

Moree Landfill

Location: Newell Highway, Moree NSW 2400 Environment Protection Licence Number: 12788
 Licensee under Protection of Environment Operations Act 1997 (POEO Act): Moree Plains Shire Council, PO Box 420, Moree NSW 2400

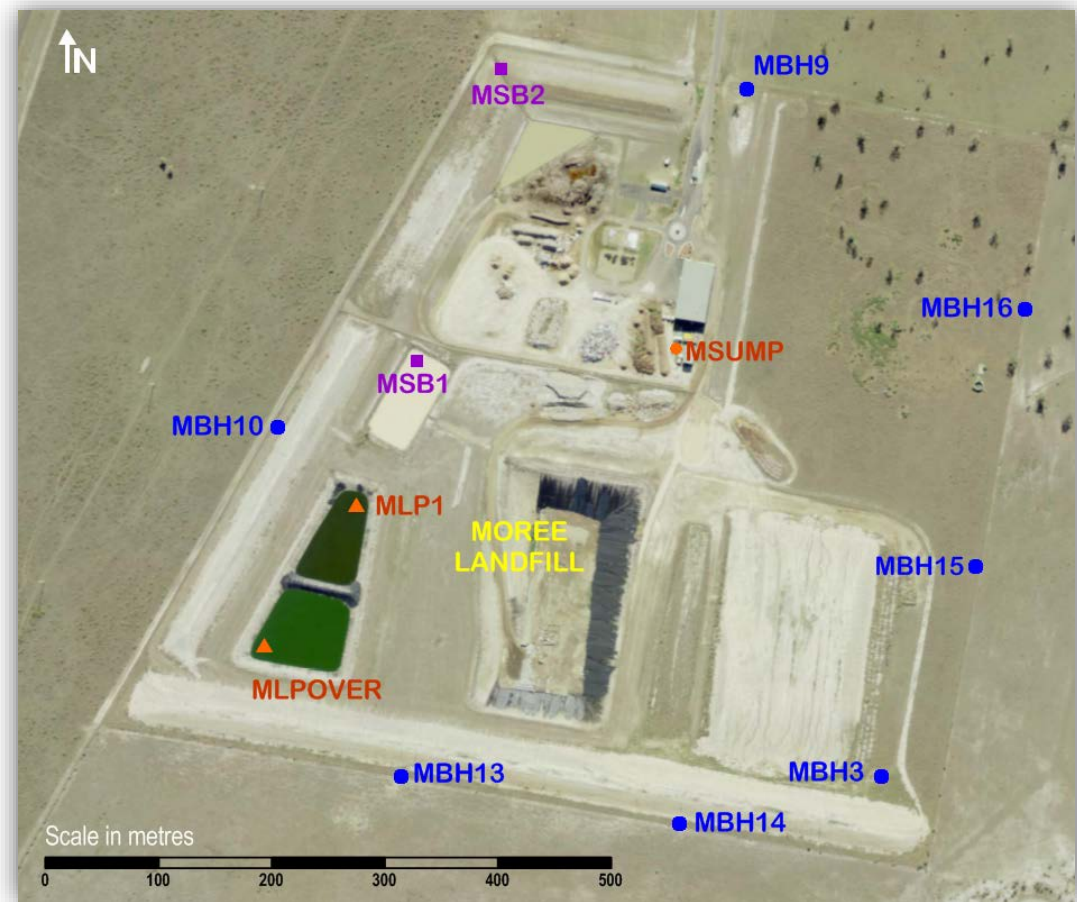
Activities: Waste disposal to land and waste processing

The internet link to Licence No. 12788 is <https://apps.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=118200&SYSUID=1&LICID=12788>

Council is required to monitor groundwater, surface water, leachate and methane at various sampling points. To meet its obligation under Section 66 (6) of the POEO Act, a link to the current version of this document is available on Council's website.

Locations of the sampling points are shown on the adjacent figure. Historical names are used. MBH stands for Moree Bore Hole. [A bore hole is an investigative hole. When casing and screen are installed for monitoring, it is called a monitoring well.] S = Surface water; P = Pond. Corresponding Environment Protection Authority (EPA) Identification Numbers detailed on the Licence are provided below.

EPA No. 1	MLP1 (leachate)
EPA No. 2	MSB1 (surface water - flows to MSB2)
EPA No. 3	MSB2 (surface water)
EPA No. 4	MBH13 (groundwater monitoring well)
EPA No. 5	MBH14 (groundwater monitoring well)
EPA No. 6	MBH3 (groundwater monitoring well)
EPA No. 7	MBH9 (groundwater monitoring well)
EPA No. 8	MBH10 (groundwater monitoring well)
EPA No. 9	MBH15 (groundwater monitoring well)
EPA No. 10	MBH16 (groundwater monitoring well)
EPA No. 11	Surface methane monitoring
EPA No. 12	Building methane monitoring
EPA No. 13	MLPOVER (Leachate pond overflow)



Base map: NSW Land and Property Information, Spatial Information Exchange 2011

Monitoring results for at least the last four years are presented in the following tables, as required by licence.

Water quality analytes are organised in the following tables according to chemical grouping to assist chemical review. [Analytes are listed on the licence in alphabetical order.] They include analytes for groundwater, surface water and landfill leachate.

Tables are organised according to field and laboratory results. Field results start with the date the sampling and field tests were undertaken. Laboratory results tables start with the date the laboratory issued the results, followed by the date by which results were placed on the Moree Plains Shire Council website.

Abbreviations made in the tables are provided here in alphabetical order:

Al = Aluminium; Alk = Alkalinity measured as mg/L CaCO₃ equivalent; As = Arsenic; Ba = Barium; BTEX = Benzene, Toluene, Ethylbenzene, Xylene; Ca = Calcium; Cd = Cadmium; Cl = Chloride; Co = Cobalt; Cr = Chromium; D = Depth to water from either top of PVC casing or standpipe; DO = Dissolved Oxygen; EC = Electrical Conductivity; Eh = Redox Potential; Fe = Iron; Fl = Fluoride; Hg = Mercury; K = Potassium; Mg = Magnesium; Mn = Manganese; Na = Sodium; NC = Not continuing; ND = Nil detected; NH₃ = Ammonia as a measure of ammonium ions; NO_x = Nitrite + Nitrate; NR = Not required; OC&OP = Organochlorine and Organophosphorus; PAH = Polynuclear aromatic hydrocarbons; Pb = Lead; RL = water level converted to Reduced Level relative to mean sea level; SO₄ = Sulphate; SS = Total suspended solids; TDS = Total Dissolved Solids; Temp = Temperature; TKN = Total Kjeldahl Nitrogen (organic nitrogen + ammonia); TOC = Total Organic Carbon; TP = Total Phosphorus; TRH = Total Recoverable Hydrocarbons; Zn = Zinc.

Measures:

mg/L = milligram per litre (equivalent to ppm); μ S/cm = microSiemens per centimetre; mV = millivolts; °C = degrees Celsius; ppm = parts per million.

Choice of water quality analytes:

Some analytes are tested because they give a general understanding of groundwater, surface water and leachate quality. The concentrations are usually greater in leachate than in groundwater and surface water. A simple comparison can tell us if landfill leachate may have escaped into groundwater or surface water. However, groundwater has particular characteristics that need to be taken into account so that false conclusions are not made. For example, groundwater may have naturally high salt levels due to the clay strata in which it resides. EC is an indicator of salt levels. The EC of the Moree Landfill groundwater is a case in point. Its high EC levels (Table 1) are not due to landfill leachate because they were these concentrations before any solid waste was accepted at the Moree Landfill. They are due to the clay strata.

Other analytes give us more specific information about the possible presence of landfill leachate in groundwater and surface water. Even with these we must carefully consider if their increased concentrations are definitely due to landfill leachate and are not from some other source.

- Nitrogen compounds indicate biodegradation of the plant and animal waste in our solid waste. They may also be due to fertilizer use on nearby properties. A general rule of thumb is that total nitrogen (TKN + NO_x) should be <5 mg/L.
- Iron and manganese above 10 mg/L is an indicator that landfill leachate may be present in groundwater. However, these groundwater analytes may have increased due to leaching of iron and manganese from the soil after excessive rainfall or flood water infiltration.
- Organic analytes such as BTEX compounds are most likely to indicate landfill leachate, especially if they haven't been detected before.

So it is important to monitor on a regular basis to note any changes in water quality analyte concentrations and to judicially review the results. Increases in groundwater and surface water analyte concentrations due to landfill leachate intrusion are often at least three to four times the previous concentrations.

Comments on water quality monitoring results: There are no concerns with the groundwater results. Surface water has not discharged since 31 March 2012. Leachate has returned to more concentrated levels after being diluted by two extreme rainfall events: one in November 2011, and the other in February 2012. Due to licence changes some analyses are no longer required.

Table 1: Groundwater quality well MBH3 (EPA Point 6)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH3 Six-monthly		MBH3																							
12/03/16		0.66	3598	7.04	+123	24.7	427	32.44	185.24	22/03/16	13/04/16	46	896	<0.001	<0.0001	<0.001	<0.001	0.006	0.002	<0.05	0.02	0.23	<0.1	0.2	<1
11/11/16		0.53	3620	7.07	+158	22.0	420	32.08	185.60	23/11/16	09/01/17	48	850	<0.001	<0.0001	<0.001	<0.001	0.005	<0.001	<0.05	<0.01	0.25	<0.1	0.2	<5
17/07/17		0.48	3523	7.08	+96	22.4	415	32.10	185.58	31/07/17	18/08/17	48	813	<0.001	<0.0001	<0.001	<0.001	<0.005	0.001	<0.05	0.01	0.21	<0.1	0.2	4
02/12/17		0.36	3600	7.08	+113	22.7	413	31.99	185.69	19/12/17	11/01/18	47	862	<0.001	<0.0001	<0.001	<0.001	<0.005	0.002	<0.05	0.01	0.16	0.1	0.3	1
14/08/18		0.46	2601	7.35	+136	21.2	420	32.09	185.59	23/08/18	12/09/18	48	918	<0.001	<0.0001	<0.001	<0.001	0.005	<0.001	<0.05	0.02	0.18	<0.1	0.2	5
07/12/18		0.39	3420	7.16	+463	23.7	417	32.03	185.65	18/12/18	10/01/19	45	844	<0.001	<0.0001	<0.001	<0.001	0.006	0.002	<0.05	0.05	0.12	<0.1	0.1	2
27/06/19		0.47	3465	7.00	+251	22.0	417	32.66	185.02	11/07/19	31/07/19	43	888	<0.001	<0.0001	<0.001	<0.001	0.005	<0.001	<0.05	<0.01	0.22	<0.1	0.2	4
20/11/19		0.54	3558	6.95	+106	24.0	427	32.85	184.83	03/12/19	23/12/19	49	896	<0.001	<0.0001	<0.001	<0.001	0.006	<0.001	<0.05	<0.01	0.25	0.1	0.4	4
27/05/20		0.49	3600	7.05	+101	22.0	433	33.03	184.65	09/06/20	29/06/20	50	905	<0.001	<0.0001	<0.001	<0.001	0.008	<0.001	<0.05	0.07	0.26	0.1	0.4	<5
10/12/20		0.71	3475	7.01	+117	26.0	430	32.69	184.99	29/12/20	19/01/21	47	876	<0.001	<0.0001	<0.001	<0.001	0.006	<0.001	<0.05	<0.01	0.20	<0.1	0.2	3

Table 2: Groundwater quality well MBH9 (EPA Point 7)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH9 Six-monthly		MBH9																							
12/03/16		4.41	2266	7.38	+101	23.9	500	30.92	186.40	22/03/16	13/04/16	66	459	<0.001	<0.0001	0.002	<0.001	0.006	0.001	<0.05	<0.01	0.06	0.2	0.3	<1
12/11/16		2.80	2437	7.46	+73	24.4	484	30.82	186.50	23/11/16	09/01/17	80	481	<0.001	<0.0001	0.002	<0.001	<0.005	<0.001	<0.05	0.03	0.13	0.2	0.3	<5
18/07/17		2.32	2381	7.44	+56	22.2	503	30.96	186.36	31/07/17	18/08/17	74	461	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.001	<0.05	<0.01	0.06	0.2	0.3	9
04/12/17		2.75	2246	7.03	+23	23.4	487	30.88	186.44	19/12/17	11/01/18	70	507	<0.001	<0.0001	0.002	<0.001	<0.005	0.001	<0.05	<0.01	0.06	0.3	0.4	3
14/08/18		2.91	2370	7.52	+123	22.0	477	31.04	186.28	23/08/18	12/09/18	64	528	<0.001	<0.0001	0.002	<0.001	0.005	<0.001	<0.05	0.03	0.07	<0.1	<0.1	2
08/12/18		3.42	2424	7.55	+127	24.9	470	31.00	186.32	18/12/18	10/01/19	68	509	<0.001	<0.0001	0.002	<0.001	<0.005	<0.001	<0.05	0.09	0.06	<0.1	<0.1	6
28/06/19		2.75	2113	7.29	+68	23.3	467	31.11	186.21	11/07/19	31/07/19	55	478	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.001	<0.05	<0.01	0.06	<0.1	<0.1	5
19/11/19		2.87	2167	7.26	+99	23.5	470	30.97	186.35	03/12/19	23/12/19	60	464	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.001	<0.05	<0.01	0.05	<0.1	<0.1	3
27/05/20		3.47	2613	7.46	+91	22.1	483	31.04	186.28	09/06/20	29/06/20	85	568	<0.001	<0.0001	0.003	<0.001	<0.005	<0.001	<0.05	<0.01	0.05	<0.1	<0.1	<5
10/12/20		3.15	2585	7.40	+94	26.9	477	31.00	186.32	29/12/20	19/01/21	91	558	<0.001	<0.0001	0.003	<0.001	<0.005	0.002	<0.05	<0.01	0.04	<0.1	<0.1	<1

Table 3: Groundwater quality well MBH10 (EPA Point 8)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
										mg/L	mg/L														
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH10 Six-monthly										MBH10															
12/03/16		2.51	2174	7.25	+105	23.8	353	29.01	188.68	22/03/16	13/04/16	29	507	<0.001	<0.0001	<0.001	<0.001	<0.005	0.001	<0.05	<0.01	0.18	<0.1	0.2	<1
11/11/16		2.20	2165	7.29	+95	22.7	380	28.87	188.82	23/11/16	09/01/17	29	486	<0.001	<0.0001	<0.001	<0.001	0.006	0.004	<0.05	<0.01	0.23	<0.1	0.2	<5
17/07/17		2.34	2127	7.03	+144	21.5	373	28.97	188.72	31/07/17	18/08/17	30	488	<0.001	<0.0001	<0.001	<0.001	<0.005	0.002	<0.05	0.01	0.21	<0.1	0.2	4
02/12/17		2.00	2224	7.02	+64	22.7	353	28.91	188.78	19/12/17	11/01/18	28	493	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.001	<0.05	<0.01	0.22	<0.1	0.2	3
15/08/18		2.30	1998	7.35	-7	21.2	363	28.98	188.71	23/08/18	12/09/18	32	545	<0.001	<0.0001	<0.001	<0.001	0.006	<0.001	<0.05	0.02	0.27	<0.1	0.3	4
07/12/18		2.64	2112	7.36	+222	22.9	347	28.91	188.78	18/12/18	10/01/19	28	524	<0.001	<0.0001	<0.001	<0.001	0.005	<0.001	<0.05	0.08	0.26	<0.1	0.3	6
27/06/19		2.97	2075	7.22	+95	22.4	350	29.05	188.64	11/07/19	31/07/19	28	430	<0.001	<0.0001	<0.001	<0.001	0.006	<0.001	<0.05	<0.01	0.28	<0.1	0.3	5
19/11/19		3.20	2083	7.11	+92	23.4	349	29.07	188.62	03/12/19	23/12/19	29	513	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.001	<0.05	<0.01	0.28	0.1	0.4	3
27/05/20		3.13	2094	7.19	+139	22.7	357	29.08	188.61	09/06/20	29/06/20	28	506	<0.001	<0.0001	0.002	<0.001	<0.005	<0.001	<0.05	0.03	0.30	<0.1	0.3	<5
10/12/20		3.17	2070	7.30	+86	24.8	360	29.10	188.59	29/12/20	19/01/21	30	485	<0.001	<0.0001	0.002	<0.001	0.005	<0.001	<0.05	<0.01	0.30	<0.1	0.3	<1

Table 4: Groundwater quality well MBH13 (EPA Point 4)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
										mg/L	mg/L														
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH13 Six-monthly										MBH13															
12/03/16		4.25	1928	7.36	+98	23.4	400	30.85	186.74	22/03/16	13/04/16	34	391	<0.001	<0.0001	0.002	<0.001	<0.005	0.002	<0.05	<0.01	0.29	<0.1	0.3	<1
11/11/16		4.23	1941	7.43	+101	22.1	400	30.71	186.88	23/11/16	09/01/17	34	385	<0.001	<0.0001	0.002	<0.001	<0.005	0.004	<0.05	<0.01	0.31	<0.1	0.3	<5
17/07/17		4.91	2057	7.18	+141	21.3	403	30.72	186.87	31/07/17	18/08/17	34	404	<0.001	<0.0001	0.002	<0.001	<0.005	0.004	<0.05	0.01	0.31	<0.1	0.3	7
02/12/17		3.69	1974	7.26	-15	22.5	387	30.68	186.91	19/12/17	11/01/18	34	400	<0.001	<0.0001	0.003	<0.001	0.044	0.006	<0.05	0.02	0.32	<0.1	0.3	7
15/08/18		4.34	1996	7.48	+45	20.9	403	30.78	186.81	23/08/18	12/09/18	34	444	<0.001	<0.0001	0.003	<0.001	<0.005	<0.001	<0.05	0.02	0.33	<0.1	0.3	5
07/12/18		4.62	2049	7.44	+221	23.2	403	30.82	186.77	18/12/18	10/01/19	31	434	<0.001	<0.0001	0.004	<0.001	0.005	0.003	<0.05	0.08	0.32	0.1	0.4	<1
27/06/19		5.26	2045	7.29	+114	21.1	405	30.80	186.79	11/07/19	31/07/19	28	430	<0.001	<0.0001	0.006	<0.001	<0.005	0.001	<0.05	<0.01	0.31	<0.1	0.3	3
19/11/19		4.67	1947	7.18	+111	24.5	403	30.76	186.83	03/12/19	23/12/19	30	439	<0.001	<0.0001	0.006	<0.001	<0.005	0.002	<0.05	<0.01	0.30	<0.1	0.3	2
28/05/20		4.92	2148	7.35	+137	22.2	313	30.61	186.98	09/06/20	29/06/20	98	513	<0.001	<0.0001	0.006	<0.001	<0.005	<0.001	<0.05	<0.01	0.17	<0.1	0.2	<5
10/12/20		4.28	2683	7.33	+80	24.0	263	30.52	187.07	29/12/20	19/01/21	72	703	<0.001	<0.0001	0.004	<0.001	<0.005	0.002	<0.05	<0.01	0.16	<0.1	0.2	2

Table 5: Groundwater quality well MBH14 (EPA Point 5)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH14	Six-monthly									MBH14															
12/03/16		6.78	5123	7.31	+91	24.2	458	32.47	185.76	22/03/16	13/04/16	67	1300	<0.001	<0.0001	0.012	<0.001	<0.005	0.010	<0.05	0.02	0.71	0.1	0.8	<1
11/11/16		6.01	5190	7.35	+112	22.2	453	32.22	185.47	23/11/16	09/01/17	68	1250	<0.001	<0.0001	0.012	<0.001	<0.005	<0.001	<0.05	<0.01	0.72	<0.1	0.7	<5
17/07/17		5.69	5183	7.20	+95	21.8	450	32.25	185.72	31/07/17	18/08/17	68	1160	<0.001	<0.0001	0.012	<0.001	<0.005	<0.001	<0.05	<0.01	0.68	<0.1	0.7	10
02/12/17		4.78	5320	7.27	+29	22.4	447	32.15	185.69	19/12/17	11/01/18	63	1380	<0.001	<0.0001	0.012	<0.001	0.022	0.002	<0.05	0.02	0.70	<0.1	0.7	4
15/08/18		4.59	5000	7.44	+61	21.6	447	32.23	185.71	23/08/18	12/09/18	67	1460	<0.001	<0.0001	0.012	<0.001	<0.005	0.001	<0.05	0.01	0.74	<0.1	0.7	<1
07/12/18		4.81	5265	7.41	+204	23.7	447	32.22	185.72	18/12/18	10/01/19	64	1350	<0.001	<0.0001	0.012	<0.001	<0.005	0.002	<0.05	0.03	0.69	<0.1	0.7	6
27/06/19		5.68	5358	7.22	+123	22.3	453	32.70	185.24	11/07/19	31/07/19	57	1380	<0.001	<0.0001	0.013	<0.001	<0.005	0.001	<0.05	<0.01	0.69	<0.1	0.7	2
19/11/19		4.99	5078	7.18	+102	25.3	443	32.81	185.13	03/12/19	23/12/19	67	1380	<0.001	<0.0001	0.012	<0.001	<0.005	<0.001	<0.05	<0.01	0.66	<0.1	0.7	3
28/05/20		4.79	5178	7.33	+123	22.3	447	33.03	184.91	09/06/20	29/06/20	67	1400	<0.001	<0.0001	0.014	<0.001	<0.005	<0.001	<0.05	0.01	0.68	<0.1	0.7	<5
10/12/20		4.75	5135	7.33	+56	23.7	453	32.83	185.11	29/12/20	19/01/21	61	1360	<0.001	<0.0001	0.014	<0.001	<0.005	0.002	<0.05	<0.01	0.65	<0.1	0.6	3

Table 6: Groundwater quality well MBH15 (EPA Point 9)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L	m	m			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L as N	mg/L
MBH15	Six-monthly									MBH15															
12/03/16		0.98	1808	7.12	+69	26.1	410	32.66	185.10	22/03/16	13/04/16	45	338	0.001	<0.0001	<0.001	<0.001	0.005	0.051	0.10	<0.01	0.01	<0.1	<0.1	<1
12/11/16		0.79	1804	7.17	+65	22.7	417	32.17	185.59	23/11/16	09/01/17	42	323	0.001	<0.0001	<0.001	<0.001	<0.005	0.041	0.11	<0.01	<0.01	<0.1	<0.1	<5
18/07/17		1.12	1739	7.20	+83	20.3	423	32.17	185.59	31/07/17	18/08/17	43	324	0.001	<0.0001	<0.001	<0.001	<0.005	0.040	0.15	0.01	<0.01	<0.1	<0.1	12
02/12/17		0.74	1820	7.08	+72	23.0	407	32.04	185.72	19/12/17	11/01/18	46	320	0.001	<0.0001	<0.001	<0.001	0.011	0.019	0.09	0.01	<0.01	<0.1	<0.1	3
15/08/18		0.83	1749	7.53	+74	23.0	387	32.12	185.64	23/08/18	12/09/18	44	360	0.001	<0.0001	<0.001	<0.001	0.006	0.032	0.07	0.03	0.03	<0.1	<0.1	4
08/12/18		0.88	1817	7.17	+124	24.3	410	32.07	185.69	18/12/18	10/01/19	41	332	<0.001	<0.0001	<0.001	<0.001	<0.005	0.009	0.07	0.07	0.03	<0.1	<0.1	8
28/06/19		1.01	1785	7.07	+91	22.4	413	32.75	185.01	11/07/19	31/07/19	40	323	<0.001	<0.0001	<0.001	<0.001	0.015	0.016	<0.05	<0.01	0.02	<0.1	<0.1	3
20/11/19		1.17	1691	7.03	+83	25.4	410	33.06	184.70	03/12/19	23/12/19	42	326	<0.001	<0.0001	<0.001	<0.001	<0.005	0.007	<0.05	<0.01	0.03	<0.1	<0.1	3
26/05/20		0.72	1710	7.16	+131	21.8	380	33.14	184.62	09/06/20	29/06/20	46	331	<0.001	<0.0001	<0.001	<0.001	<0.005	0.006	0.06	0.01	0.02	<0.1	<0.1	<5
10/12/20		0.96	1697	7.12	+76	31.6	377	32.92	184.84	29/12/20	19/01/21	44	320	<0.001	<0.0001	<0.001	<0.001	0.006	0.010	0.06	<0.01	0.02	<0.1	<0.1	2

Table 7: Groundwater quality well MBH16 (EPA Point 10)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	D	RL	Received from laboratory	Accessible on Council website by	SO ₄	Cl	As	Cd	Cr	Pb	Zn	Mn	Fe	NH ₃	NO _x	TKN	TN	TOC
										mg/L	mg/L														
MBH16		MBH16																							
12/03/16	Six-monthly	0.48	1530	7.76	-180	25.9	447	32.15	184.96	22/03/16	13/04/16	20	245	0.003	<0.0001	<0.001	<0.001	<0.005	0.122	0.07	<0.01	<0.01	<0.1	<0.1	<1
12/11/16		0.51	1532	7.72	-157	22.8	427	31.56	185.55	23/11/16	09/01/17	18	231	0.002	<0.0001	<0.001	<0.001	<0.005	0.123	0.16	0.07	<0.01	<0.1	<0.1	<5
18/07/17		0.41	1489	7.53	-215	22.5	427	31.58	185.53	31/07/17	18/08/17	19	233	0.002	<0.0001	<0.001	<0.001	<0.005	0.131	0.12	<0.01	<0.01	<0.1	<0.1	4
02/12/17		0.46	1530	7.27	-208	24.3	503	31.49	185.62	19/12/17	11/01/18	18	227	0.002	<0.0001	<0.001	<0.001	<0.005	0.124	0.12	0.03	<0.01	<0.1	<0.1	9
15/08/18		0.80	1486	7.80	-161	23.1	146	31.41	185.70	23/08/18	12/09/18	25	245	0.002	<0.0001	<0.001	<0.001	<0.005	0.118	0.12	0.04	<0.01	<0.1	<0.1	2
07/12/18		0.31	1407	7.65	-80	24.7	440	31.26	185.85	18/12/18	10/01/19	21	241	0.002	<0.0001	<0.001	<0.001	<0.005	0.109	0.12	0.10	<0.01	<0.1	<0.1	6
28/06/19		0.35	1518	7.47	-72	22.2	427	32.11	185.00	11/07/19	31/07/19	19	230	0.002	<0.0001	<0.001	<0.001	<0.005	0.110	0.13	<0.01	<0.01	<0.1	<0.1	4
20/11/19		0.44	1441	7.35	-76	25.4	427	32.44	184.67	03/12/19	23/12/19	19	233	0.002	<0.0001	<0.001	<0.001	<0.005	0.105	0.09	<0.01	<0.01	<0.1	<0.1	3
26/05/20		0.37	1446	7.53	-36	22.0	440	32.48	184.63	09/06/20	29/06/20	18	232	0.002	<0.0001	<0.001	<0.001	<0.005	0.110	0.10	<0.01	<0.01	<0.1	<0.1	<5
10/12/20		0.61	1445	7.50	-79	23.5	433	32.36	184.75	29/12/20	19/01/21	19	225	0.002	<0.0001	<0.001	<0.001	<0.005	0.110	0.07	<0.01	<0.01	<0.1	<0.1	<1

Table 8: Surface water quality (EPA Point 3)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	Received from laboratory	Accessible on Council website	SS	NH ₃	TKN	NO _x	TN
								mg/L	mg/L					
MSB2		MSB2												
no discharge	on discharge													

Table 9a: Leachate quality – field parameters and analytes, and laboratory analytes (a) (MLP1 – EPA Point 1)

Sampling date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	Received	Accessible	SO ₄	Cl	As	Cd	Cr	Mn	Pb	Zn	Fe
								from laboratory	on Council website by									
Measure		mg/L	µS/cm	1-14	mV	°C	mg/L			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MLP1	Six monthly	NR			NR	NR		MLP1										
15/06/16		1.72	9212	7.55	+140	24.8	3000	23/06/16	13/07/16	101	1090	0.052	<0.0001	0.082	1.460	0.003	0.038	4.54
12/11/16		0.49	7815	8.70	+48	22.9	1900	23/11/16	09/01/17	194	1440	0.066	0.0001	0.061	0.446	0.003	0.070	1.30
18/07/17		4.36	19440	9.43	-70	15.3	3500	31/07/17	18/08/17	202	928	0.356	0.0002	0.074	0.382	0.012	0.087	2.31
04/12/17		11.04	16550	9.27	-46	24.3	2200	19/12/17	11/01/18	223	3830	0.263	0.0003	0.027	0.007	0.069	0.199	0.82
15/08/18		0.15	7720	7.97	-228	15.6	2400	23/08/18	12/09/18	67	1200	0.029	0.0004	0.056	1.840	0.016	0.122	15.5
08/12/18		0.35	11225	8.23	-100	24.2	2600	18/12/18	10/01/19	<10	2410	0.067	0.0019	0.108	2.960	0.094	0.917	33.3
28/06/19		0.17	8915	8.05	-76	20.5	2900	11/07/19	31/07/19	<5	238	0.026	0.0011	0.106	1.380	0.272	0.350	10.1
20/11/19		0.08	6575	7.97	+67	24.8	1500	03/12/19	23/12/19	107	1020	0.036	0.0016	0.053	1.680	0.039	0.414	9.53
28/05/20		0.06	8560	8.46	+68	22.5	2000	09/06/20	29/06/20	1050	1300	0.103	0.0022	0.090	0.220	1.020	1.720	34.5
10/12/20		0.09	9378	8.61	+47	26.1	2200	29/12/20	19/01/21	86	405	0.019	0.0033	0.025	1.700	0.104	0.841	16.7
MLPOVER no overflow	overflow	NR			NR		NR	MLPOVER no overflow		NR	NR	NR	NR	NR	NR	NR	NR	NR

Table 9b: Leachate quality – laboratory analytes (b) (MLP1 – EPA Point 1)

	SS	NH ₃	NO _x	TKN	TN	TP	TOC	Phenols	OC & OP pesticides	PAH	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH >C10-C40 (sum)	BTEX/VOC compounds
Measure	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MLP1	NR															
15/06/16	409.0	0.32	448.0	448.0	5.36	299		ND	Naphthalene 0.0021	0.050	3.210	9.710	0.540	13.500	Benzene 0.003; Ethylbenzene 0.007; meta & para Xylene 0.004; ortho Xylene 0.002.	
12/11/16	50.4	<0.05	132.0	132.0	12.6	44		ND	ND	<0.020	1.200	5.520	0.120	6.840	ND	
18/07/17	2.38	<0.50	172.0	172.0	16.9	1610		ND	ND	<0.020	2.830	8.470	0.520	11.800	ND	
04/12/17	1.72	0.01	118	118	8.14	990		ND	ND	0.020	1.780	5.740	0.390	7.910	ND	
15/08/18	266	<0.05	252	252	13.30	345		ND	Naphthalene 0.0135	0.090	2.320	5.900	0.570	8.790	Toluene 0.004; meta- & para-Xylene 0.008; ortho-Xylene 0.004; Naphthalene 0.029; 1.3.5-Trimethylbenzene 0.012; 1.2.4-Trimethylbenzene 0.031; p-Isopropyltoluene 0.026.	
08/12/18	101	0.28	255	255	20.50	762		ND	ND	0.020	0.020	3.160	44.400	6.860	ND	
28/06/19	317	<0.05	426	426	12.4	599		Diazinon 0.0067	ND	0.020	2.110	25.800	2.860	30.800	Meta- & para-Xylene 0.008; Carbon disulphide 0.005.	
20/11/19	108	<0.10	221	221	21.3	576		ND	ND	<0.020	<0.020	1.360	4.280	0.440	ND	
28/05/20	150	<0.01	361	361	33.0	542		ND	ND	0.040	0.030	0.770	9.390	1.390	Toluene 0.003; meta & para Xylene 0.003; 2-Butanone (MEK) 0.200	
10/12/20	71.2	0.02	134	134	13.2	728		ND	ND	0.090	2.980	19.000	1.790	23.800	Toluene 0.007; 2-Butanone (MEK) 0.910	
MLPOVER		NR	NR	NR	NR	NR		NR	NR	NR	NR	NR	NR	NR	NR	NR
no overflow																

Methane is a colourless, odourless gas that is flammable and explosive. It is generated approximately three months after the deposition of putrescible solid waste and once oxygen is depleted. Testing is conducted above ground surfaces to assure than none is escaping to air, and in buildings to assure against asphyxiation and explosion.

Comments on methane monitoring results: No methane has been detected on the ground surface or in buildings.

Table 5: Methane detections (surface and buildings) (EPA Points 11 & 12)

Frequency required by licence	Detection locations	Methane (CH ₄) by volume in air	Methane (CH ₄) by volume in air	Methane (CH ₄) (Lower Explosive Limit)	Accessible on Council website
Measure		ppm CH ₄ in air	% CH ₄ in air	% LEL	
Reporting limit		500	0.05%	1%	
3 monthly					
12/03/16	nil detections				13/04/16
15/06/16	nil detections				13/07/16
28/10/16	nil detections				09/01/17
16/12/16	nil detections				09/01/17
05/02/17	nil detections				18/08/17
22/05/17	nil detections				18/08/17
18/07/17	nil detections				18/08/17
05/12/17	nil detections				11/01/18
25/03/18	nil detections				12/09/18
15/08/18	nil detections				12/09/18
08/12/18	Nil detections				10/01/19
06/03/19	Nil detections				31/07/19
28/06/19	Nil detections				31/07/19
01/10/19	Nil detections				23/12/19
20/11/19	Nil detections				23/12/19
12/02/20	Nil detections				29/06/20
31/05/20	Nil detections				29/06/20
09/09/20	Nil detections				19/01/21
11/12/20	Nil detections				19/01/21

Note: 500 ppm CH₄ by volume in air = 0.05% CH₄ by volume in air = 1% LEL