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Our Ref: 217500_LET_022

20 January 2025

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

Attention: Nigel Campbell, Waste & Recycling Manager

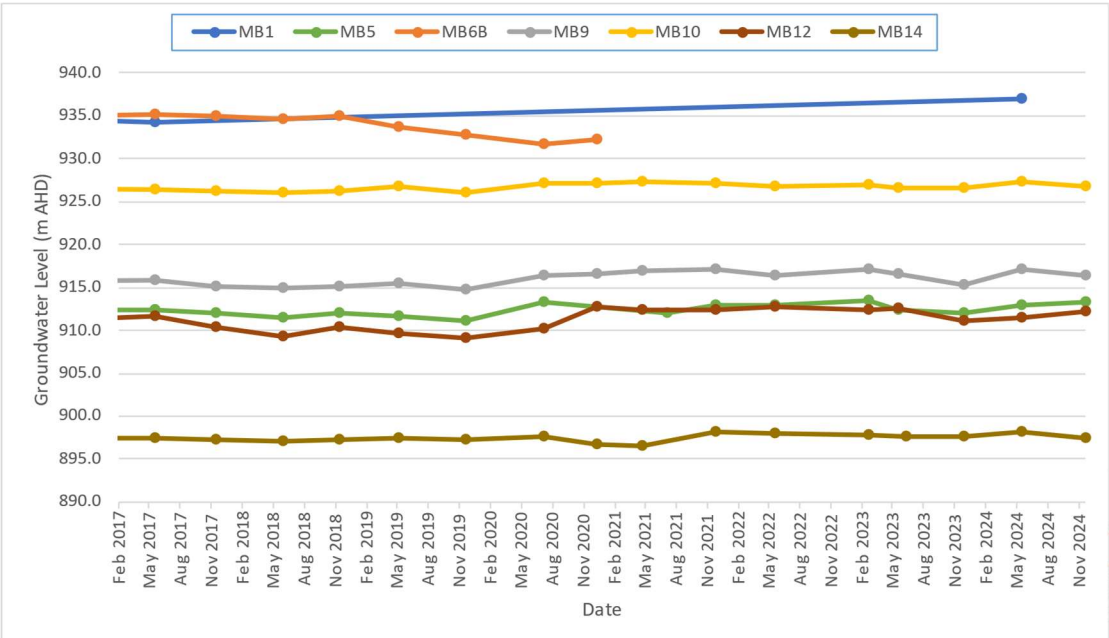
Environmental Monitoring of Lithgow Solid Waste Facility, Under Environment Protection Licence 6004 – November 2024

Premise has completed scheduled groundwater and accumulated landfill gas monitoring at Lithgow Solid Waste Facility, located off Geordie Street, Lithgow on 18 November 2024. 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. Groundwater observations were as follows:

- Depths to groundwater ranged from 2.37 metres below ground level (mbgl) at MB5, to 12.50 mbgl at MB9. Corrected groundwater elevations ranged from 897.53 metres Australian Height Datum (mAHD) at MB14, to 926.70 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 MB1, 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 3.9 at MB12 to 6.9 at MB14. The pH of groundwater at MB12 was verified by field probe measurement and remained outside the guideline range considered suitable for pumping, irrigation, and stock watering (6.0 to 8.5 pH units).
- Electrical conductivity (EC) ranged from 97 µS/cm at MB12 to 1,600 µS/cm at MB5.
- Total dissolved solids (TDS) ranged from 83 mg/L at MB10 to 970 mg/L at MB5. TDS concentrations remained below the livestock watering 'loss of production' tolerance limit for the most susceptible livestock category, poultry (3,000 mg/L – ANZECC & ARMCANZ, 2000).
- The chemical oxygen demand (COD) of groundwater samples ranged from below the laboratory limit of reporting (LOR) of 10 mg/L at MB10 and MB14 to 46 mg/L at MB5.
- Total alkalinity in groundwater ranged from below the laboratory LOR of 5 mg$CaCO_3$/L at MB12 to 460 mg$CaCO_3$/L at MB5. Alkalinity of groundwater exceeded the guideline hardness value for potential fouling of waters (350 mg/L) at MB5.
- Groundwater chloride concentrations ranged from 9.2 mg/L at MB10 to 320 mg/L at MB12. All concentrations remained below the guideline value for protection of moderately sensitive crops (350 mg/L).
- Fluoride concentrations in groundwater were recorded as below the LOR of 0.1 mg/L at all monitoring bores. All concentrations remained below the guideline value of 1 mg/L for long-term irrigation use (up to 100 years).
- Sulfate concentrations in groundwater ranged from 2.1 mg/L at MB9 to 130 mg/L at MB12.
- Calcium concentrations ranged from 5 mg/L at MB10 to 130 mg/L at MB5.
- Magnesium concentrations ranged from 3.7 mg/L at MB10 to 38 mg/L at MB5.

- Potassium concentrations ranged from 2.1 mg/L at MB10 to 68 mg/L at MB5.
- Sodium concentrations ranged from 5.6 mg/L at MB10 to 130 mg/L at MB5. Sodium concentrations remained below the guideline level for irrigation to moderately sensitive crops (<230 mg/L).
- Ammonia concentrations in groundwater ranged from 0.04 mgN/L at MB10 to 11 mgN/L at MB12.
- Nitrate concentrations ranged from below the laboratory LOR of 0.005 mgN/L at MB12 and MB14 to 6.8 mgN/L at MB5. The nitrate concentration in groundwater at MB5 was recorded to have increased since the previous monitoring (0.78 mgN/L in May 2024), however nitrate concentrations at MB5 have been observed to fluctuate.
- Phosphorus concentrations in groundwater ranged from 0.02 mg/L at MB12 and MB14 to 0.1 mg/L at MB5. Phosphorus concentrations remained above the guideline value of 0.05 mg/L for long-term irrigation use (up to 100 years) at MB5.
- Aluminium concentrations in groundwater ranged from below the laboratory LOR of 0.005 mg/L at MB9 to 10 mg/L at MB12. The aluminium concentration in groundwater exceeded the long-term (up to 100 years) irrigation guideline concentration of 5 mg/L at MB12.
- Hexavalent chromium concentrations were below the laboratory LOR of 0.004 mg/L at all monitoring points. Total chromium concentrations in groundwater were recorded at below the laboratory LOR of 0.001 mg/L. Concentrations of hexavalent chromium remained below the long-term (up to 100 years) irrigation guideline concentration of 0.1 mg/L.
- Iron concentrations ranged from 0.009 mg/L at MB5 to 28 mg/L at MB12. Iron concentrations at monitoring points MB9 and MB12 exceeded the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Manganese concentrations ranged from 0.009 mg/L at MB10 to 3.8 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 0.8 mg/L at MB10 to 9.1 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 exception of:
  - TRH C_{10}-C_{14} fraction at MB12 (79 µg/L).
  - TRH C_{15}-C_{28} fraction at MB12 (360 µg/L).
  - TRH C_{10}-C_{40} fraction at MB12 (520 µg/L).
  - TPH >C_{10}-C_{16} fraction at MB12 (120 µg/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 7.3, noted to be slightly alkaline.
- Total alkalinity was recorded at 240 mg/L, which remained below the guideline hardness value for potential fouling of waters (350 mg/L).
- The recorded chloride concentration was 200 mg/L, below the guideline value for protection of moderately sensitive crops (350 mg/L).
- The fluoride concentration of leachate was recorded below the laboratory LOR of 0.1 mg/L, below the guideline value of 1 mg/L for long-term irrigation use (up to 100 years).
- The leachate sulfate concentration was recorded at 28 mg/L.
- Calcium in leachate was recorded at 78 mg/L.
- Magnesium in leachate was recorded at 24 mg/L.
- Potassium in leachate was recorded at 46 mg/L.
- Sodium in leachate was recorded at 98 mg/L, remaining below the guideline level for irrigation to moderately sensitive crops (230 mg/L).
- Total organic carbon (TOC) was recorded at 8.5 mg/L.
- The ammonia concentration of leachate was recorded at 0.06 mgN/L.
- The nitrate concentration of leachate was recorded at 2 mgN/L.
- Iron in leachate was recorded at 0.046 mg/L, below the long-term (up to 100 years) irrigation guideline concentration of 0.2 mg/L.
- Manganese in leachate was recorded at 0.16 mg/L, below 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 June 2024 to November 2024. Results of gas monitoring are included in **Table 3** (attached)

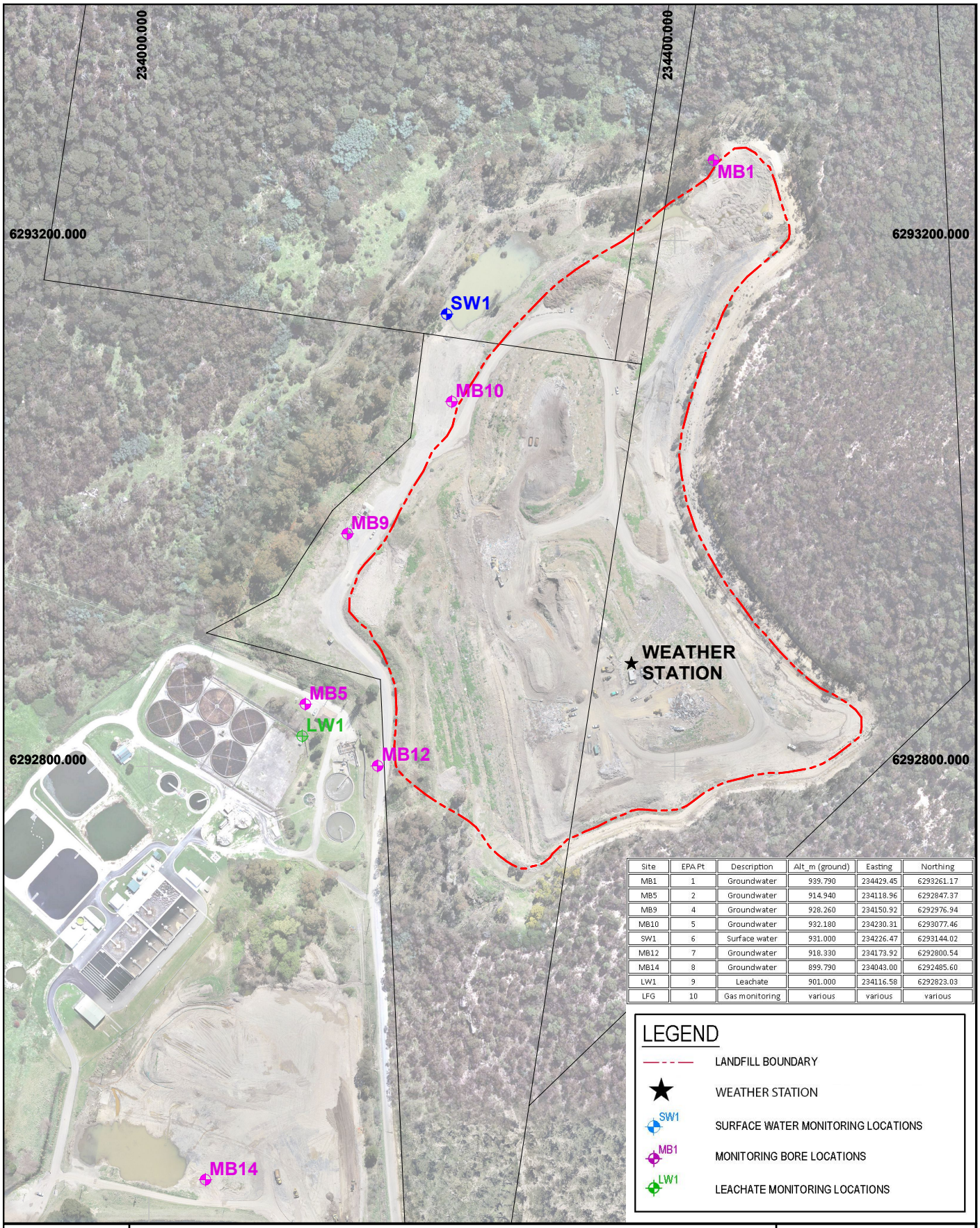
The next routine monitoring for groundwater, leachate and accumulated landfill gas is scheduled for May 2025. Surface water monitoring is required to take place any calendar month when a surface water discharge is recorded. Please do not hesitate to contact us with any questions or comments you may have 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) – November 2024
Table 3 – Accumulated Landfill Gas Monitoring
SGS Laboratories Analytical Reports – November 2024



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

0 50 100

SCALE: 1:4000(A4)

NOTES:
MGA COORDINATES AND AHD DATUM
BOUNDARIES HAVE NOT BEEN SURVEYED

Border size = 185mm x 272mm on A4 paper.

MGA56

CEH SURVEY
CONSULTING LAND, ENGINEERING AND MINING SURVEYORS
"Astrolabe" 1 Rutherford Lane, LITHGOW 2790
ABN: 68 056 544 551 Office: (02) 6351 2281
Email: survey@ceh.com.au Website: www.ceh.com.au

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

Premise

TABLE 1: LITHGOW SOLID WASTE FACILITY - GROUNDWATER LEVEL RESULTS

Ground Water Levels: 18-Nov-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)
MB1	939.790	0.86	940.650	18/11/2024	NMWL	-	6.5	934.15	nil
MB5	914.940	0.80	915.740	18/11/2024	2.37	913.37	9.8	905.94	7.43
MB6B	946.290	0.75	947.040	18/11/2024	NMWL	-	19.3	927.74	nil
MB9	928.260	0.69	928.950	18/11/2024	12.50	916.45	17.1	911.85	4.60
MB10	932.180	0.73	932.910	18/11/2024	6.21	926.70	13.7	919.21	7.49
MB12	918.330	0.76	919.090	18/11/2024	6.92	912.17	22.3	896.84	15.33
MB14	899.790	0.78	900.570	18/11/2024	3.04	897.53	17.7	882.87	14.66

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.

	MB1		**MB5**		**MB6B**		**MB9**		**MB10**		**MB12**		**MB14**	
Date	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
28-Nov-23	NMWL		3.65	912.09	NMWL		13.65	915.30	6.33	926.58	8.06	911.03	2.89	897.68
13-May-24	3.67	936.98	2.76	912.98	NMWL		11.80	917.15	5.59	927.32	7.56	911.53	2.46	898.11
18-Nov-24	NMWL		2.37	913.37	NMWL		12.50	916.45	6.21	926.70	6.92	912.17	3.04	897.53

TABLE 2: LITHGOW SOLID WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2024

				Sample ID	MB5	MB9	MB10	MB12	MB14	LW1
				Sample Date / Time	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS
Physical Parameters	pH (Lab)	0	No unit	6.0 - 8.5	**6.5**	**6.6**	**6.1**	**3.9**	**6.9**	**7.3**
	Electrical Conductivity (Lab)	2	µS/cm	4478	**1600**	**580**	**97**	**1300**	**790**	-
	Total Dissolved Solids	10	mg/L	3000	**970**	**290**	**83**	**790**	**490**	-
	Chemical Oxygen Demand	10	mg/L	-	**46**	**44**	< 10	**29**	< 10	-
Alkalinity	Total Alkalinity as CaCO3	5	mg/L	350	**460**	**270**	**15**	< 5	**350**	**240**
Anions	Chloride	1	mg/L	350	**250**	**27**	**9.2**	**320**	**36**	**200**
	Fluoride	0.1	mg/L	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Sulfate (SO4)	1	mg/L	-	**35**	**2.1**	**9.8**	**130**	**48**	**28**
Cations	Calcium (Ca)	0.1	mg/L	1000	**130**	**53**	**5**	**22**	**110**	**78**
	Magnesium (Mg)	0.1	mg/L	-	**38**	**13**	**3.7**	**16**	**32**	**24**
	Potassium (K)	0.2	mg/L	-	**68**	**24**	**2.1**	**18**	**9.8**	**46**
	Sodium (Na)	0.1	mg/L	230	**130**	**20**	**5.6**	**120**	**17**	**98**
Forms of Carbon	Total Organic Carbon	0.2	mg/L	-	**9.1**	**3.4**	**0.8**	**8.3**	**3.4**	**8.5**
Nutrients	Ammonia (NH3) as N	0.01	mg/L	-	**4.1**	**9.3**	**0.04**	**11**	**0.19**	**0.06**
	Nitrate (NO3) as N	0.005	mg/L	-	**6.8**	**0.011**	**0.32**	< 0.005	< 0.005	**2**
	Total Phosphorus	0.02	mg/L	0.05	**0.1**	**0.03**	**0.05**	**0.02**	**0.02**	-
Trace Metals	Aluminium (Al)	0.005	mg/L	5	**0.008**	< 0.005	**0.078**	**10**	**0.011**	-
	Chromium (Cr)	0.001	mg/L	-	< 0.001	< 0.001	< 0.001	**0.001**	< 0.001	-
	Hexavalent Chromium (Cr-VI)	0.004	mg/L	0.1	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	-
	Iron (Fe)	0.005	mg/L	0.2	**0.009**	**0.24**	**0.071**	**28**	**0.8**	**0.046**
	Manganese (Mn)	0.001	mg/L	0.2	**0.97**	**3.8**	**0.009**	**1.1**	**0.08**	**0.16**
Phenolics	Total Phenols	0.05	mg/L	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

TABLE 2: LITHGOW SOLID WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2024

				Sample ID	MB5	MB9	MB10	MB12	MB14	LW1
				Sample Date / Time	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS
OC Pesticides	Aldrin	0.1	µg/L	-	< 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	-
	Alpha Chlordane	0.1	µg/L	-	< 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	-
	Beta BHC	0.1	µg/L	-	< 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	-
	Delta BHC	0.1	µg/L	-	< 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	-
	Endosulfan sulphate	0.1	µg/L	-	< 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	-
	Endrin aldehyde	0.1	µg/L	-	< 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	-
	Heptachlor	0.1	µg/L	-	< 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	-
	Hexachlorobenzene (HCB)	0.1	µg/L	-	< 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	-
	Methoxychlor	0.1	µg/L	-	< 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	-
	p,p'-DDE	0.1	µg/L	-	< 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	-
	o,p'-DDD	0.1	µg/L	-	< 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	-
	o,p'-DDE	0.1	µg/L	-	< 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	-
	trans-Nonachlor	0.1	µg/L	-	< 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	-
	Mirex	0.1	µg/L	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-
	Total OC Pesticides	1	µg/L	-	< 1	< 1	< 1	< 1	< 1	-

TABLE 2: LITHGOW SOLID WASTE FACILITY - RESULTS OF LABORATORY ANALYSIS
NOVEMBER 2024

				Sample ID	MB5	MB9	MB10	MB12	MB14	LW1
				Sample Date / Time	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024	18/11/2024
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS
OP Pesticides	Azinphos-methyl	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Bromophos Ethyl	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Chlorpyrifos (Chlorpyrifos Ethyl)	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Diazinon (Dimpylate)	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
	Dichlorvos	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
	Dimethoate	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
	Ethion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Fenitrothion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Malathion	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Parathion-ethyl (Parathion)	0.2	µg/L	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	-
	Methidathion	0.5	µg/L	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
Total Petroleum Hydrocarbons	TRH C6-C9	40	µg/L	-	< 40	< 40	< 40	< 40	< 40	-
	TRH C10-C14	50	µg/L	-	< 50	< 50	< 50	**79**	< 50	-
	TRH C15-C28	200	µg/L	-	< 200	< 200	< 200	**360**	< 200	-
	TRH C29-C36	200	µg/L	-	< 200	< 200	< 200	< 200	< 200	-
	TRH C37-C40	200	µg/L	-	< 200	< 200	< 200	< 200	< 200	-
	TRH C10-C40	320	µg/L	-	< 320	< 320	< 320	**520**	< 320	-
Total Recoverable Hydrocarbons	TRH C6-C10	50	µg/L	-	< 50	< 50	< 50	< 50	< 50	-
	TRH C6-C10 minus BTEX (F1)	50	µg/L	-	< 50	< 50	< 50	< 50	< 50	-
	TRH >C10-C16	60	µg/L	-	< 60	< 60	< 60	**120**	< 60	-
	TRH >C10-C16 minus Naphthalene (F2)	60	µg/L	-	< 60	< 60	< 60	**120**	< 60	-
	TRH >C16-C34 (F3)	500	µg/L	-	< 500	< 500	< 500	< 500	< 500	-
	TRH >C34-C40 (F4)	500	µg/L	-	< 500	< 500	< 500	< 500	< 500	-
BTEXN Analytes	Benzene (F0)	0.5	µg/L	-	< 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	05/12/2023	11/01/2024	22/02/2024	13/03/2024	09/04/2024	13/05/2024	12/06/2024	10/07/2024	28/08/2024	23/09/2024	10/10/2024	18/11/2024
Location	**LOR**	**Units**												
Site Shed	0.005	%	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Weighbridge	0.005	%	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Office (STP)	0.005	%	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	**0.02**	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Green Shed (STP)	0.005	%	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pump Room (STP)	0.005	%	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

LOR limit of reporting

ANALYTICAL REPORT

Accreditation No. 2562

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	7

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE274321 R0**
Date Received	20/11/2024
Date Reported	27/11/2024

COMMENTS

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

SIGNATORIES

Akheeqar BENIAMEEN	**Dong LIANG**	**Ly Kim HA**	**Ying Ying ZHANG**
Chemist	Metals/Inorganics Team Leader	Organic Section Head	Laboratory Technician

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C9	µg/L	40	<40	<40	<40	<40	<40
TRH C6-C10	µg/L	50	<50	<50	<50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
TRH C10-C14	µg/L	50	<50	<50	<50	**79**	<50
TRH C15-C28	µg/L	200	<200	<200	<200	**360**	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200	<200
TRH >C10-C16	µg/L	60	<60	<60	<60	**120**	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	**120**	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500	<500
TRH C10-C40	µg/L	320	<320	<320	<320	**520**	<320

OC Pesticides in Water [AN420] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
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
Total OC	µg/L	1	<1	<1	<1	<1	<1
Total OC	µg/L	1	<1	<1	<1	<1	<1

OP Pesticides in Water [AN420] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Dichlorvos	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Total Phenolics in Water [AN295] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006
Total Phenols	mg/L	0.05	<0.05

Anions by Ion Chromatography in Water [AN245] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Fluoride	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Chloride	mg/L	1	**250**	**27**	**9.2**	**320**	**36**
Sulfate, SO4	mg/L	1	**35**	**2.1**	**9.8**	**130**	**48**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**6.8**	**0.011**	**0.32**	<0.005	<0.005

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Fluoride	mg/L	0.1	<0.10	<0.10
Chloride	mg/L	1	**200**	**21**
Sulfate, SO4	mg/L	1	**28**	**7.5**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**2.0**	**1.1**

Nitrite in Water [AN277] Tested: 20/11/2024

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Nitrite Nitrogen, NO2 as N	mg/L	0.005	**0.016**

TKN Kjeldahl Digestion by Discrete Analyser [AN292] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	-	-	-
Total Nitrogen (calc)	mg/L	0.05	-	-	-	-	-

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Kjeldahl Nitrogen	mg/L	0.05	**2.7**
Total Nitrogen (calc)	mg/L	0.05	**3.9**

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 20/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**4.1**	**9.3**	**0.04**	**11**	**0.19**

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.06**	**2.1**

Total Phosphorus by Kjeldahl Digestion DA in Water [AN279/AN293(Sydney only)] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.10**	**0.03**	**0.05**	**0.02**	**0.02**

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.03**

pH in water [AN101] Tested: 20/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
pH**	No unit	-	**6.5**	**6.6**	**6.1**	**3.9**	**6.9**

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
pH**	No unit	-	**7.3**	**7.0**

Conductivity and TDS by Calculation - Water [AN106] Tested: 20/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Conductivity @ 25 C	µS/cm	2	1600	580	97	1300	790

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Conductivity @ 25 C	µS/cm	2	500

Total Dissolved Solids (TDS) in water [AN113] Tested: 22/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Dissolved Solids Dried at 175-185°C	mg/L	10	970	290	83	790	490

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Dissolved Solids Dried at 175-185°C	mg/L	10	290

Alkalinity [AN135] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Alkalinity as CaCO3	mg/L	5	**460**	**270**	**15**	<5	**350**

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Alkalinity as CaCO3	mg/L	5	**240**	**220**

COD in Water [AN179/AN181] Tested: 25/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Chemical Oxygen Demand	mg/L	10	**46**	**44**	<10	**29**	<10

Forms of Carbon [AN190] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Organic Carbon as NPOC	mg/L	0.2	9.1	3.4	0.8	8.3	3.4

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006
Total Organic Carbon as NPOC	mg/L	0.2	8.5

Hexavalent Chromium in water by Discrete Analyser [AN283] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Hexavalent Chromium, Cr6+	mg/L	0.004	<0.004	<0.004	<0.004	<0.004	<0.004

Total and Volatile Suspended Solids (TSS / VSS) [AN114] Tested: 21/11/2024

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Suspended Solids Dried at 103-105°C	mg/L	5	<5

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Calcium, Ca	mg/L	0.1	130	53	5.0	22	110
Magnesium, Mg	mg/L	0.1	38	13	3.7	16	32
Sodium, Na	mg/L	0.1	130	20	5.6	120	17
Potassium, K	mg/L	0.2	68	24	2.1	18	9.8

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Calcium, Ca	mg/L	0.1	78	65
Magnesium, Mg	mg/L	0.1	24	11
Sodium, Na	mg/L	0.1	98	16
Potassium, K	mg/L	0.2	46	14

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Aluminium	µg/L	5	**8**	<5	**78**	**10000**	**11**
Iron	µg/L	5	**9**	**240**	**71**	**28000**	**800**
Manganese	µg/L	1	**970**	**3800**	**9**	**1100**	**80**
Zinc	µg/L	5	-	-	-	-	-
Lead	µg/L	1	-	-	-	-	-
Arsenic	µg/L	1	-	-	-	-	-

PARAMETER	UOM	LOR	LW1 WATER - 18/11/2024 SE274321.006	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Aluminium	µg/L	5	-	**8**
Iron	µg/L	5	**46**	**43**
Manganese	µg/L	1	**160**	-
Zinc	µg/L	5	-	**8**
Lead	µg/L	1	-	<1
Arsenic	µg/L	1	-	<1

Trace Metals (Total) in Water by ICPMS [AN022/AN318] Tested: 21/11/2024

PARAMETER	UOM	LOR	MB5 WATER - 18/11/2024 SE274321.001	MB9 WATER - 18/11/2024 SE274321.002	MB10 WATER - 18/11/2024 SE274321.003	MB12 WATER - 18/11/2024 SE274321.004	MB14 WATER - 18/11/2024 SE274321.005
Total Chromium	µg/L	1	<1	<1	<1	1	<1

PARAMETER	UOM	LOR	SW1 - Downstream WATER - 18/11/2024 SE274321.007
Total Chromium	µg/L	1	<1

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
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).
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
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.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
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 CO2 is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O2/C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	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.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
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 Cr6+. If total chromium is also measured the trivalent form of chromium Cr3+ can be calculated from the difference (Total Cr - Cr6+). Reference APHA3500CrB.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 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-pryazolin-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.
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	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:

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.