

4 March 2024

Lithgow City Council
PO Box 19,
180 Mort Street
Lithgow NSW 2790

Attention: Nigel Campbell, Waste & Recycling Manager

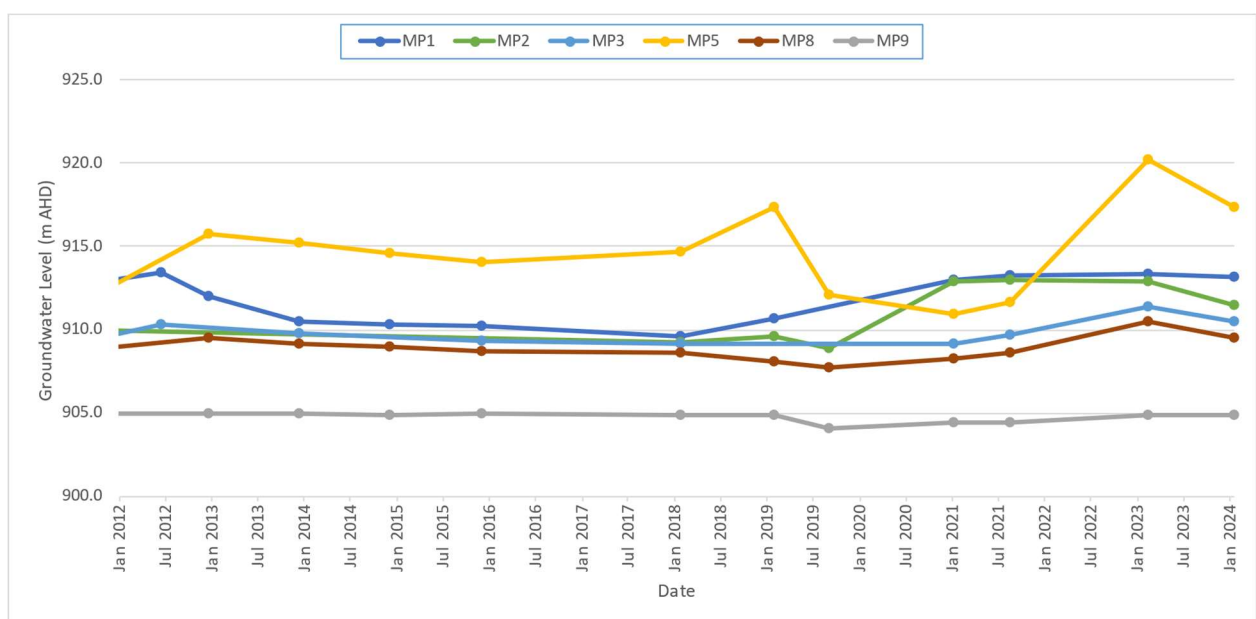
Environmental Monitoring of Portland Waste Disposal Depot, Under Environment Protection Licence 10936

Premise has completed annual groundwater monitoring at Portland Waste Disposal Depot, located off the Portland Cullen Bullen Road, approximately 2 km north of Portland, NSW.

Groundwater Levels

Groundwater was gauged at six (6) groundwater monitoring wells across the site. Groundwater gauging data is included in Table 1 (attached), and elevation trends are shown on **Figure 1**.

Figure 1 – Portland Waste Disposal Depot – Groundwater Elevations



Observations were as follows:

- Depths to groundwater ranged from artesian (overflowing) conditions observed at MP9, to 20.60 metres below ground level (mbgl) at MP5. Corrected groundwater elevations ranged from 904.90 metres Australian Height Datum (mAHD) at MP9, to 917.40 mAHD at MP5.
- Inference of groundwater elevations, calculated from available survey data from installed groundwater monitoring wells, indicates a flow direction to the north-west.

Groundwater Quality

All groundwater samples were able to be collected from their sampling points. Samples were couriered to SGS Laboratories in Alexandria, NSW, who are NATA accredited to perform the scheduled analysis. Results of analysis are included in **Table 2** (attached), and laboratory certificates have also been appended to this letter.

Groundwater quality has been assessed by comparison to criteria (where available) adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* 2000 – Primary Industries: Water quality for irrigation and general water use.

- Laboratory measured pH ranged from 4.7 at MP2 to 6.8 at MP9. Groundwater was outside the guideline range considered suitable for pumping, irrigation and stock watering (6.0 to 8.5 pH units) at points MP2 and MP3.
- Electrical conductivity (EC) ranged from 460 $\mu\text{S}/\text{cm}$ at piezometer MP2 to 3,300 $\mu\text{S}/\text{cm}$ at piezometer MP9. Corresponding total dissolved solid (TDS) concentrations (respectively 308 mg/L to 2,211 mg/L) identifies the groundwater did not exceed the livestock watering 'loss of production' TDS tolerance limit for the most sensitive livestock category, poultry (3,000 mg/L, ANZECC & ARMCANZ, 2000).
- Total alkalinity in groundwater ranged from below the laboratory limit of reporting (LOR) of 5 mg/L at MP2 and MP3, to 660 mg/L at MP9. Groundwater alkalinity at MP5, MP8 and MP9 exceeded the guideline hardness value for potential fouling of waters (350 mg/L).
- Groundwater chloride concentrations ranged from 78 mg/L at MP2 to 470 mg/L at MP3. The chloride concentration recorded at sampling point MP3 exceeded the guideline value for protection of moderately sensitive crops (350 mg/L).
- Fluoride concentrations in groundwater ranged from 0.26 mg/L at MP8 to 0.50 mg/L at MP3. All concentrations were below the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- Sulfate concentrations in groundwater ranged from 84 mg/L at MP2 to 1,100 mg/L at MP9.
- Calcium concentrations ranged from 13 mg/L at MP2 to 340 mg/L at MP9.
- Magnesium concentrations ranged from 6.7 mg/L at MP2 to 220 mg/L at MP9.
- Potassium concentrations ranged from 7.7 mg/L at MP8 to 120 mg/L at MP1.

- Concentrations of sodium ranged from 54 mg/L at MP2 to 430 mg/L at MP3. Sodium concentrations in the groundwater sample collected from MP3 exceeded the guideline level for irrigation to moderately sensitive crops (<230 mg/L).
- Total organic carbon (TOC) in groundwater ranged from 1.9 mg/L at MP9 to 85 mg/L at MP1.
- Ammonia concentrations in groundwater ranged from 0.01 mgN/L at MP2, to 3.3 mgN/L at MP1.
- Nitrate concentrations ranged from less than the laboratory LOR of 0.005 mgN/L at MP1, to 130 mgN/L at MP3.
- Iron concentrations ranged from less than the laboratory LOR of 0.005 mg/L at MP8 and MP9, to 0.16 mg/L at MP1. The iron concentration recorded in all collected groundwater samples exceeded the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Manganese concentrations ranged from 0.28 mg/L at MP2 to 6.4 mg/L at MP8. Manganese concentrations at all locations exceeded the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Total phenols were below the laboratory LOR of 0.05 mg/L at all groundwater monitoring points.
- Organochlorine pesticides were below respective laboratory LORs at all groundwater monitoring points.

Surface Water

The surface water monitoring point SW1 was inspected in January 2024. No discharge was occurring at the time of inspection, and no evidence of discharge(s) having occurred prior was apparent.

A subsequent discharge was recorded to have occurred in February 2024 and SW1 was inspected and sampled on 22 February 2024. At the time of this report, no analytical results were available for review.

The next routine monitoring for groundwater is scheduled for January 2025. Surface water monitoring is required to take place any calendar month when a surface water discharge is recorded at an interval of not less than once every 6 months.

Please do not hesitate to contact us with any questions or comments you may have regarding this report.

Yours sincerely



BRENDAN STUART

Senior Environmental Scientist

No. of Attachments – 4:

Environmental Monitoring Point Locations

Table 1 – Groundwater Level Measurements

Table 2 – Results of Laboratory Analyses (Groundwater) – January 2024

SGS Laboratories Analytical Reports – January 2024



TABLE 1: PORTLAND WASTE DISPOSAL DEPOT - GROUNDWATER LEVEL RESULTS

Ground Water Levels: 17-Jan-24

Piezometer Details:

	Ground Elev (mAHD)	Stickup (m)	Elevation Top PVC (mAHD)	Date	Measured (m)	GWL (mAHD)	Well Depth (m)	Well Base (mAHD)	Water Column (m)
MP1	913.700	0.40	914.100	17/01/2024	0.91	913.19	6.0	908.09	5.10
MP2	913.600	0.20	913.800	17/01/2024	2.33	911.47	5.0	908.80	2.67
MP3	914.200	0.60	914.800	17/01/2024	4.32	910.48	5.8	909.00	1.48
MP5	937.200	0.80	938.000	17/01/2024	20.60	917.40	61.3	876.70	40.70
MP8	911.800	0.50	912.300	17/01/2024	2.82	909.48	21.5	890.79	18.69
MP9	903.800	1.10	904.900	17/01/2024	0.00	904.90	16.7	888.20	16.70

Definitions:

Stickup:	Height of piezometer pipe above ground surface.
Ground Elev:	Actual elevation of ground at the piezometer relative to an arbitrary datum. All ground elevations are measured to the same datum, hence Piezo GWLs are relative to each other.
GWL:	Actual elevation of groundwater at the piezometer relative to an arbitrary datum.
NMWL:	No Measured Water Level
Measured:	Depth of groundwater measured from the top of the piezometer pipe.

Date	MP1		MP2		MP3		MP5		MP8		MP9	
	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)
01-Jun-10	4.21	909.89	NMWL		NMWL		30.20	907.80	4.48	907.82	0.00	904.90
15-Dec-10	1.23	912.87	NMWL		NMWL		27.37	910.63	3.44	908.86	-0.05	904.95
29-Jun-11	1.30	912.80	NMWL		5.65	909.15	25.67	912.33	3.62	908.68	-0.05	904.95
27-Jul-11	1.57	912.53	NMWL		NMWL		NMWL		NMWL		NMWL	
06-Dec-11	1.14	912.96	3.85	909.95	NMWL		25.40	912.60	Bore Damaged		-0.05	904.95
13-Jun-12	0.70	913.40	NMWL		4.48	910.32	NMWL		NMWL		NMWL	
16-Dec-12	2.09	912.01	NMWL		NMWL		22.22	915.78	2.77	909.53	-0.05	904.95
11-Dec-13	3.57	910.53	NMWL		4.98	909.82	22.79	915.21	3.16	909.14	-0.05	904.95
04-Dec-14	3.80	910.30	NMWL		NMWL		23.43	914.57	3.33	908.97	0.05	904.85
03-Dec-15	3.84	910.26	NMWL		5.45	909.35	23.97	914.03	3.57	908.73	-0.05	904.95
24-Jan-18	4.46	909.64	4.56	909.24	5.68	909.12	23.30	914.70	3.68	908.62	0.05	904.85
30-Jan-19	3.40	910.70	4.18	909.62	NMWL		20.61	917.39	4.23	908.07	0.05	904.85
02-Sep-19	NMWL		4.92	908.88	NMWL		25.93	912.07	4.61	907.69	0.87	904.03
05-Jan-21	1.11	912.99	0.9	912.90	5.61	909.19	27.05	910.95	4.04	908.26	0.49	904.41
19-Aug-21	0.85	913.25	0.84	912.96	5.13	909.67	26.35	911.65	3.69	908.61	0.50	904.40
15-Feb-23	0.72	913.38	0.92	912.88	3.43	911.37	17.82	920.18	1.85	910.45	0.00	904.90
17-Jan-24	0.91	913.19	2.33	911.47	4.32	910.48	20.60	917.40	2.82	909.48	0.00	904.90

TABLE 2: PORTLAND WASTE DISPOSAL DEPOT - RESULTS OF LABORATORY ANALYSIS
JANUARY 2024



					Sample ID	MP-1	MP-2	MP-3	MP-5	MP-8	MP-9
					Sample Date	17/01/2024 12:00 AM	17/01/2024 12:00 AM	17/01/2024 12:00 AM	17/01/2024 12:00 AM	17/01/2024 12:00 AM	17/01/2024 12:00 AM
Group	Analyte	LOR	Units	Criteria	PS	PS	PS	PS	PS	PS	PS
Physical Parameters	pH (Lab)	0	No unit	6.0 - 8.5	6.8	4.9	4.7	6.5	6.6	6.8	
	Electrical Conductivity (Lab)	2	µS/cm	4478	1600	460	3200	2000	3000	3300	
Alkalinity	Total Alkalinity as CaCO3	5	mg/L	350	350	< 5	< 5	550	620	660	
Anions	Chloride	1	mg/L	350	170	78	470	120	290	290	
	Fluoride	0.1	mg/L	1	0.28	0.26	0.5	0.35	0.28	0.27	
	Sulfate (SO4)	1	mg/L	-	300	84	650	700	930	1100	
Cations	Calcium (Ca)	0.2	mg/L	1000	130	13	140	260	310	340	
	Magnesium (Mg)	0.1	mg/L	-	38	6.7	120	120	150	220	
	Potassium (K)	0.1	mg/L	-	120	16	11	9.4	7.7	7.8	
	Sodium (Na)	0.5	mg/L	230	89	54	430	89	230	200	
Forms of Carbon	Total Organic Carbon	0.2	mg/L	-	85	21	12	4.6	4.1	1.9	
Nutrients	Ammonia (NH3) as N	0.01	mg/L	-	3.3	0.01	0.41	0.11	0.03	0.05	
	Nitrate (NO3) as N	0.005	mg/L	-	< 0.005	1.2	130	0.034	0.098	-	
	Nitrate (NO3) as N	0.025	mg/L	-	-	-	-	-	-	< 0.025	
Trace Metals	Iron (Fe)	0.005	mg/L	0.2	0.16	0.073	0.09	0.009	< 0.005	< 0.005	
	Manganese (Mn)	0.001	mg/L	0.2	0.35	0.31	4.4	0.28	6.4	1.4	
Phenolics	Total Phenols	0.05	mg/L	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
OC Pesticides	Aldrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Alpha BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Alpha Chlordane	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Alpha Endosulfan	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Beta BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Beta Endosulfan	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Delta BHC	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Dieldrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Endosulfan sulphate	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Endrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Endrin aldehyde	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Endrin ketone	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Heptachlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Heptachlor epoxide	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Hexachlorobenzene (HCB)	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Lindane (gamma BHC)	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Methoxychlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	p,p'-DDD	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	p,p'-DDE	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	p,p'-DDT	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	o,p'-DDD	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	o,p'-DDT	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	o,p'-DDE	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Gamma Chlordane	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	trans-Nonachlor	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Isodrin	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Mirex	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	

mg/L milligrams per litre
µS/cm microsiemens per centimetre
LOR limit of reporting
PS primary sample
Criteria Criteria adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality - 'Primary Industries: Water quality for irrigation and general water use', 2000

within criteria
criteria exceeded

CLIENT DETAILS

Contact **Brendan Stuart**
Client **PREMISE**
Address **LEVEL 1
100 BRUNSWICK STREET
FORTITUDE VALLEY QLD 4006**

Telephone **61 2 6939 5000**
Facsimile **(Not specified)**
Email **Brendan.stuart@premise.com.au**

Project **217501 - Portland GD**
Order Number **217501**
Samples **6**

LABORATORY DETAILS

Manager **Huong Crawford**
Laboratory **SGS Alexandria Environmental**
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SGS Reference **SE259317 R1**
Date Received **19/1/2024**
Date Reported **4/3/2024**

COMMENTS

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

This report cancels and supersedes the report No. SE259317 R0 dated 24/01/2024 due to reporting all results.

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

SIGNATORIES



Akheeqar BENIAMREEN
Chemist



Dong LIANG
Metals/Inorganics Team Leader



Ying Ying ZHANG
Laboratory Technician

OC Pesticides in Water [AN420] Tested: 23/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

OC Pesticides in Water [AN420] Tested: 23/1/2024 (continued)

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
Alpha BHC	µg/L	0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1
Heptachlor	µg/L	0.1	<0.1
Aldrin	µg/L	0.1	<0.1
Beta BHC	µg/L	0.1	<0.1
Delta BHC	µg/L	0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1
Dieldrin	µg/L	0.1	<0.1
Endrin	µg/L	0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1
Isodrin	µg/L	0.1	<0.1
Mirex	µg/L	0.1	<0.1



ANALYTICAL RESULTS

SE259317 R1

Total Phenolics in Water [AN295] Tested: 19/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Total Phenols	mg/L	0.05	<0.05

Anions by Ion Chromatography in Water [AN245] Tested: 23/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER - 17/1/2024 SE259317.001	WATER - 17/1/2024 SE259317.002	WATER - 17/1/2024 SE259317.003	WATER - 17/1/2024 SE259317.004	WATER - 17/1/2024 SE259317.005
PARAMETER	UOM	LOR					
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005	1.2	130	0.034	0.098
Chloride	mg/L	1	170	78	470	120	290
Sulfate, SO4	mg/L	1	300	84	650	700	930
Fluoride	mg/L	0.1	0.28	0.26	0.50	0.35	0.28

			MP-9
			WATER - 17/1/2024 SE259317.006
PARAMETER	UOM	LOR	
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.025†
Chloride	mg/L	1	290
Sulfate, SO4	mg/L	1	1100
Fluoride	mg/L	0.1	0.27



ANALYTICAL RESULTS

SE259317 R1

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 22/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	3.3	0.01	0.41	0.11	0.03

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	0.05



ANALYTICAL RESULTS

SE259317 R1

pH in water [AN101] Tested: 19/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
pH**	No unit	-	6.8	4.9	4.7	6.5	6.6

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
pH**	No unit	-	6.8



ANALYTICAL RESULTS

SE259317 R1

Conductivity and TDS by Calculation - Water [AN106] Tested: 19/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Conductivity @ 25 C	µS/cm	2	1600	460	3200	2000	3000

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Conductivity @ 25 C	µS/cm	2	3300



ANALYTICAL RESULTS

SE259317 R1

Alkalinity [AN135] Tested: 23/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Total Alkalinity as CaCO3	mg/L	5	350	<5	<5	550	620

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Total Alkalinity as CaCO3	mg/L	5	660



ANALYTICAL RESULTS

SE259317 R1

Forms of Carbon [AN190] Tested: 22/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024	17/1/2024	17/1/2024	17/1/2024	17/1/2024
PARAMETER	UOM	LOR	SE259317.001	SE259317.002	SE259317.003	SE259317.004	SE259317.005
Total Organic Carbon as NPOC	mg/L	0.2	85	21	12	4.6	4.1

			MP-9
			WATER
			-
			17/1/2024
PARAMETER	UOM	LOR	SE259317.006
Total Organic Carbon as NPOC	mg/L	0.2	1.9

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 22/1/2024

PARAMETER	UOM	LOR	MP-1	MP-2	MP-3	MP-5	MP-8
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			17/1/2024 SE259317.001	17/1/2024 SE259317.002	17/1/2024 SE259317.003	17/1/2024 SE259317.004	17/1/2024 SE259317.005
Calcium, Ca	mg/L	0.2	130	13	140	260	310
Magnesium, Mg	mg/L	0.1	38	6.7	120	120	150
Sodium, Na	mg/L	0.5	89	54	430	89	230
Potassium, K	mg/L	0.1	120	16	11	9.4	7.7

PARAMETER	UOM	LOR	MP-9
			WATER
			-
			17/1/2024 SE259317.006
Calcium, Ca	mg/L	0.2	340
Magnesium, Mg	mg/L	0.1	220
Sodium, Na	mg/L	0.5	200
Potassium, K	mg/L	0.1	7.8



ANALYTICAL RESULTS

SE259317 R1

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 22/1/2024

			MP-1	MP-2	MP-3	MP-5	MP-8
			WATER - 17/1/2024 SE259317.001	WATER - 17/1/2024 SE259317.002	WATER - 17/1/2024 SE259317.003	WATER - 17/1/2024 SE259317.004	WATER - 17/1/2024 SE259317.005
PARAMETER	UOM	LOR					
Iron	µg/L	5	160	73	90	9	<5
Manganese	µg/L	1	350	310	4400	280	6400

			MP-9
			WATER - 17/1/2024 SE259317.006
PARAMETER	UOM	LOR	
Iron	µg/L	5	<5
Manganese	µg/L	1	1400

METHOD

METHODOLOGY SUMMARY

AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO ₂ is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O ₂ /C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO ₂ , NO ₃ and SO ₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 660 nm by Discrete Analyser.
AN295	The water sample or extract of sample is distilled in a phosphoric acid stream. Phenolic compounds in the distillate react with a reagent stream of potassium hexacyanoferrate(III) and 4-Amino-2,3-dimethyl-3-pyrazolin-5-one in an alkaline medium to form a coloured complex which is analysed spectrophotometrically onboard a continuous flow analyser.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO ₂ D.

FOOTNOTES

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

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

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

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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