75m</u>	m agl	<b>Weather Conditions:</b>	
Standing water level: <u>8.33m</u>	m bgl	Temperature	15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>
Total well depth:	m bgl		25-30 <input type="checkbox"/> >30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy <input type="checkbox"/> Overcast <input checked="" type="checkbox"/>
Water level after purging: <u>8.94</u>	m bgl	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>
Volume of water purged: <u>3 barrels</u>	L	Windy <input type="checkbox"/>	
Water level at time of sampling:	m bgl	Fine <input type="checkbox"/>	Showers <input checked="" type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry:	YES / NO		
Purging equipment:			
Sample equipment:			

Note: 50mm internal diameter pipe = 1.96 l/m.

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC (μS cm <sup>-1</sup> )	pH	Redox (mV)	Temp (°C)	Salinity (% Refract)	Comments
	<u>8.46</u>	<u>13068</u>	<u>7.02</u>	<u>155.6</u>	<u>20.2</u>		
	<u>2.59</u>	<u>12697</u>	<u>6.85</u>	<u>154.7</u>	<u>20.4</u>		
	<u>3.02</u>	<u>12730</u>	<u>6.74</u>	<u>156</u>	<u>20.5</u>		
	<u>2.98</u>	<u>12243</u>	<u>6.66</u>	<u>155.9</u>	<u>20.5</u>		

### Water Quality and General Comments:

Clear no odour

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## GROUNDWATER FIELD DATA SHEET

Project: E04	Sample ID: WD
Client:	Sampler: C-m
Site Address: Score land fill	Date: 11-6-20

Well Information			
Monument damaged:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A	Well ID visible:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A
Locked well casing:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A	Cap on PVC casing:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A
Cement footing damaged:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A	Water in monument casing:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A
Standing water, vegetation around monument:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A	Internal obstruction in casing:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A
Well Damaged:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A	Odours from groundwater:	<input checked="" type="radio"/> YES / <input type="radio"/> NO / <input type="radio"/> N/A
Casing above ground: ..... m agl		<b>Weather Conditions:</b>	
Standing water level: 9.61m ..... m bgl		Temperature 15-20 <input type="checkbox"/> 20-25 <input checked="" type="checkbox"/>	
Total well depth: ..... m bgl		25-30 <input type="checkbox"/> >30 <input type="checkbox"/>	
Initial well volume: ..... L		Clear <input type="checkbox"/> Partly cloudy <input type="checkbox"/> Overcast <input checked="" type="checkbox"/>	
Water level after purging: 9.73 ..... m bgl		Calm <input checked="" type="checkbox"/> Slight breeze <input type="checkbox"/> Moderate breeze <input type="checkbox"/>	
Volume of water purged: 3 barrels ..... L		Windy <input type="checkbox"/>	
Water level at time of sampling: ..... m bgl		Fine <input type="checkbox"/> Showers <input checked="" type="checkbox"/> Rain <input type="checkbox"/>	
Well purged dry: YES / NO			
Purging equipment:			
Sample equipment:			

Note: 50mm internal diameter pipe = 1.96 L/m.

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC ( $\mu$ S cm <sup>-1</sup> )	pH	Redox (mV)	Temp ( $^{\circ}$ C)	Salinity (% Refract)	Comments
	2.81	12153	7.19	-177.3	26.2		
	2.27	12168	7.16	-162.2	27.7		
	2.62	12142	7.19	-154.4	27.8		
	2.77	12768	7.12	-174.5	28.0		

### Water Quality and General Comments:

Green tinge, strong odour

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## GROUNDWATER FIELD DATA SHEET

Project: E04	Sample ID: MWC
Client:	Sampler: C.M
Site Address: Saem land fill	Date: 11-6-20

### Well Information

Monument damaged:	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> / N/A	Well ID visible:	YES <input checked="" type="checkbox"/> / NO <input type="checkbox"/> / N/A
Locked well casing:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A	Cap on PVC casing:	YES <input checked="" type="checkbox"/> / NO <input type="checkbox"/> / N/A
Cement footing damaged:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A	Water in monument casing:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A
Standing water, vegetation around monument:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A	Internal obstruction in casing:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A
Well Damaged:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A	Odours from groundwater:	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/> / N/A
Casing above ground: 0.69m	m agl	<b>Weather Conditions:</b>	
Standing water level: 2.7m	m bgl	Temperature 15-20 <input type="checkbox"/>	20-25 <input checked="" type="checkbox"/>
Total well depth:	m bgl	25-30 <input type="checkbox"/>	>30 <input type="checkbox"/>
Initial well volume:	L	Clear <input type="checkbox"/>	Partly cloudy <input type="checkbox"/>
Water level after purging: 8.08	m bgl	Overcast <input checked="" type="checkbox"/>	
Volume of water purged: 4 bailers	L	Calm <input checked="" type="checkbox"/>	Slight breeze <input type="checkbox"/>
Water level at time of sampling:	m bgl	Moderate breeze <input type="checkbox"/>	
Well purged dry:	YES / NO	Windy <input type="checkbox"/>	
Purging equipment:		Fine <input type="checkbox"/>	Showers <input checked="" type="checkbox"/>
Sample equipment:		Rain <input type="checkbox"/>	

Note: 50mm internal diameter pipe = 1.96 L/m.

### Water Quality Details:

Time am / pm	DO (mg/L <sup>-1</sup> )	EC ( $\mu$ S cm <sup>-1</sup> )	pH	Redox (mV)	Temp ( $^{\circ}$ C)	Salinity (% Refract)	Comments
	5.07	12178	6.91	152.1	20.3		
	3.89	12581	6.73	151.6	20.3		
	5.42	12563	6.75	160.8	20.6		
	3.22	12657	6.68	151.9	20.5		

### Water Quality and General Comments:

Deep brown, no odour

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