

Our Ref: 217500_LET_018

22 June 2023

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

Attention: Nigell Campbell, Waste & Recycling Coordinator

ENVIRONMENTAL MONITORING OF LITHGOW SOLID WASTE FACILITY, UNDER ENVIRONMENT PROTECTION LICENCE 6004

Premise has completed scheduled groundwater and accumulated landfill gas monitoring at Lithgow Solid Waste Facility, located off Geordie Street, Lithgow on 17 May and 7 June 2023. Leachate discharge monitoring from point LW1 was also conducted.

Groundwater Levels

Groundwater was gauged at five (5) groundwater monitoring bores across the site. Groundwater gauging data is included in **Table 1** (attached), and elevation trends are shown on **Figure 1**.

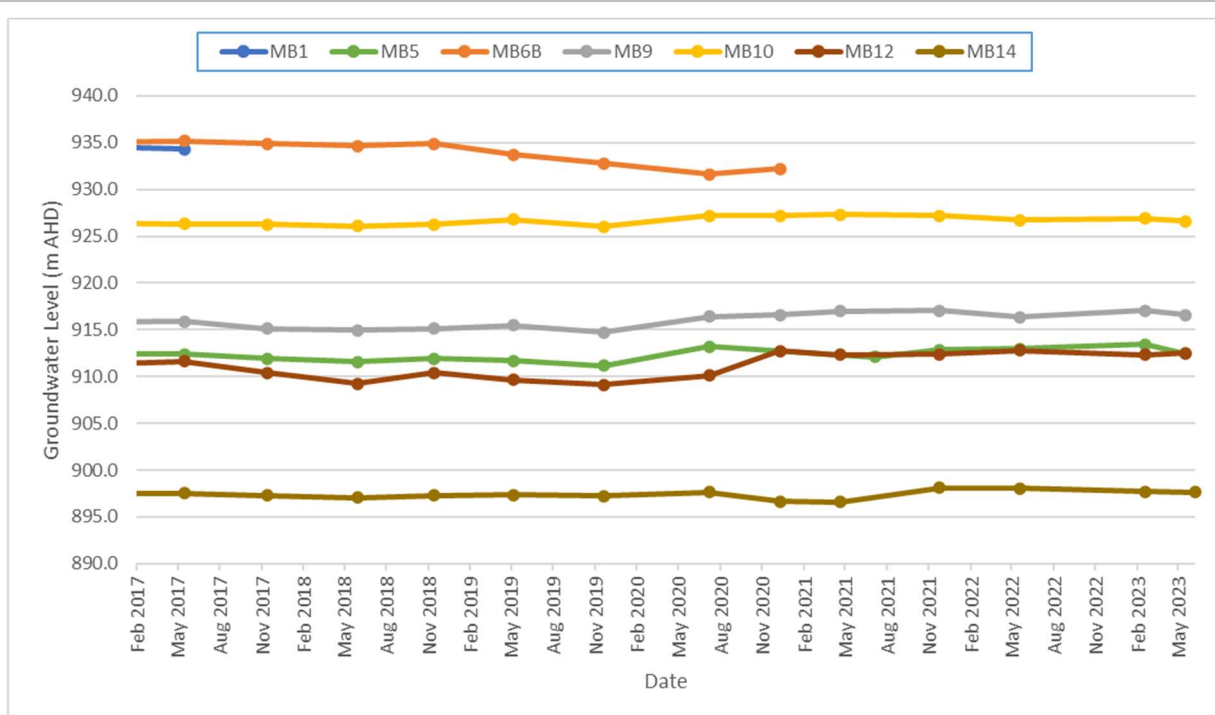


Figure 1 – Lithgow Solid Waste Facility – Groundwater Elevations

No groundwater was recorded in monitoring station MB1. Observations were as follows:

- Depths to groundwater ranged from 2.95 metres below ground level (mbgl) at MB14, to 12.37 mbgl at MB9. Corrected groundwater elevations ranged from 897.62 metres Australian Height Datum (mAHD) at MB14, to 926.62 mAHD at MB10.
- Inference of groundwater elevations, calculated from available survey data from installed groundwater monitoring bores, indicate a flow direction to the south-west.

Groundwater Quality

Groundwater samples were able to be collected from bores MB5, MB9, MB10, MB12 and MB14. 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 4.3 at MB12 to 6.9 at MB14. pH of groundwater at MB12 was verified by field probe measurement, and outside the guideline range considered suitable for pumping, irrigation and stock watering (6.0 to 8.5 pH units).
- Electrical conductivity (EC) ranged from 96 $\mu\text{S}/\text{cm}$ at piezometer MB10 to 1500 $\mu\text{S}/\text{cm}$ at piezometer MB5.
- Total dissolved solids (TDS) ranged from 110 mg/L at MB10 to 830 mg/L at MB5. TDS concentrations were below the livestock watering 'loss of production' tolerance limit for the most susceptible livestock category, poultry (3000 mg/L – ANZECC & ARMCANZ, 2000).
- The chemical oxygen demand (COD) of groundwater samples ranged from less than the laboratory limit of reporting (LOR) of 10 mg/L at MB10, to 28 mg/L at MB12.
- Total alkalinity in groundwater ranged from below the laboratory LOR of 5 mg/L at MB12, to 310 mg/L at MB14. Alkalinity of groundwater did not exceed the guideline hardness value for potential fouling of waters (350 mg/L).
- Groundwater chloride concentrations ranged from 7.4 mg/L at MB10 to 320 mg/L at MB12. All concentrations were below the guideline value for protection of moderately sensitive crops (350 mg/L).
- Fluoride concentrations in groundwater were recorded at below the LOR of 0.1 mg/L at all monitoring bores. 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 less than the laboratory LOR of 1 mg/L at MB9, to 120 mg/L at MB12.
- Calcium concentrations ranged from 4.7 mg/L at MB10 to 99 mg/L at MB14.
- Magnesium concentrations ranged from 3.7 mg/L at MB10 to 31 mg/L at MB5.
- Potassium concentrations ranged from 2.2 mg/L at MB10 to 57 mg/L at MB5.

- Concentrations of sodium ranged from 6.2 mg/L at MB10 to 130 mg/L at MB5. Sodium concentrations were below the guideline level for irrigation to moderately sensitive crops (<230 mg/L).
- Ammonia concentrations in groundwater ranged from 0.12 mgN/L at MB10 to 12 mgN/L at MB9.
- Nitrate concentrations ranged from less than the laboratory LOR of 0.005 mgN/L at MB12 and MB14, to 4.3 mgN/L at MB5. The nitrate concentration in groundwater was an increase since the previous monitoring (0.26 mgN/L in February 2023), however nitrate concentrations at MB5 have been observed to fluctuate.
- Phosphorus concentrations in groundwater ranged from less than the laboratory LOR of 0.02 mg/L at MB12, to 0.10 mg/L at MB10. Phosphorus concentrations at MB5 and MB10 were above the guideline value of 0.05 mg/L for long term irrigation use (up to 100 years).
- Aluminium concentrations in groundwater were recorded to range from less than the laboratory LOR of 0.005 mg/L at MB14, to 4.5 mg/L at MB12. Aluminium concentrations in groundwater were less than the long-term (up to 100 years) irrigation guideline concentration of 5 mg/L.
- Hexavalent chromium concentrations were below the laboratory LOR of 0.004 mg/L. Total chromium concentrations in groundwater were recorded to range from less than the laboratory LOR of 0.001 mg/L at MB5, MB9 and MB12, to 0.003 mg/L at MB14. Concentrations of hexavalent chromium were lower than the long-term (up to 100 years) irrigation guideline concentration of 0.1 mg/L.
- Iron concentrations ranged from less than the laboratory LOR of 0.005 mg/L at MB14, to 35 mg/L at MB12. Iron concentrations at all monitoring points exceeded the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L, with the exception of MB14.
- Manganese concentrations ranged from 0.039mg/L at MB10 to 3.6 mg/L at MB9. Manganese concentrations at locations MB5, MB9 and MB12 exceeded the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Total organic carbon (TOC) in groundwater ranged from 2.3 mg/L at MB10 to 7.7 mg/L at MB5.
- Total phenols were recorded at concentrations below the laboratory LOR of 0.05 mg/L at all groundwater monitoring points.
- Organochlorine pesticides and organophosphorus pesticides were below respective laboratory LORs at all groundwater monitoring points.
- Total petroleum hydrocarbons (TPH) and total recoverable hydrocarbons (TRH) were below respective laboratory LORs at all groundwater monitoring points, with the exceptions of:
 - TPH C₆-C₉ fraction at MB12 (0.12 mg/L).
 - TRH C₆-C₁₀ fraction at MB12 (0.14 mg/L).

Leachate

The leachate sample collected from LW1 was 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.

Leachate 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 was recorded at 7.4, noted to be slightly alkaline.
- Total alkalinity was recorded at 300 mg/L, which was below the guideline hardness value for potential fouling of waters (350 mg/L).
- The recorded chloride concentration was 240 mg/L, and below the guideline value for protection of moderately sensitive crops (350 mg/L).
- The fluoride concentration of leachate was recorded to be below the laboratory LOR of 0.1 mg/L, and below the guideline value of 1 mg/L for long term irrigation use (up to 100 years).
- The leachate sulphate concentration was recorded to be 34 mg/L.
- Calcium in leachate was recorded to be 100 mg/L.
- Magnesium in leachate was recorded to be 48 mg/L.
- Potassium in leachate was recorded to be 58 mg/L.
- Sodium in leachate was recorded to be 120 mg/L. The sodium concentration was below the guideline level for irrigation to moderately sensitive crops (230 mg/L).
- Total organic carbon (TOC) was recorded at 7.4 mg/L.
- The ammonia concentration of leachate was recorded to be 0.34 mgN/L.
- The nitrate concentration of leachate was recorded to be 5.5 mgN/L.
- Iron in leachate was recorded to be 0.067 mg/L, and above the long term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Manganese in leachate was recorded to be 0.28 mg/L, and above the long term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Total phenolics in leachate were recorded at below the laboratory LOR of 0.05 mg/L.

Accumulated Landfill Gas Monitoring

Accumulated (building) gas methane monitoring is conducted using a zeroed and calibrated methane gas detector, currently the Ventis MX4 Gas Meter. The threshold level for closer investigation and potential action is 12,500 parts per million (1.25 % v/v) of methane in any building on the facility or within 250 m of landfilled areas. If methane is detected above this limit, daily testing is recommended until ventilation or other measures have controlled the methane concentration. The monitoring frequency is in accordance with EPL requirements.

The following procedure is used to monitor accumulated landfill gas:

1. Before starting, prepare field notebook and check that gas analyser is working. Date, time and person(s) conducting monitoring are all recorded.
2. All enclosed buildings within 250 m of active or capped areas of landfill are monitored. All rooms are investigated, with the gas meter allowed to detect for a period of approximately one minute in each.

3. Starting in the middle of each room, with the instrument probe at head height, the ambient concentration of methane present is recorded. Locations or features such as service ingress points, floor cracks / penetrations, skirting boards and joins between walls and floors are subsequently investigated.
4. Larger spaces also have a perimeter walk conducted as well as investigation of alcoves and pits.
5. The highest concentration of methane found at any location in each structure is recorded.

Gas concentrations in buildings and sheds within the required monitoring distance of 250 metres of filled areas were all below the respective threshold concentration of 1.25 % (v/v) during the monthly monitoring rounds conducted in March 2023 to June 2023. Results of gas monitoring are included in **Table 3** (attached)

The next routine monitoring for groundwater, leachate and accumulated landfill gas is scheduled for November 2023. Surface water monitoring is required to take place any calendar month when a surface water discharge is recorded. Please do not hesitate to contact us with any questions or comments you may have regarding this report.

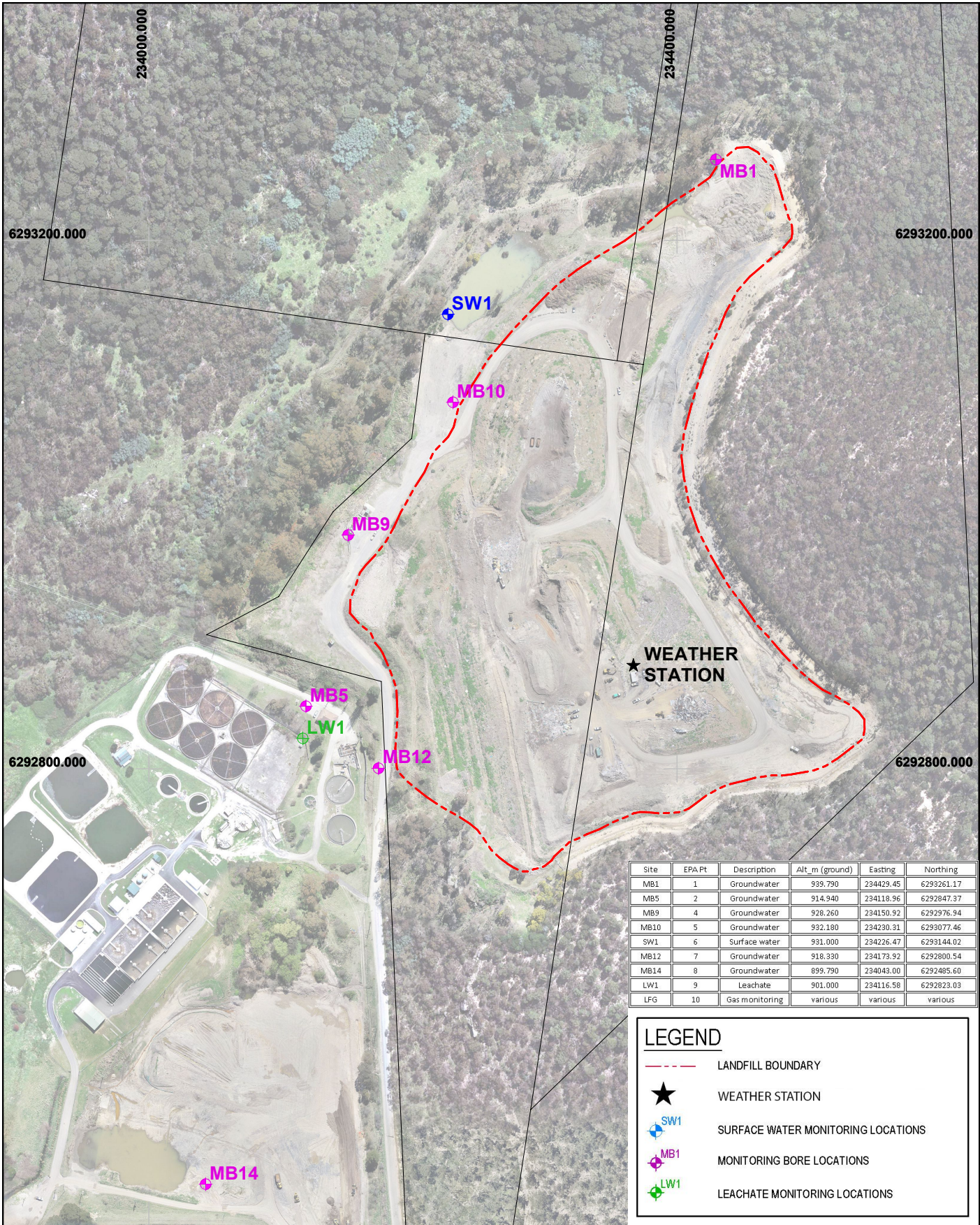
Yours sincerely



BRENDAN STUART

Senior Environmental Scientist

No. of Attachments – 5: Environmental Monitoring Point Locations
Table 1 – Groundwater Level Measurements
Table 2 – Results of Laboratory Analyses (Groundwater & Leachate) – May/June 2023
Table 3 – Accumulated Landfill Gas Monitoring
SGS Laboratories Analytical Reports – May/June 2023



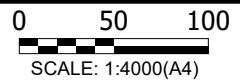
Site	EPA Pt	Description	Alt_m (ground)	Easting	Northing
MB1	1	Groundwater	939.790	234429.45	6293261.17
MB5	2	Groundwater	914.940	234118.96	6292847.37
MB9	4	Groundwater	928.260	234150.92	6292976.94
MB10	5	Groundwater	932.180	234230.31	6293077.46
SW1	6	Surface water	931.000	234226.47	6293144.02
MB12	7	Groundwater	918.330	234173.92	6292800.54
MB14	8	Groundwater	899.790	234043.00	6292485.60
LW1	9	Leachate	901.000	234116.58	6292823.03
LFG	10	Gas monitoring	various	various	various

LEGEND

- - - LANDFILL BOUNDARY
- ★ WEATHER STATION
- ⊕ SW1 SURFACE WATER MONITORING LOCATIONS
- ⊕ MB1 MONITORING BORE LOCATIONS
- ⊕ LW1 LEACHATE MONITORING LOCATIONS

DRAWING No:
LCC-MONIT_PLAN

CLIENT: LITHGOW CITY COUNCIL
 CEH REF: 3/668TH
 SURVEY: MONITORING PLAN
 PROPERTY: LITHGOW SOLID WASTE DEPOT
 LOCALITY: 62 GEORDIE STREET, HERMITAGE FLAT, NSW



NOTES:
MGA COORDINATES AND AHD DATUM
BOUNDARIES HAVE NOT BEEN SURVEYED
Border size = 185mm x 272mm on A4 paper.



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DATE	18-03-2022
AMENDED	
SURVEYOR	TH
DRAWN	TH
CHECKED	



TABLE 1: LITHGOW SOLID WASTE FACILITY - GROUNDWATER LEVEL RESULTS

Ground Water Levels: 17-May-23

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)
MB1	939.790	0.86	940.650	17/05/2023	NMWL	-	6.5	934.15	nil
MB5	914.940	0.80	915.740	17/05/2023	3.32	912.42	9.8	905.94	nil
MB6B	946.290	0.75	947.040	17/05/2023	NMWL	-	19.3	927.74	nil
MB9	928.260	0.69	928.950	17/05/2023	12.37	916.58	17.1	911.85	4.73
MB10	932.180	0.73	932.910	17/05/2023	6.29	926.62	13.7	919.21	7.41
MB12	918.330	0.76	919.090	17/05/2023	6.60	912.49	22.3	896.84	15.65
MB14	899.790	0.78	900.570	07/06/2023	2.95	897.62	17.7	882.87	14.75

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.
- Measured: Depth of groundwater measured from the top of the piezometer pipe.

Date	MB1		MB5		MB6B		MB9		MB10		MB12		MB14	
	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)	Measured	GWL (mAHD)
25-Oct-11	NMWL		3.20	912.54	9.92	937.12	12.62	916.33	5.77	927.14	8.69	910.40	2.80	897.77
08-Feb-12	5.85	934.80	3.26	912.48	4.68	942.36	12.71	916.24	5.83	927.08	8.77	910.32	NMWL	
15-Mar-12	3.11	937.54	2.29	913.45	7.82	939.22	11.56	917.39	5.51	927.40	7.95	911.14	2.64	897.93
24-Apr-12	NMWL		2.55	913.19	7.47	939.57	12.10	916.85	5.78	927.13	8.24	910.85	2.67	897.90
31-May-12	5.55	935.10	3.07	912.67	9.71	937.33	12.73	916.22	6.04	926.87	8.43	910.66	2.64	897.93
30-Oct-12	NMWL		3.29	912.45	14.64	932.40	13.33	915.62	6.19	926.72	8.90	910.19	3.11	897.46
17-Apr-13	5.81	934.84	2.87	912.87	13.55	933.49	12.80	916.15	6.10	926.81	8.50	910.59	2.91	897.66
23-Oct-13	NMWL		3.44	912.30	13.97	933.07	13.60	915.35	6.35	926.56	9.01	910.08	3.09	897.48
02-Apr-14	4.90	935.75	3.98	911.76	11.00	936.04	13.66	915.29	5.75	927.16	9.04	910.05	3.20	897.37
02-Jun-14	NMWL		3.96	911.78	NMWL		NMWL		NMWL		NMWL		NMWL	
21-Oct-14	NMWL		3.81	911.93	11.41	935.63	13.13	915.82	6.01	926.90	8.89	910.20	2.97	897.60
21-Apr-15	NMWL		3.56	912.18	14.98	932.06	13.19	915.76	6.26	926.65	9.06	910.03	3.27	897.30
13-Oct-15	NMWL		3.34	912.40	12.18	934.86	13.30	915.65	6.30	926.61	8.35	910.74	3.06	897.51
15-May-17	6.36	934.30	3.37	912.38	11.88	935.16	13.09	915.86	6.58	926.34	7.45	911.64	3.05	897.52
13-Nov-17	NMWL		3.80	911.94	12.15	934.89	13.84	915.11	6.63	926.28	8.70	910.39	3.29	897.28
29-May-18	NMWL		4.19	911.55	12.38	934.66	13.99	914.96	6.83	926.08	9.84	909.25	3.50	897.07
13-Nov-18	NMWL		3.80	911.94	12.15	934.89	13.84	915.11	6.63	926.28	8.70	910.39	3.29	897.28
06-May-19	NMWL		4.05	911.69	13.31	933.73	13.48	915.47	6.13	926.78	9.45	909.64	3.20	897.37
19-Nov-19	NMWL		4.58	911.16	14.25	932.79	14.21	914.74	6.86	926.05	9.95	909.14	3.36	897.21
08-Jul-20	NMWL		2.52	913.22	15.40	931.64	12.52	916.43	5.73	927.18	8.97	910.12	2.91	897.66
10-Dec-20	NMWL		NMWL		14.85	932.19	12.39	916.56	5.71	927.20	6.35	912.74	3.89	896.68
20-Apr-21	NMWL		NMWL		NMWL		11.97	916.98	5.60	927.31	6.79	912.30	3.96	896.61
05-Jul-21	NMWL		3.65	912.09	NMWL		NMWL		NMWL		NMWL		NMWL	
24-Nov-21	NMWL		2.90	912.84	NMWL		11.91	917.04	5.70	927.21	6.69	912.40	2.45	898.12
18-May-22	NMWL		2.79	912.95	NMWL		12.62	916.33	6.20	926.71	6.29	912.80	2.50	898.07
16-Feb-23	NMWL		2.28	913.46	NMWL		11.90	917.05	6.04	926.87	6.74	912.35	2.84	897.73
17-May-23	NMWL		3.32	912.42	NMWL		12.37	916.58	6.29	926.62	6.60	912.49		
07-Jun-23													2.95	897.62

TABLE 2: LITHGOW SOLID WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
MAY 2023 - JUNE 2023

GROUNDWATER & LEACHATE



Group	Analyte	LOR	Units	Criteria	Sample ID	MB5	MB9	MB10	MB12	MB14	LW1	
					Sample Date / Time	17/05/2023 14:15	17/05/2023 12:00	17/05/2023 12:45	17/05/2023 15:00	07/06/2023 10:45	17/05/2023 13:30	
Physical Parameters	pH (Lab)	0	No unit	6.0 - 8.5	PS	6.4	6.6	6.4	4.3	6.9	7.4	
	Electrical Conductivity (Lab)	2	µS/cm	4478	PS	1500	580	96	1200	810	-	
	Total Dissolved Solids	10	mg/L	3000	PS	830	260	110	800	470	-	
Alkalinity	Chemical Oxygen Demand	10	mg/L	-	PS	27	14	< 10	28	22	-	
	Total Alkalinity as CaCO3	5	mg/L	350	PS	290	220	19	< 5	310	300	
Anions	Chloride	1	mg/L	350	PS	250	25	7.4	320	38	240	
	Fluoride	0.1	mg/L	1	PS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Sulfate (SO4)	1	mg/L	-	PS	40	< 1	5.3	120	55	34	
Cations	Calcium (Ca)	0.1	mg/L	1000	PS	-	-	-	-	99	-	
	Calcium (Ca)	0.2	mg/L	1000	PS	93	39	4.7	31	-	100	
	Magnesium (Mg)	0.1	mg/L	-	PS	31	12	3.7	22	31	38	
	Potassium (K)	0.1	mg/L	-	PS	57	29	2.2	15	-	58	
	Potassium (K)	0.2	mg/L	-	PS	-	-	-	-	9.8	-	
	Sodium (Na)	0.5	mg/L	230	PS	130	18	6.2	110	18	120	
Forms of Carbon	Total Organic Carbon	0.2	mg/L	-	PS	7.7	4.1	2.3	6.3	3.7	7.4	
Nutrients	Ammonia (NH3) as N	0.01	mg/L	-	PS	10	12	0.12	7.4	0.19	0.34	
	Nitrate (NO3) as N	0.005	mg/L	-	PS	4.3	0.007	0.12	< 0.005	< 0.005	5.5	
	Total Phosphorus	0.02	mg/L	0.05	PS	0.08	0.03	0.1	< 0.02	0.02	-	
Trace Metals	Aluminium (Al)	0.005	mg/L	5	PS	0.39	0.63	1.3	4.5	< 0.005	-	
	Chromium (Cr)	0.001	mg/L	-	PS	< 0.001	< 0.001	0.001	< 0.001	0.003	-	
	Hexavalent Chromium (Cr-VI)	0.004	mg/L	0.1	PS	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	-	
	Iron (Fe)	0.005	mg/L	0.2	PS	1.4	27	3.7	35	< 0.005	0.067	
	Manganese (Mn)	0.001	mg/L	0.2	PS	0.93	3.6	0.039	1.6	0.086	0.28	
Phenolics	Total Phenols	0.05	mg/L	-	PS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
OC Pesticides	Aldrin	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Alpha BHC	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Alpha Chlordane	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Alpha Endosulfan	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Beta BHC	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Beta Endosulfan	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Delta BHC	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Dieldrin	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Endosulfan sulphate	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Endrin	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Endrin aldehyde	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Endrin ketone	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Heptachlor	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Heptachlor epoxide	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Hexachlorobenzene (HCB)	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Lindane (gamma BHC)	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Methoxychlor	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	p,p'-DDD	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	p,p'-DDE	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	p,p'-DDT	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	o,p'-DDD	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	o,p'-DDT	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	o,p'-DDE	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Gamma Chlordane	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	trans-Nonachlor	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Isodrin	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Mirex	0.0001	mg/L	-	PS	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	
	Total OC Pesticides		0.001	mg/L	-	PS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-
	OP Pesticides	Azinphos-methyl	0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-
Bromophos Ethyl		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Chlorpyrifos (Chlorpyrifos Ethyl)		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Diazinon (Dimpylate)		0.0005	mg/L	-	PS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	-	
Dichlorvos		0.0005	mg/L	-	PS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	-	
Dimethoate		0.0005	mg/L	-	PS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	-	
Ethion		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Fenitrothion		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Malathion		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Parathion-ethyl (Parathion)		0.0002	mg/L	-	PS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	
Methidathion		0.0005	mg/L	-	PS	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	-	
Total Petroleum Hydrocarbons	TRH C6-C9	0.04	mg/L	-	PS	< 0.04	< 0.04	< 0.04	0.12	< 0.04	-	
	TRH C10-C14	0.05	mg/L	-	PS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	
	TRH C10-C40	0.32	mg/L	-	PS	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32	-	
	TRH C15-C28	0.2	mg/L	-	PS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-	
	TRH C29-C36	0.2	mg/L	-	PS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-	
	TRH C37-C40	0.2	mg/L	-	PS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-	
Total Recoverable Hydrocarbons	TRH C6-C10	0.05	mg/L	-	PS	< 0.05	< 0.05	< 0.05	0.14	< 0.05	-	
	TRH C6-C10 minus BTEX (F1)	0.05	mg/L	-	PS	< 0.05	< 0.05	< 0.05	0.14	< 0.05	-	
	TRH >C10-C16	0.06	mg/L	-	PS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	-	
	TRH >C10-C16 minus Naphthalene (F2)	0.06	mg/L	-	PS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	-	
	TRH >C16-C34 (F3)	0.5	mg/L	-	PS	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	
TRH >C34-C40 (F4)	0.5	mg/L	-	PS	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-		
BTEXN Analytes	Benzene (F0)	0.5	µg/L	-	PS	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	

mg/L milligrams per litre
 µg/L micrograms 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

TABLE 3: LITHGOW SOLID WASTE FACILITY - ACCUMULATED LANDFILL GAS MONITORING
METHANE (as %, v/v)



		Date	04/07/2022	30/08/2022	19/09/2022	10/10/2022	15/11/2022	19/12/2022	31/01/2023	07/02/2023	15/03/2023	20/04/2023	17/05/2023	07/06/2023
Location	LOR	Units												
Site Shed	0.005	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05
Weighbridge	0.005	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05
Office (STP)	0.005	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05
Green Shed (STP)	0.005	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05
Pump Room (STP)	0.005	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05

LOR limit of reporting

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 **217500 - Lithgow SWF**
 Order Number **217500**
 Samples **5**

LABORATORY DETAILS

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SGS Reference **SE247726 R0**
 Date Received **19 May 2023**
 Date Reported **26 May 2023**

COMMENTS

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

SIGNATORIES



Akheevar BENIAMEEN
Chemist



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Senior Chemist



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Senior Chemist



Ly Kim HA
Organic Section Head



Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number	SE247726.001	SE247726.002	SE247726.003	SE247726.004
			Sample Matrix	Water	Water	Water	Water
			Sample Date	17 May 2023	17 May 2023	17 May 2023	17 May 2023
			Sample Name	MB5	MB9	MB10	MB12

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
TRH C6-C10	µg/L	50	<50	<50	<50	140
TRH C6-C9	µg/L	40	<40	<40	<40	120

Surrogates

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
d4-1,2-dichloroethane (Surrogate)	%	-	105	112	107	109
d8-toluene (Surrogate)	%	-	106	107	104	98
Bromofluorobenzene (Surrogate)	%	-	135	135	132	133

VPH F Bands

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	140

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320

TRH F Bands

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500

OC Pesticides in Water Method: AN420 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Alpha BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	µg/L	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
Delta BHC	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	µg/L	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
p,p'-DDE	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	µg/L	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
p,p'-DDD	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	µg/L	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
p,p'-DDT	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1	<0.1	<0.1	<0.1
Total OC	µg/L	1	<1	<1	<1	<1
Total OC	µg/L	1	<1	<1	<1	<1

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Number			SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Matrix			Water	Water	Water	Water
Sample Date			17 May 2023	17 May 2023	17 May 2023	17 May 2023
Sample Name			MB5	MB9	MB10	MB12

OC Pesticides in Water Method: AN420 Tested: 23/5/2023 (continued)

Surrogates

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	51	76	59	62

OP Pesticides in Water Method: AN420 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Azinphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Dichlorvos	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2

Surrogates

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
2-fluorobiphenyl (Surrogate)	%	-	53	53	62	69
d14-p-terphenyl (Surrogate)	%	-	78	75	80	93

Total Phenolics in Water Method: AN295 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05	<0.05

Anions by Ion Chromatography in Water Method: AN245 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Chloride	mg/L	1	250	25	7.4	320
Sulfate, SO4	mg/L	1	40	<1.0	5.3	120
Fluoride	mg/L	0.1	<0.10	<0.10	<0.10	<0.10
Nitrate Nitrogen, NO3-N	mg/L	0.005	4.3	0.007	0.12	<0.005

Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 19/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	10	12	0.12	7.4

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Number			SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Matrix			Water	Water	Water	Water
Sample Date			17 May 2023	17 May 2023	17 May 2023	17 May 2023
Sample Name			MB5	MB9	MB10	MB12

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	0.08	0.03	0.10	<0.02

pH in water Method: AN101 Tested: 19/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
pH**	No unit	-	6.4	6.6	6.4	4.3

Conductivity and TDS by Calculation - Water Method: AN106 Tested: 19/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Conductivity @ 25 C	µS/cm	2	1500	580	96	1200

Total Dissolved Solids (TDS) in water Method: AN113 Tested: 24/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Dissolved Solids Dried at 175-185°C	mg/L	10	830	260	110	800

Alkalinity Method: AN135 Tested: 25/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Alkalinity as CaCO3	mg/L	5	290	220	19	<5

COD in Water Method: AN179/AN181 Tested: 24/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Chemical Oxygen Demand	mg/L	10	27	14	<10	28

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Number			SE247726.001	SE247726.002	SE247726.003	SE247726.004
Sample Matrix			Water	Water	Water	Water
Sample Date			17 May 2023	17 May 2023	17 May 2023	17 May 2023
Sample Name			MB5	MB9	MB10	MB12

Forms of Carbon Method: AN190 Tested: 23/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Organic Carbon as NPOC	mg/L	0.2	7.7	4.1	2.3	6.3

Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 19/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Hexavalent Chromium, Cr6+	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 24/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Calcium, Ca	mg/L	0.2	93	39	4.7	31
Magnesium, Mg	mg/L	0.1	31	12	3.7	22
Potassium, K	mg/L	0.1	57	29	2.2	15
Sodium, Na	mg/L	0.5	130	18	6.2	110

Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 22/5/2023

Parameter	Units	LOR	SE247726.001	SE247726.002	SE247726.003	SE247726.004
Total Aluminium	µg/L	5	390	630	1300	4500
Total Chromium	µg/L	1	<1	<1	1	<1
Total Iron	µg/L	5	1400	27000	3700	35000
Total Manganese	µg/L	1	930	3600	39	1600

Sample Number	SE247726.005	
Sample Matrix	Water	
Sample Date	17 May 2023	
Sample Name	LW1	
Parameter	Units	LOR

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 24/5/2023

TRH C6-C10	µg/L	50	-
TRH C6-C9	µg/L	40	-

Surrogates

d4-1,2-dichloroethane (Surrogate)	%	-	-
d8-toluene (Surrogate)	%	-	-
Bromofluorobenzene (Surrogate)	%	-	-

VPH F Bands

Benzene (F0)	µg/L	0.5	-
TRH C6-C10 minus BTEX (F1)	µg/L	50	-

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 26/5/2023

TRH C10-C14	µg/L	50	-
TRH C15-C28	µg/L	200	-
TRH C29-C36	µg/L	200	-
TRH C37-C40	µg/L	200	-
TRH C10-C40	µg/L	320	-

TRH F Bands

TRH >C10-C16	µg/L	60	-
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	-
TRH >C16-C34 (F3)	µg/L	500	-
TRH >C34-C40 (F4)	µg/L	500	-

OC Pesticides in Water Method: AN420 Tested: 24/5/2023

Alpha BHC	µg/L	0.1	-
Hexachlorobenzene (HCB)	µg/L	0.1	-
Beta BHC	µg/L	0.1	-
Lindane (gamma BHC)	µg/L	0.1	-
Delta BHC	µg/L	0.1	-
Heptachlor	µg/L	0.1	-
Aldrin	µg/L	0.1	-
Isodrin	µg/L	0.1	-
Heptachlor epoxide	µg/L	0.1	-
Gamma Chlordane	µg/L	0.1	-
Alpha Chlordane	µg/L	0.1	-
Alpha Endosulfan	µg/L	0.1	-
o,p'-DDE	µg/L	0.1	-
p,p'-DDE	µg/L	0.1	-
Dieldrin	µg/L	0.1	-
Endrin	µg/L	0.1	-
Beta Endosulfan	µg/L	0.1	-
o,p'-DDD	µg/L	0.1	-
p,p'-DDD	µg/L	0.1	-
Endrin aldehyde	µg/L	0.1	-
Endosulfan sulphate	µg/L	0.1	-
o,p'-DDT	µg/L	0.1	-
p,p'-DDT	µg/L	0.1	-
Endrin ketone	µg/L	0.1	-
Methoxychlor	µg/L	0.1	-
Mirex	µg/L	0.1	-
trans-Nonachlor	µg/L	0.1	-
Total OC	µg/L	1	-
Total OC	µg/L	1	-

Sample Number	SE247726.005	
Sample Matrix	Water	
Sample Date	17 May 2023	
Sample Name	LW1	
Parameter	Units	LOR

OC Pesticides in Water Method: AN420 Tested: 24/5/2023 (continued)

Surrogates

Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	-
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OP Pesticides in Water Method: AN420 Tested: 26/5/2023

Azinphos-methyl	µg/L	0.2	-
Bromophos Ethyl	µg/L	0.2	-
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	-
Diazinon (Dimpylate)	µg/L	0.5	-
Dichlorvos	µg/L	0.5	-
Dimethoate	µg/L	0.5	-
Ethion	µg/L	0.2	-
Fenitrothion	µg/L	0.2	-
Malathion	µg/L	0.2	-
Methidathion	µg/L	0.5	-
Parathion-ethyl (Parathion)	µg/L	0.2	-

Surrogates

2-fluorobiphenyl (Surrogate)	%	-	-
d14-p-terphenyl (Surrogate)	%	-	-

Total Phenolics in Water Method: AN295 Tested: 23/5/2023

Total Phenols	mg/L	0.05	<0.05
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Anions by Ion Chromatography in Water Method: AN245 Tested: 23/5/2023

Chloride	mg/L	1	240
Sulfate, SO4	mg/L	1	34
Fluoride	mg/L	0.1	<0.10
Nitrate Nitrogen, NO3-N	mg/L	0.005	5.5

	Sample Number	SE247726.005
	Sample Matrix	Water
	Sample Date	17 May 2023
	Sample Name	LW1
Parameter	Units	LOR

Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 19/5/2023

Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	0.34
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Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 24/5/2023

Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	-
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pH in water Method: AN101 Tested: 22/5/2023

pH**	No unit	-	7.4
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Conductivity and TDS by Calculation - Water Method: AN106 Tested: 22/5/2023

Conductivity @ 25 C	µS/cm	2	-
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Total Dissolved Solids (TDS) in water Method: AN113 Tested: 24/5/2023

Total Dissolved Solids Dried at 175-185°C	mg/L	10	-
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Alkalinity Method: AN135 Tested: 25/5/2023

Total Alkalinity as CaCO ₃	mg/L	5	300
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Sample Number	SE247726.005	
Sample Matrix	Water	
Sample Date	17 May 2023	
Sample Name	LW1	
Parameter	Units	LOR

COD in Water Method: AN179/AN181 Tested: 26/5/2023

Chemical Oxygen Demand	mg/L	10	-
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Forms of Carbon Method: AN190 Tested: 23/5/2023

Total Organic Carbon as NPOC	mg/L	0.2	7.4
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Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 22/5/2023

Hexavalent Chromium, Cr6+	mg/L	0.004	-
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Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 24/5/2023

Calcium, Ca	mg/L	0.2	100
Magnesium, Mg	mg/L	0.1	38
Potassium, K	mg/L	0.1	58
Sodium, Na	mg/L	0.5	120

Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 22/5/2023

Total Aluminium	µg/L	5	-
Total Chromium	µg/L	1	-
Total Iron	µg/L	5	67
Total Manganese	µg/L	1	280

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB280499	mg/L	5	<5	0 - 4%	100%

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH ₃ as N	LB280045	mg/L	0.01	<0.01	0%	101%	97%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Chloride	LB280238	mg/L	1	<1.0	3%	95%	97%
Sulfate, SO ₄	LB280238	mg/L	1	<1.0	6%	97%	
Fluoride	LB280238	mg/L	0.1	<0.10	0%	113%	
Nitrate Nitrogen, NO ₃ -N	LB280238	mg/L	0.005	<0.005	7 - 8%	99%	

COD in Water Method: ME-(AU)-[ENV]AN179/AN181

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chemical Oxygen Demand	LB280363	mg/L	10	<10	1 - 2%	96%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB280056	µS/cm	2	<2	0%	100%
	LB280160	µS/cm	2	<2	0 - 1%	101%

Forms of Carbon Method: ME-(AU)-[ENV]AN190

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Organic Carbon as NPOC	LB280254	mg/L	0.2	<0.2	2 - 7%	98%	94%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared to the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Hexavalent Chromium in water by Discrete Analyser Method: ME-(AU)-[ENV]AN283

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Hexavalent Chromium, Cr6+	LB280043	mg/L	0.004	<0.004	0%	91%	5%

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Calcium, Ca	LB280353	mg/L	0.2	<0.2	0%	102%	109%
Magnesium, Mg	LB280353	mg/L	0.1	<0.1	0%	102%	107%
Potassium, K	LB280353	mg/L	0.1	<0.1		100%	110%
Sodium, Na	LB280353	mg/L	0.5	<0.5		104%	112%

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

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Alpha BHC	LB280227	µg/L	0.1	<0.1	NA
Hexachlorobenzene (HCB)	LB280227	µg/L	0.1	<0.1	NA
Beta BHC	LB280227	µg/L	0.1	<0.1	NA
Lindane (gamma BHC)	LB280227	µg/L	0.1	<0.1	NA
Delta BHC	LB280227	µg/L	0.1	<0.1	90%
Heptachlor	LB280227	µg/L	0.1	<0.1	91%
Aldrin	LB280227	µg/L	0.1	<0.1	91%
Isodrin	LB280227	µg/L	0.1	<0.1	NA
Heptachlor epoxide	LB280227	µg/L	0.1	<0.1	NA
Gamma Chlordane	LB280227	µg/L	0.1	<0.1	NA
Alpha Chlordane	LB280227	µg/L	0.1	<0.1	NA
Alpha Endosulfan	LB280227	µg/L	0.1	<0.1	NA
o,p'-DDE	LB280227	µg/L	0.1	<0.1	NA
p,p'-DDE	LB280227	µg/L	0.1	<0.1	NA
Dieldrin	LB280227	µg/L	0.1	<0.1	90%
Endrin	LB280227	µg/L	0.1	<0.1	91%
Beta Endosulfan	LB280227	µg/L	0.1	<0.1	NA
o,p'-DDD	LB280227	µg/L	0.1	<0.1	NA
p,p'-DDD	LB280227	µg/L	0.1	<0.1	NA
Endrin aldehyde	LB280227	µg/L	0.1	<0.1	NA
Endosulfan sulphate	LB280227	µg/L	0.1	<0.1	NA
o,p'-DDT	LB280227	µg/L	0.1	<0.1	NA
p,p'-DDT	LB280227	µg/L	0.1	<0.1	85%
Endrin ketone	LB280227	µg/L	0.1	<0.1	NA
Methoxychlor	LB280227	µg/L	0.1	<0.1	NA
Mirex	LB280227	µg/L	0.1	<0.1	NA
trans-Nonachlor	LB280227	µg/L	0.1	<0.1	NA
Total OC	LB280227	µg/L	1	<1	
Total OC	LB280227	µg/L	1	<1	

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB280227	%	-	83%	86%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Water Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Azinphos-methyl	LB280227	µg/L	0.2	<0.2	NA
Bromophos Ethyl	LB280227	µg/L	0.2	<0.2	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB280227	µg/L	0.2	<0.2	106%
Diazinon (Dimpylate)	LB280227	µg/L	0.5	<0.5	103%
Dichlorvos	LB280227	µg/L	0.5	<0.5	96%
Dimethoate	LB280227	µg/L	0.5	<0.5	NA
Ethion	LB280227	µg/L	0.2	<0.2	118%
Fenitrothion	LB280227	µg/L	0.2	<0.2	NA
Malathion	LB280227	µg/L	0.2	<0.2	NA
Methidathion	LB280227	µg/L	0.5	<0.5	NA
Parathion-ethyl (Parathion)	LB280227	µg/L	0.2	<0.2	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
2-fluorobiphenyl (Surrogate)	LB280227	%	-	44%	53%
d14-p-terphenyl (Surrogate)	LB280227	%	-	72%	75%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB280056	No unit	-	0%	100%
	LB280160	No unit	-	0 - 1%	100%

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Total Dissolved Solids Dried at 175-185°C	LB280279	mg/L	10	<10	1 - 3%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phenolics in Water Method: ME-(AU)-[ENV]AN295

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phenols	LB280233	mg/L	0.05	<0.05	0 - 15%	101%	95%

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB280284	mg/L	0.02	<0.02	7 - 15%	102%

Trace Metals (Total) in Water by ICPMS Method: ME-(AU)-[ENV]AN022/AN318

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery	MS %Recovery
Total Aluminium	LB280089	µg/L	5	<5	113%	
Total Chromium	LB280089	µg/L	1	<1	98%	NA
Total Iron	LB280089	µg/L	5	<5	108%	
Total Manganese	LB280089	µg/L	1	<1	102%	

TRH (Total Recoverable Hydrocarbons) in Water Method: ME-(AU)-[ENV]AN403

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB280227	µg/L	50	<50	0%	75%
TRH C15-C28	LB280227	µg/L	200	<200	0%	99%
TRH C29-C36	LB280227	µg/L	200	<200	0%	105%
TRH C37-C40	LB280227	µg/L	200	<200	0%	NA
TRH C10-C40	LB280227	µg/L	320	<320	0%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB280227	µg/L	60	<60	0%	88%
TRH >C10-C16 - Naphthalene (F2)	LB280227	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB280227	µg/L	500	<500	0%	103%
TRH >C34-C40 (F4)	LB280227	µg/L	500	<500	0%	110%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatle Petroleum Hydrocarbons in Water Method: ME-(AU)-[ENV]AN433

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB280224	µg/L	50	<50	0%	90%	113%
TRH C6-C9	LB280224	µg/L	40	<40	0%	90%	113%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB280224	%	-	103%	5 - 7%	96%	112%
d8-toluene (Surrogate)	LB280224	%	-	104%	3 - 7%	121%	120%
Bromofluorobenzene (Surrogate)	LB280224	%	-	130%	15 - 16%	108%	117%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB280224	µg/L	0.5		0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB280224	µg/L	50	<50	0%	86%	115%

METHOD

METHODOLOGY SUMMARY

AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, referenced to USEPA 6020B and USEPA 200.8 (5.4).
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.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
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
AN181	Analysis of COD by Semi Closed Reflux: The sample is refluxed with strong acid and a known excess of oxidant. After digestion the unreduced oxidant is back titrated to determine the amount of oxidant consumed. The chemically oxidised matter is calculated in terms of oxygen equivalents. Reference APHA 5220 B.
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The 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.

METHOD

METHODOLOGY SUMMARY

AN245	<p>Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO₂, NO₃ and SO₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B</p>
AN279/AN293(Sydney)	<p>The sample is digested with Sulphuric acid, K₂SO₄ and CuSO₄. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.</p>
AN283	<p>Hexavalent Chromium via DA: Soluble hexavalent chromium forms a red/violet colour with diphenylcarbazide in acidic solution. This procedure is very sensitive and nearly specific for Cr⁶⁺. If total chromium is also measured the trivalent form of chromium Cr³⁺ can be calculated from the difference (Total Cr - Cr⁶⁺). Reference APHA3500CrB.</p>
AN291	<p>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 670 nm by Discrete Analyser.</p>
AN295	<p>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.</p>
AN320	<p>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.</p>
AN320	<p>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.</p>
AN403	<p>Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C₆-C₉, C₁₀-C₁₄, C₁₅-C₂₈ and C₂₉-C₃₆ and in recognition of the NEPM 1999 (2013), >C₁₀-C₁₆ (F₂), >C₁₆-C₃₄ (F₃) and >C₃₄-C₄₀ (F₄). Where F₂ is corrected for Naphthalene, the VOC data for Naphthalene is used.</p>
AN403	<p>Additionally, the volatile C₆-C₉/C₆-C₁₀ fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.</p>
AN403	<p>The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.</p>
AN420	<p>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).</p>

METHOD

METHODOLOGY SUMMARY

AN433

VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

Calculation

Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
***	Indicates that both * and ** apply.	-	The sample was not analysed for this analyte
		NVL	Not Validated

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:

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

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

The QC 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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 Order Number **217500**
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 Date Received **09 Jun 2023**
 Date Reported **19 Jun 2023**

COMMENTS

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

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Sample Number	SE248897.001	
Sample Matrix	Water	
Sample Date	07 Jun 2023	
Sample Name	MB14	
Parameter	Units	LOR

Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 15/6/2023

TRH C6-C10	µg/L	50	<50
TRH C6-C9	µg/L	40	<40

Surrogates

d4-1,2-dichloroethane (Surrogate)	%	-	106
d8-toluene (Surrogate)	%	-	104
Bromofluorobenzene (Surrogate)	%	-	111

VPH F Bands

Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 14/6/2023

TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH C10-C40	µg/L	320	<320

TRH F Bands

TRH >C10-C16	µg/L	60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500

OC Pesticides in Water Method: AN420 Tested: 14/6/2023

Alpha BHC	µg/L	0.1	<0.1
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
Beta BHC	µg/L	0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1
Delta BHC	µg/L	0.1	<0.1
Heptachlor	µg/L	0.1	<0.1
Aldrin	µg/L	0.1	<0.1
Isodrin	µg/L	0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1
o,p'-DDE	µg/L	0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1
Dieldrin	µg/L	0.1	<0.1
Endrin	µg/L	0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1
o,p'-DDD	µg/L	0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1
o,p'-DDT	µg/L	0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1
Mirex	µg/L	0.1	<0.1
trans-Nonachlor	µg/L	0.1	<0.1
Total OC	µg/L	1	<1
Total OC	µg/L	1	<1

Sample Number SE248897.001
 Sample Matrix Water
 Sample Date 07 Jun 2023
 Sample Name MB14

Parameter	Units	LOR
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OC Pesticides in Water Method: AN420 Tested: 14/6/2023 (continued)

Surrogates

Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	66
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OP Pesticides in Water Method: AN420 Tested: 14/6/2023

Azinphos-methyl	µg/L	0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2
Diazinon (Dimpylate)	µg/L	0.5	<0.5
Dichlorvos	µg/L	0.5	<0.5
Dimethoate	µg/L	0.5	<0.5
Ethion	µg/L	0.2	<0.2
Fenitrothion	µg/L	0.2	<0.2
Malathion	µg/L	0.2	<0.2
Methidathion	µg/L	0.5	<0.5
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2

Surrogates

2-fluorobiphenyl (Surrogate)	%	-	62
d14-p-terphenyl (Surrogate)	%	-	84

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 13/6/2023

Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	0.02
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Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 9/6/2023

Ammonia Nitrogen, NH ₃ as N	mg/L	0.01	0.19
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Sample Number SE248897.001
 Sample Matrix Water
 Sample Date 07 Jun 2023
 Sample Name MB14

Parameter	Units	LOR
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COD in Water Method: AN179/AN181 Tested: 14/6/2023

Chemical Oxygen Demand	mg/L	10	22
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Total Phenolics in Water Method: AN295 Tested: 15/6/2023

Total Phenols	mg/L	0.05	<0.05
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Forms of Carbon Method: AN190 Tested: 13/6/2023

Total Organic Carbon as NPOC	mg/L	0.2	3.7
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Anions by Ion Chromatography in Water Method: AN245 Tested: 13/6/2023

Chloride	mg/L	1	38
Sulfate, SO4	mg/L	1	55
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005
Fluoride	mg/L	0.1	<0.10

Alkalinity Method: AN135 Tested: 15/6/2023

Total Alkalinity as CaCO3	mg/L	5	310
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pH in water Method: AN101 Tested: 13/6/2023

pH**	No unit	-	6.9
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	Sample Number	SE248897.001
	Sample Matrix	Water
	Sample Date	07 Jun 2023
	Sample Name	MB14
Parameter	Units	LOR

Conductivity and TDS by Calculation - Water Method: AN106 Tested: 13/6/2023

Conductivity @ 25 C	µS/cm	2	810
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Total Dissolved Solids (TDS) in water Method: AN113 Tested: 16/6/2023

Total Dissolved Solids Dried at 175-185°C	mg/L	10	470
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Hexavalent Chromium in water by Discrete Analyser Method: AN283 Tested: 9/6/2023

Hexavalent Chromium, Cr6+	mg/L	0.004	<0.004
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Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 15/6/2023

Calcium, Ca	mg/L	0.1	99
Magnesium, Mg	mg/L	0.1	31
Potassium, K	mg/L	0.2	9.8
Sodium, Na	mg/L	0.5	18

Trace Metals (Dissolved) in Water by ICPMS Method: AN318 Tested: 15/6/2023

Aluminium	µg/L	5	<5
Iron	µg/L	5	<5
Manganese	µg/L	1	86

Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 14/6/2023

Total Chromium	µg/L	1	3
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MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB282429	mg/L	5	<5	1%	97%

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH ₃ as N	LB282067	mg/L	0.01	<0.01	1 - 2%	97%	96%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Chloride	LB282172	mg/L	1	<0.05	4%	90%	91%
Sulfate, SO ₄	LB282172	mg/L	1	<1.0	14%	90%	71%
Nitrate Nitrogen, NO ₃ -N	LB282172	mg/L	0.005	<0.005	0%	92%	97%
Fluoride	LB282172	mg/L	0.1	<0.10		87%	

COD in Water Method: ME-(AU)-[ENV]AN179/AN181

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chemical Oxygen Demand	LB282306	mg/L	10	<10	2 - 7%	98%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Conductivity @ 25 C	LB282118	µS/cm	2	<2	93%

Forms of Carbon Method: ME-(AU)-[ENV]AN190

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Organic Carbon as NPOC	LB282185	mg/L	0.2	<0.2	3%	94%	94%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Hexavalent Chromium in water by Discrete Analyser Method: ME-(AU)-[ENV]AN283

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Hexavalent Chromium, Cr6+	LB282066	mg/L	0.004	<0.004	0%	97%	71%

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Calcium, Ca	LB282421	mg/L	0.1	<0.1	1 - 2%	99%	107 - 115%
Magnesium, Mg	LB282421	mg/L	0.1	<0.1	1 - 7%	93%	105%
Potassium, K	LB282421	mg/L	0.2	<0.2	1%	93%	92%
Sodium, Na	LB282421	mg/L	0.5	<0.5	1%	99%	90%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Alpha BHC	LB282303	µg/L	0.1	<0.1	0%	NA
Hexachlorobenzene (HCB)	LB282303	µg/L	0.1	<0.1	0%	NA
Beta BHC	LB282303	µg/L	0.1	<0.1	0%	NA
Lindane (gamma BHC)	LB282303	µg/L	0.1	<0.1	0%	NA
Delta BHC	LB282303	µg/L	0.1	<0.1	0%	111%
Heptachlor	LB282303	µg/L	0.1	<0.1	0%	106%
Aldrin	LB282303	µg/L	0.1	<0.1	0%	102%
Isodrin	LB282303	µg/L	0.1	<0.1	0%	NA
Heptachlor epoxide	LB282303	µg/L	0.1	<0.1	0%	NA
Gamma Chlordane	LB282303	µg/L	0.1	<0.1	0%	NA
Alpha Chlordane	LB282303	µg/L	0.1	<0.1	0%	NA
Alpha Endosulfan	LB282303	µg/L	0.1	<0.1	0%	NA
o,p'-DDE	LB282303	µg/L	0.1	<0.1	0%	NA
p,p'-DDE	LB282303	µg/L	0.1	<0.1	0%	NA
Dieldrin	LB282303	µg/L	0.1	<0.1	0%	110%
Endrin	LB282303	µg/L	0.1	<0.1	0%	118%
Beta Endosulfan	LB282303	µg/L	0.1	<0.1	0%	NA
o,p'-DDD	LB282303	µg/L	0.1	<0.1	0%	NA
p,p'-DDD	LB282303	µg/L	0.1	<0.1	0%	NA
Endrin aldehyde	LB282303	µg/L	0.1	<0.1	0%	NA
Endosulfan sulphate	LB282303	µg/L	0.1	<0.1	0%	NA
o,p'-DDT	LB282303	µg/L	0.1	<0.1	0%	NA
p,p'-DDT	LB282303	µg/L	0.1	<0.1	0%	100%
Endrin ketone	LB282303	µg/L	0.1	<0.1	0%	NA
Methoxychlor	LB282303	µg/L	0.1	<0.1	0%	NA
Mirex	LB282303	µg/L	0.1	<0.1	0%	NA
trans-Nonachlor	LB282303	µg/L	0.1	<0.1	0%	NA
Total OC	LB282303	µg/L	1	<1		
Total OC	LB282303	µg/L	1	<1		

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB282303	%	-	96%	19%	95%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Water Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Azinphos-methyl	LB282303	µg/L	0.2	<0.2	NA
Bromophos Ethyl	LB282303	µg/L	0.2	<0.2	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB282303	µg/L	0.2	<0.2	102%
Diazinon (Dimpylate)	LB282303	µg/L	0.5	<0.5	109%
Dichlorvos	LB282303	µg/L	0.5	<0.5	97%
Dimethoate	LB282303	µg/L	0.5	<0.5	NA
Ethion	LB282303	µg/L	0.2	<0.2	131%
Fenitrothion	LB282303	µg/L	0.2	<0.2	NA
Malathion	LB282303	µg/L	0.2	<0.2	NA
Methidathion	LB282303	µg/L	0.5	<0.5	NA
Parathion-ethyl (Parathion)	LB282303	µg/L	0.2	<0.2	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
2-fluorobiphenyl (Surrogate)	LB282303	%	-	61%	56%
d14-p-terphenyl (Surrogate)	LB282303	%	-	82%	62%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB282118	No unit	-	1%	100%

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Total Dissolved Solids Dried at 175-185°C	LB282626	mg/L	10	<10	6%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phenolics in Water Method: ME-(AU)-[ENV]AN295

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phenols	LB282478	mg/L	0.05	<0.05	0 - 11%	99%	100%

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB282173	mg/L	0.02	<0.02	2 - 4%	105%

Trace Metals (Dissolved) in Water by ICPMS Method: ME-(AU)-[ENV]AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Aluminium	LB282435	µg/L	5	<5	0%	100 - 101%	94%
Iron	LB282435	µg/L	5	<5	1%	102 - 104%	81%
Manganese	LB282435	µg/L	1	<1		99%	

Trace Metals (Total) in Water by ICPMS Method: ME-(AU)-[ENV]AN022/AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Chromium	LB282298	µg/L	1	<1	4%	100%

TRH (Total Recoverable Hydrocarbons) in Water Method: ME-(AU)-[ENV]AN403

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB282303	µg/L	50	<50	0%	77%
TRH C15-C28	LB282303	µg/L	200	<200	0%	105%
TRH C29-C36	LB282303	µg/L	200	<200	0%	126%
TRH C37-C40	LB282303	µg/L	200	<200	0%	NA
TRH C10-C40	LB282303	µg/L	320	<320	0%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB282303	µg/L	60	<60	0%	91%
TRH >C10-C16 - Naphthalene (F2)	LB282303	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB282303	µg/L	500	<500	0%	116%
TRH >C34-C40 (F4)	LB282303	µg/L	500	<500	0%	130%

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatile Petroleum Hydrocarbons in Water Method: ME-(AU)-[ENV]AN433

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB282443	µg/L	50	<50	0%	110%	98%
TRH C6-C9	LB282443	µg/L	40	<40	0%	110%	98%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB282443	%	-	99%	1%	102%	100%
d8-toluene (Surrogate)	LB282443	%	-	96%	2 - 3%	106%	116%
Bromofluorobenzene (Surrogate)	LB282443	%	-	97%	5 - 6%	97%	109%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB282443	µg/L	0.5		0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB282443	µg/L	50	<50	0%	116%	101%

METHOD

METHODOLOGY SUMMARY

AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, referenced to USEPA 6020B and USEPA 200.8 (5.4).
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.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
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
AN181	Analysis of COD by Semi Closed Reflux: The sample is refluxed with strong acid and a known excess of oxidant. After digestion the unreduced oxidant is back titrated to determine the amount of oxidant consumed. The chemically oxidised matter is calculated in terms of oxygen equivalents. Reference APHA 5220 B.
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The 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.

METHOD

METHODOLOGY SUMMARY

AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, 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
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K ₂ SO ₄ and CuSO ₄ . All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN283	Hexavalent Chromium via DA: Soluble hexavalent chromium forms a red/violet colour with diphenylcarbazide in acidic solution. This procedure is very sensitive and nearly specific for Cr ⁶⁺ . If total chromium is also measured the trivalent form of chromium Cr ³⁺ can be calculated from the difference (Total Cr - Cr ⁶⁺). Reference APHA3500CrB.
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 670 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.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

METHOD

METHODOLOGY SUMMARY

AN420

SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

AN433

VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

Calculation

Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
***	Indicates that both * and ** apply.	-	The sample was not analysed for this analyte
		NVL	Not Validated

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:

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

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

The QC 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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