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**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>OH&amp;S</b>	Occupational Health and Safety
<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



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## 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 5<sup>th</sup> June 2019.

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 2019 sampling event, results are detailed in **Tables 2 to 6**. Comparisons have been made to the previous round of monitoring (March 2019). Refer to **Attachment 1** – NATA Accredited Laboratory Results and **Attachment 3** – Data Log.

There was one exceedance of the site criteria for June in MWA, Iron at a concentration of 0.64mg/L. Refer to Table 2.

**Table 2 – Quarterly Groundwater Results and Comparison March - June 2019 (MWA)**

	Analytes	Units	Site Criteria (mg/L)	MWA March 2019	MWA March 2019
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	610	600
	<b>Alkalinity (total)</b>	mg/L	NA	510	520
	<b>Chloride</b>	mg/L	NA	6400	6500
	<b>Fluoride</b>	mg/L	NA	0.2	0.1
	<b>Potassium<sup>1</sup></b>	mg/L	410	3.4	2.8
	<b>Magnesium</b>	mg/L	NA	1200	1100
	<b>Sulphate</b>	mg/L	NA	39	52
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<b>1.8</b>	<b>0.64</b>
	<b>Manganese</b>	mg/L	1.9	0.07	0.038
<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	6.8	6.7
	<b>Sodium</b>	mg/L	NA	2500	2100
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.02	<LOR
	<b>Nitrate</b>	mg/L	0.7	0.44	0.6
	<b>Total Organic Carbon</b>	mg/L	4	4	3
	<b>EC</b>	µS/cm	NA	20000	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 were two exceedances of the site criteria for June in MWB, Nitrate and TOC at concentrations of 0.71mg/L and 7mg/L respectively. Refer to Table 3.

**Table 3 – Quarterly Groundwater Results and Comparison March - June 2019 (MWB)**

	Analytes	Units	Site Criteria (mg/L)	MWB March 2019	MWB June 2019
<b>IONS</b>	Calcium	mg/L	NA	610	560
	Alkalinity (total)	mg/L	NA	430	420
	Chloride	mg/L	NA	5000	5200
	Fluoride	mg/L	NA	0.3	0.3
	Potassium <sup>1</sup>	mg/L	410	2.9	2.6
	Magnesium	mg/L	NA	770	740
	Sulphate	mg/L	NA	76	76
<b>HEAVY METALS</b>	Iron	mg/L	0.3	2.1	0.027
	Manganese	mg/L	1.9	0.067	<LOR
<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	6.9
	Sodium	mg/L	NA	2000	1600
	Ammonia <sup>2</sup>	mg/L	0.9	<LOR	<LOR
	Nitrate	mg/L	0.7	0.75	0.71
	Total Organic Carbon (TOC)	mg/L	4	5	7
	EC	µS/cm	NA	16000	15000

Highlighted results exceed site criteria

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

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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 four exceedances of the site criteria for June in MWC, Iron, Manganese, Nitrate and TOC at concentrations of 12mg/L, 5.8mg/L, 2.2mg/L and 80mg/L respectively. Refer to Table 4.

**Table 4 – Quarterly Groundwater Results and Comparison March - June 2019 (MWC)**

	Analytes	Units	Site Criteria (mg/L)	MWC March 2019	MWC June 2019
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	370	370
	<b>Alkalinity (total)</b>	mg/L	NA	680	690
	<b>Chloride</b>	mg/L	NA	4000	4000
	<b>Fluoride</b>	mg/L	NA	0.3	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	2.2	2.1
	<b>Magnesium</b>	mg/L	NA	570	600
	<b>Sulphate</b>	mg/L	NA	150	160
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<b>16</b>	<b>12</b>
	<b>Manganese</b>	mg/L	1.9	<b>10</b>	<b>5.8</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	2100	1700
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.006	0.072
	<b>Nitrate</b>	mg/L	0.7	<b>2</b>	<b>2.2</b>
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	<b>11</b>	<b>80</b>
	<b>EC</b>	µS/cm	NA	14000	13000

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.

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 March - June 2019 (MWD)**

	Analytes	Units	Site Criteria (mg/L)	MWD (leachate) Mar 2019	MWD (leachate) June 2019
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	72	79
	<b>Alkalinity (total)</b>	mg/L	NA	2700	2700
	<b>Chloride</b>	mg/L	NA	3000	2900
	<b>Fluoride</b>	mg/L	NA	0.3	0.3
	<b>Potassium<sup>1</sup></b>	mg/L	410	210	190
	<b>Magnesium</b>	mg/L	NA	170	170
	<b>Sulphate</b>	mg/L	NA	46	40
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<b>28</b>	<b>13</b>
	<b>Manganese</b>	mg/L	1.9	0.22	0.21
<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	7.7	7.6
	<b>Sodium</b>	mg/L	NA	2400	1900
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	<b>290</b>	<b>290</b>
	<b>Nitrate</b>	mg/L	0.7	<LOR	<LOR
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	<b>410</b>	<b>170</b>
	<b>EC</b>	µS/cm	NA	14000	13000

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 were two exceedances of the site criteria for June in MWE, Iron and TOC at concentrations of 9.4 mg/L and 340mg/L respectively. Refer to Table 5.

**Table 5 –Quarterly Groundwater Results and Comparison March - June 2019 (MWE)**

	Analytes	Units	Threshold Criteria (mg/L)	MWE March 2019	MWE June 2019
<b>IONS</b>	<b>Calcium</b>	mg/L	NA	53	53
	<b>Alkalinity (total)</b>	mg/L	NA	1200	1200
	<b>Chloride</b>	mg/L	NA	270	310
	<b>Fluoride</b>	mg/L	NA	0.6	0.6
	<b>Potassium<sup>1</sup></b>	mg/L	410	<LOR	0.5
	<b>Magnesium</b>	mg/L	NA	59	57
	<b>Sulphate</b>	mg/L	NA	110	130
<b>HEAVY METALS</b>	<b>Iron</b>	mg/L	0.3	<b>10</b>	<b>9.4</b>
	<b>Manganese</b>	mg/L	1.9	0.16	0.22
<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	7.4	7.2
	<b>Sodium</b>	mg/L	NA	710	690
	<b>Ammonia<sup>2</sup></b>	mg/L	0.9	0.045	0.052
	<b>Nitrate</b>	mg/L	0.7	<LOR	0.01
	<b>Total Organic Carbon (TOC)</b>	mg/L	4	<b>9</b>	<b>340</b>
	<b>EC</b>	µS/c	NA	3100	3100

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

## 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 2019 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. The following changes have occurred in the water quality of MWA:

- Iron has decreased from 1.8mg/L (March 2019) to 0.64mg/L, remaining above the site criteria of 0.3mg/L; and,
- Manganese has decreased significantly from 0.07mg/L (March 2019) to 0.038mg/L, remaining below the site criteria.

All other 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 following changes have occurred in the water quality of MWB:

- A concentration of TOC (7 mg/L) was reported in MWB exceeding the Site Criteria (4 mg/L). This is an increase from the previous monitoring event in March 2019 (5mg/L);
- Iron has decreased significantly from a concentration of 2.1mg/L to 0.27mg/L, now below the site criteria of 0.3mg/L;
- Nitrate has remained relatively consistent with the previous sampling event with a concentration of 0.71mg/L, above the site criteria of 0.7mg/L; and,
- Manganese has decreased to a non-detection.

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 increasing turbidity with sedimentation in observations from the field.

The following changes have occurred in the water quality of MWC:

- A concentration of Manganese (5.8mg/L) was reported in MWC exceeding the Site Criteria (1.9 mg/L), representing a decrease from the previous round of monitoring (10mg/L) with a continued exceedance;
- A concentration of TOC (80 mg/L) was reported in MWC exceeding the Site Criteria (1.9 mg/L), which is a significant increase from the previous reported concentration in March 2019 (11 mg/L);
- A concentration of Nitrate (2.2 mg/L) was reported in MWC exceeding the Site Criteria (0.7 mg/L), which is a small increase from the previous reported concentration in March 2019 (2.0mg/L); and,
- A concentration of Iron (12 mg/L) was reported in MWC exceeding the Site Criteria (0.03 mg/L). This represents a decrease from the March 2019 concentration reported as 16mg/L.

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.

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 located in the perched leachate water table. The Nitrate may be migrating onto the site from the farmland to the north through the local ground water.

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

- Ammonia has remained steady at a concentration of 290 mg/L;
- Iron concentration of 13 mg/L has significantly decreased since March 2019 concentration of 28 mg/L; and,
- TOC has decreased from 410 mg/L to a concentration of 170 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 MWE:

- A concentration of TOC (340 mg/L) was reported in MWE significantly increasing from the previous round of monitoring 9mg/l in March 2019; and,
- -Iron has remained relatively consistent with a concentration of 9.4mg/L in June with the March contraction of 10mg/L, above the site criteria of 0.3mg/L.

All other analytes reported concentrations consistent with previous monitoring data.

The following analytes exceeded the Threshold Criteria during the June 2019 sampling event, excluding the Leachate Monitoring well (MWD); Iron in MWA, MWC and MWE, TOC in MWA, MWC and MWE, Manganese in MWC and Nitrate in MWC. Refer to **Attachment 3** – Data Log.

### **Site and Maintenance**

The area has been in drought for some time and in the 3 days leading up to the monitoring there was rain which fell on the site and surrounding area. These may be factors influencing the groundwater concentrations of some analytes in MWE and MWC at the time of sampling.

The weather conditions (drought and rain events) and surrounding land uses are likely impacting the local groundwater conditions. The next round of monitoring will indicate if these specific analyte results were an anomaly.

The concrete surrounding the base of several of the wells is cracked. These can be easily maintained, which would also reset a barrier for surface migrating into the groundwater.

## **6.0 CONCLUSIONS**

There are seasonal fluctuations observed with regional groundwater conditions. The recent weather conditions of drought and the 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 results and discussion of the laboratory sample analysis from the Scone Waste Facility during the June 2019 quarterly sampling event displayed several ongoing exceedances of the Site Criteria from the previous monitoring period.

The following analytes exceeded the Site Criteria for the June 2019 sampling event; Iron in MWA, MWC and MWE, TOC in MWB, MWC and MWE, Manganese in MWC and Nitrate in MWC.

A significant increase in the concentration of TOC was noted in MWC and a major increase in MWE, these two wells and TOC will be sampled and analysed in the next round of monitoring.

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 2019.

## 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*;
- *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);
- *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 219186

### 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>E04-0619-UHSC</u>
<b>Number of Samples</b>	5 Water
<b>Date samples received</b>	07/06/2019
<b>Date completed instructions received</b>	07/06/2019

### 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>	17/06/2019
<b>Date of Issue</b>	17/06/2019

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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  
Giovanni Agosti, Group Technical Manager  
Priya Samarawickrama, Senior Chemist  
Steven Luong, Organics Supervisor

#### Authorised By

Nancy Zhang, Laboratory Manager

OCP in water						
Our Reference		219186-1	219186-2	219186-3	219186-4	219186-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		05/06/2019	05/06/2019	05/06/2019	05/06/2019	05/06/2019
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
Date analysed	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
TCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-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
beta-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
pp-DDD	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-DDT	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
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	%	76	96	97	83	119

Total Phenolics in Water						
Our Reference		219186-1	219186-2	219186-3	219186-4	219186-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		05/06/2019	05/06/2019	05/06/2019	05/06/2019	05/06/2019
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
Date analysed	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - total						
Our Reference		219186-1	219186-2	219186-3	219186-4	219186-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		05/06/2019	05/06/2019	05/06/2019	05/06/2019	05/06/2019
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
Date analysed	-	11/06/2019	11/06/2019	11/06/2019	11/06/2019	11/06/2019
Iron-Total	µg/L	640	27	12,000	13,000	9,400
Manganese-Total	µg/L	38	<5	5,800	210	220

Miscellaneous Inorganics						
Our Reference		219186-1	219186-2	219186-3	219186-4	219186-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		05/06/2019	05/06/2019	05/06/2019	05/06/2019	05/06/2019
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Ammonia as N in water	mg/L	<0.005	<0.005	0.072	290	0.052
pH	pH Units	6.7	6.9	6.8	7.6	7.2
Electrical Conductivity	µS/cm	19,000	15,000	13,000	13,000	3,100
Fluoride, F	mg/L	0.1	0.3	0.3	0.3	0.6
Total Organic Carbon	mg/L	3	7	80	170	340
Nitrate as N in water	mg/L	0.60	0.71	2.2	<0.05	0.01

Ion Balance						
Our Reference		219186-1	219186-2	219186-3	219186-4	219186-5
Your Reference	UNITS	MWA	MWB	MWC	MWD	MWE
Date Sampled		05/06/2019	05/06/2019	05/06/2019	05/06/2019	05/06/2019
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Calcium - Dissolved	mg/L	600	560	370	79	53
Potassium - Dissolved	mg/L	2.8	2.6	2.1	190	0.5
Sodium - Dissolved	mg/L	2,100	1,600	1,700	1,900	690
Magnesium - Dissolved	mg/L	1,100	740	600	170	57
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	520	420	690	2,700	1,200
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	mg/L	520	420	690	2,700	1,200
Sulphate, SO <sub>4</sub>	mg/L	52	76	160	40	130
Chloride, Cl	mg/L	6,500	5,200	4,000	2,900	310
Ionic Balance	%	5.0	0	5.0	-12	2.0

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-005</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Client Reference: E04-0619-UHSC

QUALITY CONTROL: OCP in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
Date analysed	-			11/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
HCB	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	74	[NT]
gamma-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	83	[NT]
Heptachlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	82	[NT]
delta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	101	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	86	[NT]
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	89	[NT]
Dieldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	93	[NT]
Endrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	89	[NT]
pp-DDD	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	78	[NT]
Endosulfan II	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	94	[NT]
Methoxychlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	79	1	76	96	23	83	[NT]

Client Reference: E04-0619-UHSC

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
Date analysed	-			11/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	97	[NT]

Client Reference: E04-0619-UHSC

QUALITY CONTROL: HM in water - total				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			13/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
Date analysed	-			13/06/2019	1	11/06/2019	11/06/2019		11/06/2019	[NT]
Iron-Total	µg/L	10	Metals-022	<10	1	640	620	3	102	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	1	38	40	5	97	[NT]

Client Reference: E04-0619-UHSC

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	219186-2
Date prepared	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	07/06/2019
Date analysed	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	07/06/2019
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	<0.005	<0.005	0	96	85
pH	pH Units		Inorg-001	[NT]	1	6.7	6.7	0	102	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	19000	19000	0	107	[NT]
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	1	0.1	0.1	0	99	83
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	3	3	0	97	100
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.60	0.60	0	104	120

Client Reference: E04-0619-UHSC

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	[NT]
Date analysed	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	600	[NT]		106	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2.8	[NT]		106	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	2100	[NT]		97	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1100	[NT]		108	[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	520	520	0	[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	520	520	0	105	[NT]
Sulphate, SO <sub>4</sub>	mg/L	1	Inorg-081	<1	1	52	47	10	112	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	6500	6900	6	114	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	5.0	[NT]		[NT]	[NT]

## 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.
<p>Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, &amp; E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC &amp; ARMC 2011.</p>	

## 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; 60-140% for organics (+/-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.

## Report Comments

Samples received in good order: Holding time exceedance

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



# CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services  
12 Ashley St, Chatswood, NSW 2067  
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- Combo1=TRH/BTEX/Pb
- Combo2=TRH/BTEX/PAH/Pb
- Combo3=TRH/BTEX/PAH/Met
- Combo4=TRH/BTEX/PAH/Met/Phen
- Combo5=TRH/BTEX/PAH/OC/PCB/Met
- Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
- Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
- Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
- Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
- Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
- Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
- Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH ,6 Met
- Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH ,6Met

A Combo with an 'A' Indicates Asbestos is also needed.

Client: Engage Environmental Services  
 Contact Person: Stephen Challinor  
 Project Mgr: Stephen  
 Sampler: Stephen Challinor  
 Address: 113 Reservoir Rd, Glendale NSW 2285.  
 Phone: 0478 362 005 Mob: 0478362005  
 Email: [stephen.challinor@engage-es.com.au](mailto:stephen.challinor@engage-es.com.au);  
[admin@engage-es.com.au](mailto:admin@engage-es.com.au)

Client Project Name / Number / Site etc (ie report title):  
 E04-0619 - UHSC  
 PO No.:  
 Envirolab Quote No.:  
 Date results required:  
 Or choose: STANDARD  
*Note: Inform lab in advance if urgent turnaround is required - surcharges apply*  
 Report format: esdat / equis /  
 Lab Comments:

Sample information					Tests Required													Comments	
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	OCp	Cation suite: Ca, K, Na, Mg	Anions major: Chloride, Sulfate, alkalinity	phenols	Ammonia	iron	manganese	Fluoride	TOC	Nitrate	EC	pH			Provide as much information about the sample as you can
1	MWA		5/06/2019	Water	X	X	X	X	X	X	X	X	X	X	X	X			
2	MWB		5/06/2019	Water	X	X	X	X	X	X	X	X	X	X	X	X			
3	MWC		5/06/2019	Water	X	X	X	X	X	X	X	X	X	X	X	X			
4	MWD		5/06/2019	Water	X	X	X	X	X	X	X	X	X	X	X	X			leachate
5	MWE		5/06/2019	Water	X	X	X	X	X	X	X	X	X	X	X	X			

Relinquished by (Company): Engage Environmental Services  
 Print Name: Stephen Challinor  
 Date & Time: 6/6/19  
 Signature: *[Signature]*

Received by (Company): *EA*  
 Print Name: *Ming Yan To*  
 Date & Time: *07/06/19 10:41*  
 Signature: *MT*

Lab use only:  
 Samples Received:  Cool or Ambient (circle one)  
 Temperature Received at: *13.4* (if applicable)  
 Transported by: Hand delivered / courier

ENVIROLAB  
 Envirolab Services  
 12 Ashley St  
 Chatswood NSW 2067  
 Ph: (02) 9910 6200

Job No: *219186*  
 Date Received: *07/06/19*  
 Time Received: *10:41*  
 Received by: *MT*  
 Temp:  Cool / Ambient *13.4*  
 Cooling:  Ice / Ice pack  
 Security:  Intact / Broken / None

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

## Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**  
 Serial No. **18L102024**



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 Calibration

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 7.00		pH 7.00		330737	pH 6.98
2. pH 4.00		pH 4.00		324985	pH 3.81
3. pH 10.00		pH 10.00		324189	pH 10.07
3. mV		234mV		324355/325421	233.4mV
4. EC		2.76mS		322349	2.75mS
5. D.O		0.00ppm		329994	0.00ppm
6. Temp		20.6°C		MultiTherm	20.0°C

Calibrated by:

Kylie Boardman

Calibration date:

3/06/2019

Next calibration due:

3/07/2019

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

ENGAGE ENVIRONMENTAL SERVICES			Sampler/Reviewer			STC/SJC			Site Criteria
			Sample ID	MWA	MWB	MWC	MWD	MWE	
Site : SCONE WASTE FACILITY			219186	219186	219186	219186	219186		
Monitoring Frequency	Analyses	Units	5/06/2019	5/06/2019	5/06/2019	5/06/2019	5/06/2019		
Quarterly	Calcium	mg/L	600	560	370	79	53	NA	
Quarterly	Alkalinity	mg/L	520	420	690	2700	1200	NA	
Quarterly	Chloride	mg/L	6500	5200	4000	2900	310	NA	
Quarterly	Fluoride	mg/L	0.1	0.3	0.3	0.3	0.6	NA	
Quarterly	Iron	mg/L	0.64	0.027	12	13	9.4	0.3	
Quarterly	Magnesium	mg/L	1100	740	600	170	57	NA	
Quarterly	Manganese	mg/L	0.038	<5	5.8	0.21	0.22	1.9	
Quarterly	Organochlorine pesticides (OCP)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00001*	
Quarterly	Potassium	mg/L	2.8	2.6	2.1	190	0.5	NA	
Quarterly	pH	pH units	6.7	6.9	6.8	7.6	7.2	6.5-8	
Quarterly	Sodium	mg/L	2100	1600	1700	1900	690	NA	
Quarterly	Ammonia	mg/L	<0.005	<0.005	0.072	290	0.052	0.9	
Quarterly	Nitrate	mg/L	0.6	0.71	2.2	<0.05	0.01	0.7	
Quarterly	Sulphate	mg/L	52	76	160	40	130	NA	
Quarterly	Total organic carbon	mg/L	3	7	80	170	340	4	
Quarterly	Total phenolics	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.32	
Quarterly	Electrical conductivity (EC)	µS/cm	19000	15000	13000	13000	3100	NA	

\* - trigger value

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

## GROUNDWATER FIELD DATA SHEET

Project: E04-619	Sample ID: MW <b>A</b>
Client: UHSC	Sampler: SC
Site Address: Scone Waste Facility	Date: <b>5.6.19</b>

**Well Information**

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

Casing above ground: ..... m agl

Standing water level: **7.74** ..... m bgl

Total well depth: **12.58** ..... m bgl

Initial well volume: ..... L

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

Volume of water purged: ..... L

Water level at time of sampling: **9.35** ..... m bgl

Well purged dry: YES / **NO**

Purging equipment: **Baker**

Sample equipment: **Baker**

**Weather Conditions:**

Temperature 15-20  20-25  25-30  >30

Clear  Partly cloudy  Overcast

Calm  Slight breeze  Moderate breeze

Windy

Fine  Showers  Rain

*lid damaged*  
*grass*  
*showers on the way.*

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
10.00	5.16	19946	7.25	146.2	20.6		
10.02	4.20	19995	6.59	159.2	20.7		
10.05	4.15	19980	6.62	158.1	20.7		
10.08	4.20	19990	6.68	159.7	20.7		
10.10	4.18	19994	6.68	159.7	20.7		

**Water Quality and General Comments:**

*Grass surrounding well*  
*monument lid is not attached still sits on monument.*  
*concrete is cracked at base of monument*  
*Slightly cloudy*  
*Water with Salinity on plate.*

## GROUNDWATER FIELD DATA SHEET

Project: E04-619	Sample ID: MW <u>B</u>
Client: UHSC	Sampler: SC
Site Address: Scone Waste Facility	Date: <u>5.6.19</u>

### Well Information

Monument damaged:	YES / NO / N/A	Well ID visible:	YES / NO / N/A
Locked well casing:	YES / <u>NO</u> / N/A	Cap on PVC casing:	YES / <u>NO</u> / N/A
Cement footing damaged:	<u>YES</u> / NO / N/A	Water in monument casing:	YES / <u>NO</u> / N/A
Standing water, vegetation around monument:	<u>YES</u> / NO / N/A <u>SAWD</u>	Internal obstruction in casing:	YES / <u>NO</u> / N/A
Well Damaged:	YES / <u>NO</u> / N/A	Odours from groundwater:	YES / <u>NO</u> / N/A
Casing above ground: <u>0.76</u>	m agl	<b>Weather Conditions:</b>	
Standing water level: <u>7.66</u>	m bgl	Temperature 15-20 <input checked="" type="checkbox"/>	20-25 <input type="checkbox"/>
Total well depth: <u>15.92</u>	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:	m bgl	Overcast <input checked="" type="checkbox"/>	
Volume of water purged:	L	Calm <input type="checkbox"/>	Slight breeze <input type="checkbox"/>
Water level at time of sampling: <u>10.10</u>	m bgl	Moderate breeze <input checked="" type="checkbox"/>	
Well purged dry:	YES / <u>NO</u>	Windy <input type="checkbox"/>	
Purging equipment: <u>Bailer</u>		Fine <input type="checkbox"/>	Shows <input checked="" type="checkbox"/> Rain <input type="checkbox"/>
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 (°C)	Salinity (% Refract)	Comments
<u>10.25</u>		<u>15451</u>			<u>20.5</u>		
<u>10.28</u>	<u>3.25</u>	<u>14700</u>	<u>6.80</u>	<u>175</u>	<u>20.4</u>		
<u>10.32</u>	<u>1.20</u>	<u>14900</u>	<u>6.82</u>	<u>183</u>	<u>20.5</u>		
<u>10.34</u>	<u>1.22</u>	<u>15010</u>	<u>6.85</u>	<u>184</u>	<u>20.5</u>		
<u>10.37</u>	<u>1.25</u>	<u>15025</u>	<u>6.88</u>	<u>179</u>	<u>20.5</u>		

### Water Quality and General Comments:

Sinks surrounding the well  
Lower sediment, no odour, no beer, slightly cloudy

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## GROUNDWATER FIELD DATA SHEET

Project: E04-619	Sample ID: MW <u>C</u>
Client: UHSC	Sampler: SC
Site Address: Scone Waste Facility	Date: <u>5.6.19</u>

### Well Information

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
Casing above ground: <u>0.75</u>	m agl	<b>Weather Conditions:</b>	
Standing water level: <u>7.15</u>	m bgl	Temperature 15-20 <input checked="" type="checkbox"/>	20-25 <input type="checkbox"/>
Total well depth: <u>12.60</u>	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:	m bgl	Overcast <input checked="" type="checkbox"/>	
Volume of water purged:	L	Calm <input type="checkbox"/>	Slight breeze <input type="checkbox"/>
Water level at time of sampling: <u>9.95</u> <u>9.0</u>	m bgl	Moderate breeze <input checked="" type="checkbox"/>	
Well purged dry:	YES / NO	Windy <input type="checkbox"/>	
Purging equipment: <u>Balor</u>		Fine <input type="checkbox"/>	Showers <input type="checkbox"/>
Sample equipment:		Rain <input type="checkbox"/>	

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

showers on way

### 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
<u>10.58</u>	<u>1.21</u>	<u>12500</u>	<u>6.71</u>	<u>190.1</u>			
<u>11.01</u>	<u>1.15</u>	<u>12346</u>	<u>6.82</u>	<u>190.0</u>	<u>20.6</u>		
<u>11.05</u>	<u>1.05</u>	<u>12185</u>	<u>6.83</u>	<u>183.2</u>	<u>20.6</u>		
<u>11.07</u>	<u>1.03</u>	<u>12107</u>	<u>6.85</u>	<u>181.1</u>	<u>20.7</u>		
<u>11.10</u>	<u>1.05</u>	<u>12154</u>	<u>6.83</u>	<u>182.3</u>	<u>20.7</u>		

### Water Quality and General Comments:

A lot of sediment in CW. No odor no sheen.  
Broken sediment.

---

Surrounding area has had grass removed from bank & woodchip installed. Runoff??

## GROUNDWATER FIELD DATA SHEET

Project: E04-619	Sample ID: MWF
Client: UHSC	Sampler: SC
Site Address: Scone Waste Facility	Date: 5.6.19

### Well Information

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: 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: 0.73 m agl	<b>Weather Conditions:</b>
Standing water level: 7.62 m bgl	
Total well depth: 9.30 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: m bgl	Calm <input type="checkbox"/> Slight breeze <input type="checkbox"/> Moderate breeze <input checked="" type="checkbox"/>
Volume of water purged: L	Windy <input type="checkbox"/>
Water level at time of sampling: 8.95 m bgl	Fine <input type="checkbox"/> Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry: YES / NO	
Purging equipment: Bailers	
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
11.35	0.81	3180	7.11	118.2	20.8		
11.41	0.68	3140	7.08	109.2	20.6		
11.47	0.54	3090	7.01	102.1	20.6		
11.52	0.49	3085	6.97	102.5	20.6		

### Water Quality and General Comments:

Brown sediment, no odour no smell

Bailers clogs sticking to side of well. Clay penetrating into well? Filter pack?

Cement body cracked.

## GROUNDWATER FIELD DATA SHEET

Project: E04-619	Sample ID: MW <span style="color: blue;">D</span>
Client: UHSC	Sampler: SC
Site Address: Scone Waste Facility	Date: 3.6.19

### Well Information

Monument damaged: <span style="color: blue;">YES</span> / NO / N/A	Well ID visible: YES / <span style="color: blue;">NO</span> / N/A
Locked well casing: YES / <span style="color: blue;">NO</span> / N/A	Cap on PVC casing: <span style="color: blue;">YES</span> / NO / N/A
Cement footing damaged: <span style="color: blue;">YES</span> / NO / N/A	Water in monument casing: YES / <span style="color: blue;">NO</span> / N/A
Standing water, vegetation around monument: YES / <span style="color: blue;">NO</span> / N/A	Internal obstruction in casing: YES / <span style="color: blue;">NO</span> / N/A
Well Damaged: <span style="color: blue;">YES</span> / NO / N/A	Odours from groundwater: <span style="color: blue;">YES</span> / NO / N/A
Casing above ground: <span style="color: blue;">NA</span> m agl	<b>Weather Conditions:</b>
Standing water level: <span style="color: blue;">8.5</span> m bgl	
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: m bgl	Calm <input type="checkbox"/> Slight breeze <input type="checkbox"/> Moderate breeze <input checked="" type="checkbox"/>
Volume of water purged: L	Windy <input type="checkbox"/>
Water level at time of sampling: m bgl	Fine <input type="checkbox"/> Showers <input type="checkbox"/> Rain <input type="checkbox"/>
Well purged dry: YES / <span style="color: blue;">NO</span>	
Purging equipment: <span style="color: blue;">Bailey</span>	
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
<span style="color: blue;">12.55</span>	<span style="color: blue;">1.12</span>	<span style="color: blue;">12605</span>	<span style="color: blue;">7.41</span>	<span style="color: blue;">-180.3</span>	<span style="color: blue;">24.4</span>		
<span style="color: blue;">1.02</span>	<span style="color: blue;">1.10</span>	<span style="color: blue;">12570</span>	<span style="color: blue;">7.49</span>	<span style="color: blue;">-1742</span>	<span style="color: blue;">25.1</span>		
<span style="color: blue;">1.05</span>	<span style="color: blue;">1.18</span>	<span style="color: blue;">12626</span>	<span style="color: blue;">7.51</span>	<span style="color: blue;">-1832</span>	<span style="color: blue;">25.2</span>		

### Water Quality and General Comments:

Leachate very odourous - Green tinge in water

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