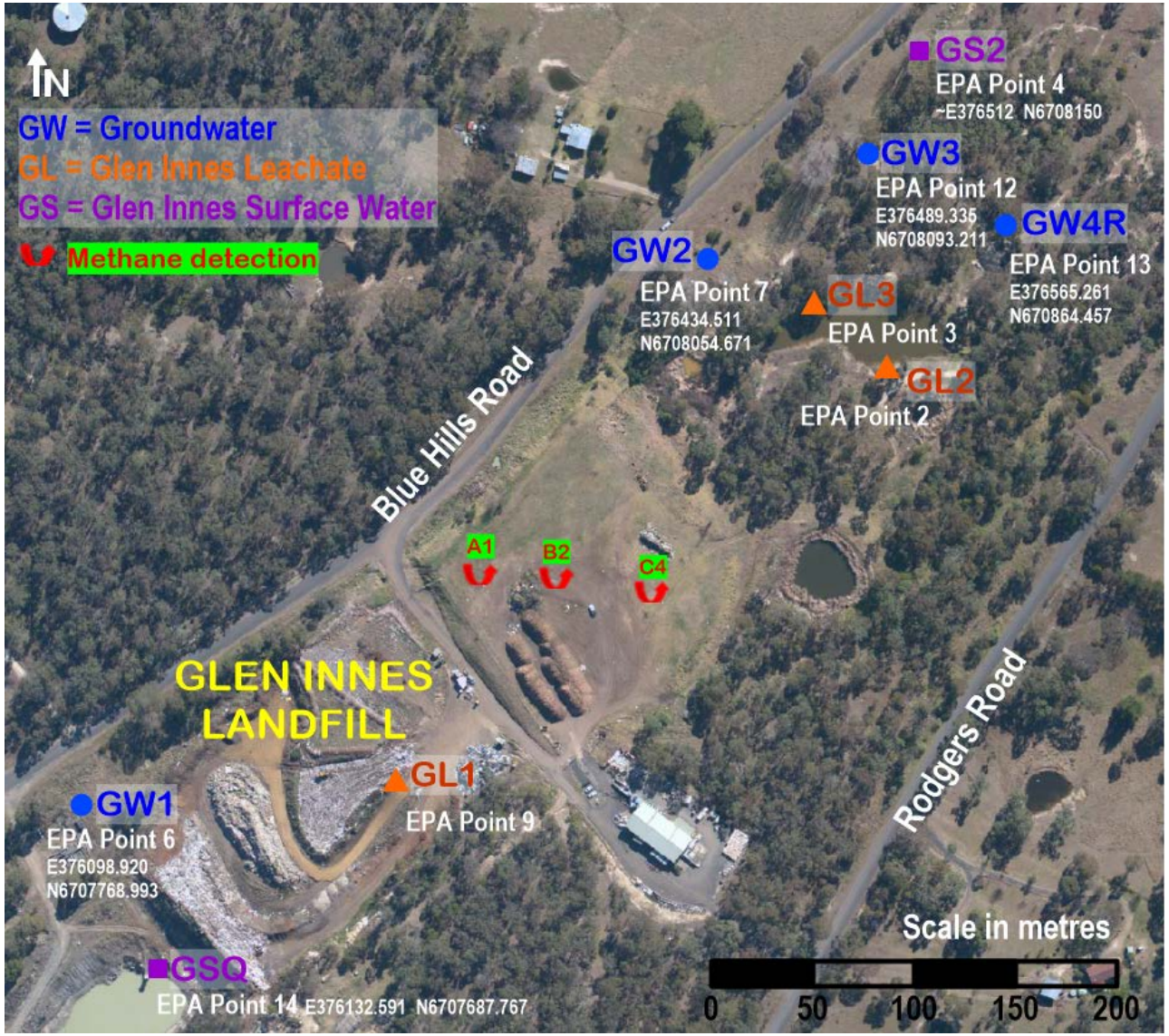
Glen Innes Waste Management Facility

Location: Rodgers Road, Glen Innes NSW 2370 Environment Protection Licence Number: 5939 Activities: Waste disposal to land and waste processing
The internet link to Licence No. 5939 is
https://apps.epa.nsw.gov.au/prpoeoapp/Detail.aspx?instid=5939&id=5939&option=licence&searchrange=general&range=POEO%20licence&prp=no&status=Issued
Licensee under the Protection of Environment Operations Act 1997 (POEO Act):
Glen Innes Severn Council, PO Box 61, Glen Innes NSW 2370

Council is required to monitor methane, groundwater, surface water and leachate at various sampling points. This document details recent results. 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.

On the adjacent figure, sampling locations are given historical names and colour coded according to the type of monitoring: G = Glen Innes; W = Well; L = Leachate; and S = Surface water. Corresponding Environment Protection Authority (EPA) Identification Numbers detailed as per the order in the Licence are provided below. A few EPA ID numbers are missing due to changes since initial licensing of the landfill.

EPA No. 10 Surface methane
EPA No. 11 Building methane
EPA No. 2 GL2 (third dam leachate/water quality)
EPA No. 3 GL3 (spillway if third dam overflows)
EPA No. 4 GS2 (creek surface water quality)
EPA No. 5 Annual leachate volume discharge to utilisation area
EPA No. 6 GW1 (groundwater monitoring well)
EPA No. 7 GW2 (groundwater monitoring well)
EPA No. 9 GL1 (leachate sump)
EPA No. 12 GW3 (groundwater monitoring well)
EPA No. 13 GW4R (groundwater monitoring well)
EPA No. 14 GSQ (quarry sedimentation dam water quality)



Base satellite map from Glen Innes Shire Council 2009.
Locations of sampling points are within 5 metres of their actual location.

Monitoring results for the last four years are presented on following pages – as required in the EPA publishing requirements.

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 Glen Innes Shire Council website.

Abbreviations in the tables are provided here in alphabetical order:

Al = Aluminium; Alk = Alkalinity measured as mg/L $CaCO_3$ equivalent; As = Arsenic; BTEX = Benzene, Toluene, Ethylbenzene, Xylene; Ca = Calcium; Cd = Cadmium; Cl = Chloride; Cr = Total Chromium; Cu = Copper; D = Depth to water from top of internal well PVC casing; DO = Dissolved Oxygen; EC = Electrical Conductivity also called conductivity; Eh = Redox Potential; Fe = Iron; Hg = Mercury; K = Potassium; Mg = Magnesium; Mn = Manganese; Na = Sodium; ND = Nil detected; NH_3 = Ammonia as a measure of ammonium ions; Ni = Nickel; NO_x = Nitrite + Nitrate; NR = not required by licence; PAH = Polyaromatic Hydrocarbons; RL = water level converted to Reduced Level relative to mean sea level; PAH = Polynuclear aromatic hydrocarbons; Pb = Lead; SO_4 = Sulphate; SS = Total suspended solids; Temp = Temperature; TKN = Total Kjeldahl Nitrogen (organic nitrogen + ammonia); TN = Total Nitrogen; TOC = Total Organic Carbon; TP = Total Phosphorus; VFR = Volumetric Flow Rate; Zn = Zinc.

Measures:

mg/L = milligram per litre (equivalent to ppm); µS/cm = micro Siemens per centimetre; mV = millivolts; ºC= degrees Celsius; kL = kilolitres; 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, care is needed when reviewing these general results so that false conclusions are not made. The salt levels in groundwater are a case in point. EC is an indicator of salt levels. If the EC has previously been low, and then becomes at least three to four times higher, one would assume it is due to landfill leachate ingress into groundwater. Wells GW1, GW2 and GW4R have relatively low EC (Table 1) due to their screens being amongst rocks and not clay. So landfill leachate intrusion may be indicated if the EC in these three wells becomes a lot higher.

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 or old night soil trenches. 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 increase 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 results: There is no indication of contamination in the groundwater monitoring wells. The quarry dam shows no indication of contamination. The ephemeral stream sampled at GS2 is a degraded stream due to old car bodies etc.

Table 1a: Groundwater quality & depth (GW1)

	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk
Measure		mg/L	µS/cm	1-14	mV	ºC	m	m	mg/L
GW1	3 monthly								
17/02/20		0.50	912	7.15	-42	18.6	9.74	1096.20	273
08/05/20		0.61	952	7.29	+23	17.0	9.34	1096.60	275
07/09/20		0.44	902	7.26	+38	16.3	9.05	1096.89	267
24/01/21		0.63	895	7.22	+31	20.0	9.29	1096.65	277
25/04/21		1.12	902	7.23	+126	13.9	9.29	1096.65	280
10/08/21		0.97	906	7.14	+95	13.2	8.73	1097.21	280
08/10/21		0.71	833	6.93	+12	17.1	8.43	1097.51	277
18/01/22		0.71	854	7.05	+16	18.8	8.05	1097.89	289
24/04/22		1.40	876	7.29	+101	16.7	7.80	1098.14	287
18/07/22		1.59	854	7.03	+79	15.6	7.78	1098.16	280
19/09/22		1.26	852	7.16	+66	16.9	7.69	1098.25	260
01/04/23		1.28	879	7.06	+147	17.9	7.98	1097.96	260
09/07/23		0.62	831	7.09	-250	14.6	7.88	1098.06	307
15/09/23		1.01	825	7.11	+56	17.7	8.00	1097.94	263
23/11/23		0.78	794	7.14	+49	18.2	8.13	1097.81	267

Received from laboratory	Accessible on Council website by	SO_4	Cl	Mn	Zn	Fe	NH_3	NO_x	TKN	TN	TOC	PAH
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L	mg/L
GW1												
04/03/20	24/03/20	71	82	0.258	0.010	0.08	0.04	0.02	0.3	0.3	13	ND
19/05/20	08/06/20	79	89	0.290	0.016	0.11	0.13	<0.01	0.2	0.2	1	ND
16/09/20	06/10/20	77	88	0.295	0.019	0.10	0.08	0.01	0.1	0.1	9	ND
03/02/21	23/02/21	74	94	0.277	0.016	0.16	0.04	0.01	<0.1	<0.1	6	ND
06/05/21	26/05/21	71	89	0.241	0.016	0.06	0.03	<0.01	0.1	0.1	4	ND
19/08/21	08/09/21	90	94	0.195	0.021	0.15	0.05	0.05	0.1	0.2	1	ND
18/10/21	05/11/21	71	93	0.168	0.019	0.09	0.10	0.05	<0.1	<0.1	5	ND
28/01/22	18/02/22	67	88	0.149	0.011	<0.05	0.02	0.08	0.1	0.2	6	ND
09/05/22	27/05/22	75	93	0.087	0.016	<0.05	0.02	0.51	0.1	0.6	6	ND
29/07/22	18/08/22	74	85	0.024	0.015	<0.05	<0.01	0.49	0.2	0.7	3	ND
04/10/22	24/10/22	74	95	0.032	0.014	<0.05	0.02	0.36	0.2	0.6	5	ND
13/04/23	02/05/23	75	89	0.028	0.013	<0.05	0.01	0.20	<0.1	0.2	4	ND
18/07/23	07/08/23	74	90	0.068	0.009	<0.05	<0.01	0.09	0.1	0.2	3	ND
26/09/23	17/10/23	75	81	0.085	0.009	<0.05	0.01	0.01	0.2	0.2	2	ND
07/12/23	29/12/23	74	84	0.042	0.009	<0.05	0.03	0.10	<0.1	0.1	2	ND

Table 1b: Groundwater quality & depth (GW2)

	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk
Measure		mg/L	µS/cm	1-14	mV	ºC	m	m	mg/L
GW2	3 monthly								
17/02/20		2.39	1217	7.09	+92	18.0	9.37	1079.88	507
08/05/20		2.58	1216	7.29	+90	18.0	9.17	1080.08	500
07/09/20		0.25	1196	7.21	+100	16.1	8.84	1080.41	507
24/01/21		3.06	1110	7.18	+110	21.3	8.83	1080.42	507
21/04/21		0.49	1149	7.09	+90	17.6	8.57	1080.68	520
10/08/21		2.51	1173	6.82	+69	14.8	8.06	1081.19	493
08/10/21		0.96	1052	6.91	+48	16.2	7.79	1081.46	440
18/01/22		3.72	933	7.38	+90	17.9	7.19	1082.06	360
24/04/22		0.87	1020	6.97	+80	16.4	6.65	1082.60	367
19/07/22		0.57	1060	7.11	+88	15.7	6.65	1082.60	493
19/09/22		0.59	1031	6.99	+140	17.6	6.38	1082.87	413
14/01/23		1.21	952	7.00	+41	17.5	5.59	1083.66	413
01/04/23		0.55	993	6.94	+157	17.7	5.07	1084.18	407
09/07/23		0.99	898	6.95	+41	16.1	4.17	1085.08	387
16/09/23		3.20	843	7.16	+307	19.0	4.55	1084.70	373
23/11/23		1.89	762	6.98	+98	18.1	4.30	1084.95	360

Received from laboratory	Accessible on Council website by	SO_4	Cl	Mn	Zn	Fe	NH_3	NO_x	TKN	TN	TOC	PAH
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L	mg/L
GW2												
04/03/20	24/03/20	4	112	0.003	0.006	<0.05	<0.01	0.18	0.2	0.4	8	ND
19/05/20	08/06/20	5	124	0.003	0.060	<0.05	0.02	0.19	0.3	0.5	1	ND
16/09/20	06/10/20	6	125	0.002	0.051	<0.05	<0.01	0.24	0.2	0.4	8	ND
03/02/21	23/02/21	5	131	0.002	0.040	<0.05	<0.01	0.28	0.1	0.4	13	ND
06/05/21	26/05/21	5	125	0.002	0.034	<0.05	<0.01	0.20	0.2	0.4	10	ND
19/08/21	08/09/21	7	128	0.002	0.006	<0.05	0.04	0.37	0.2	0.6	4	ND
18/10/21	05/11/21	9	127	0.003	0.063	<0.05	<0.01	0.45	<0.1	0.4	9	ND
28/01/22	18/02/22	16	111	0.003	0.007	<0.05	<0.01	1.38	0.4	1.8	12	ND
09/05/22	27/05/22	13	122	0.005	<0.005	<0.05	<0.01	0.82	0.3	1.1	12	ND
29/07/22	18/08/22	16	116	0.005	0.112	<0.05	<0.01	0.63	0.2	0.8	8	ND
04/10/22	24/10/22	14	130	0.006	0.101	<0.05	<0.01	0.62	0.3	0.9	12	ND
24/01/23	17/02/23	16	103	0.005	<0.005	<0.05	0.01	0.65	0.2	0.8	5	ND
13/04/23	02/05/23	17	104	0.005	0.034	<0.05	0.06	0.57	0.2	0.8	6	ND
18/07/23	07/08/23	17	99	0.004	0.066	<0.05	<0.01	0.56	0.2	0.8	8	ND
26/09/23	17/10/23	17	82	0.053	0.010	0.45	<0.01	0.55	0.4	1.0	5	ND
07/12/23	29/12/23	18	81	0.006	<0.005	<0.05	0.04	0.55	0.2	0.8	5	ND

Table 1c: Groundwater quality & depth (GW3, GW4R)

	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk
Measure		mg/L	µS/cm	1-14	mV	ºC	m	m	mg/L
GW3	3 monthly								
17/02/20		0.11	4803	7.14	-73	18.8	10.08	1078.020	1200
08/05/20		0.00	4780	7.17	+54	17.4	10.09	1078.010	1130
07/09/20		0.10	4708	7.15	+132	16.3	9.88	1078.220	1210
24/01/20		0.06	4660	7.06	+119	18.5	9.72	1078.380	1120
21/04/21		0.11	4540	6.97	+117	16.8	9.60	1078.495	1130
10/08/21		0.02	4470	6.99	+183	14.7	9.27	1078.825	1120
08/10/21		0.00	4380	7.00	+136	13.2	9.02	1079.080	1140
18/01/22		0.04	4230	6.98	+136	18.3	8.58	1079.520	1120
24/04/22		0.05	3993	6.91	+123	16.9	8.05	1080.050	1130
19/07/22		0.20	3883	7.07	+101	16.5	7.56	1080.535	1160
20/09/22		0.02	3765	6.94	+166	18.6	7.33	1080.765	1100
01/04/23		0.03	3745	6.91	+143	17.3	6.34	1081.755	1100
09/07/23		0.16	3353	6.92	+105	16.4	5.94	1082.155	1167
16/09/23		0.12	3223	6.96	+251	17.7	5.84	1082.255	1147
24/11/23		0.11	2980	7.02	+156	17.3	5.69	1082.405	1140
GW4R	6 monthly								
17/02/20		3.30	1817	7.32	+102	20.5	19.28	1069.09	620
07/09/20		3.26	1734	6.99	+226	16.1	20.00	1068.37	673
21/04/21		0.61	1649	6.70	+106	18.4	19.96	1068.41	588
08/10/21		0.90	1634	6.71	+125	15.5	19.86	1068.51	687
24/05/22		4.43	1580	7.80	+170	17.2	19.76	1068.61	660
20/09/22		3.10	1565	6.89	+212	21.4	19.53	1068.84	573
01/04/23		5.29	1572	6.76	+204	19.4	19.24	1069.13	640
16/09/23		1.30	1474	6.73	+159	21.4	19.16	1069.21	627

Received from laboratory	Accessible on Council website by	SO_4	Cl	Mn	Zn	Fe	NH_3	NO_x	TKN	TN	TOC	PAH
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L	mg/L
GW3												
04/03/20	24/03/20	64	967	0.092	0.008	0.08	<0.01	<0.01	<0.1	<0.1	13	ND
19/05/20	08/06/20	72	1030	0.078	0.005	0.07	<0.01	<0.01	<0.1	<0.1	19	ND
16/09/20	06/10/20	70	1020	0.062	0.008	0.05	<0.01	<0.01	<0.1	<0.1	<5	ND
03/02/21	23/02/21	69	1040	0.052	0.007	<0.05	0.01	<0.01	<0.1	<0.1	15	ND
06/05/21	26/05/21	66	1020	0.036	0.007	<0.05	<0.01	<0.01	<0.1	<0.1	17	ND
19/08/21	08/09/21	68	1040	0.037	0.008	<0.05	<0.01	<0.01	<0.1	<0.1	<2	ND
18/10/21	05/11/21	66	1050	0.038	0.012	<0.05	<0.01	<0.01	<0.1	<0.1	17	ND
28/01/22	18/02/22	63	1020	0.034	0.006	<0.05	<0.01	<0.01	<0.1	<0.1	28	ND
09/05/22	27/05/22	67	1050	0.036	0.007	<0.05	0.04	<0.01	0.1	0.1	20	ND
29/07/22	18/08/22	65	932	0.037	0.007	<0.05	<0.01	<0.01	<0.1	<0.1	10	ND
04/10/22	24/10/22	66	964	1.140	0.009	0.07	<0.01	<0.01	0.2	0.2	17	ND
13/04/23	02/05/23	68	937	1.900	0.017	0.13	<0.01	<0.01	0.2	0.2	8	ND
18/07/23	07/08/23	62	879	0.180	0.006	<0.05	<0.01	<0.01	<0.1	<0.1	11	ND
26/09/23	17/10/23	61	823	0.082	<0.005	<0.05	<0.01	<0.01	0.2	0.2	6	ND
07/12/23	29/12/23	64	891	0.153	0.008	<0.05	0.02	<0.01	0.1	0.1	15	ND
GW4R												
04/03/20	24/03/20	62	174	0.015	0.009	0.05	0.05	0.15	0.2	0.4	<1	ND
16/09/20	06/10/20	69	181	0.093	0.011	0.29	<0.01	0.02	<0.1	<0.1	5	ND
06/05/21	26/05/21	65	190	0.051	0.083	0.18	<0.01	<0.01	<0.1	<0.1	12	ND
18/10/21	05/11/21	62	199	0.033	0.094	0.10	<0.01	0.05	<0.1	<0.1	12	ND
09/05/22	27/05/22	63	194	0.240	0.018	0.59	<0.01	0.02	0.1	0.1	10	ND
04/10/22	24/10/22	60	196	0.015	0.057	<0.05	<0.01	0.01	0.1	0.1	11	ND
13/04/23	02/05/23	62	188	0.014	0.084	<0.05	<0.01	0.02	<0.1	<0.1	4	ND
26/09/23	17/10/23	60	179	0.015	0.111	0.13	<0.01	0.04	0.2	0.2	6	ND

Note: RLs were adjusted using registered survey conducted April 2016.

Table 2: Surface water quality (GS2, GSQ)

	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	VFR	Received from laboratory	Accessible on Council website by	SS	SO_4	Cl	Ca	Mg	Na	K	Cr	Mn	Zn	Fe	Al (Diss)	Al (Tot)	NH_3	NO_x	TKN	TN	TP	TOC	O&G
Measure		mg/L	µS/cm	1-14	mV	ºC	mg/L	kL/day			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L as N	µg/L as N	µg/L as n	mg/L	mg/L	mg/L	mg/L
GS2	6 monthly								GS2																					
17/02/20		3.86	504	7.59	-39	23.1	171	622.08	04/03/20	24/03/20	12	46	28	32	19	32	17	<0.001	0.109	0.056	<0.05			0.03	0.02	0.9	0.9	0.04	21	
07/09/20		5.05	824	7.78	-43	14.3	327	5.76	16/09/20	06/10/20	<5	19	72	61	36	60	17	<0.001	0.431	0.019	0.91			<0.01	<0.01	0.6	0.6	0.02	18	
24/01/21	NO WATER																													
25/04/21		5.93	1092	7.00	+143	9.9	447	8.64	06/05/21	26/05/21	12	28	118	86	54	79	25	<0.001	0.824	0.024	<0.05			<0.01	<0.01	1.4	1.4	0.10	30	
10/08/21		7.43	783	7.75	+114	11.3	233	1,382	19/08/21	08/09/21	15	43	86	51	28	53	15	<0.001	0.081	0.035	0.06			0.07	0.89	1.1	2.0	0.04	21	
18/01/22		3.10	763	7.45	-93	21.5	353	21.6	28/01/22	18/02/22	36	<1	68	59	31	52	18	<0.001	3.920	0.017	1.11			0.04	0.03	1.2	1.2	0.04	24	
19/07/22		3.40	1260	7.72	+23	10.2	540	28.6	29/07/22	18/08/22	8	40	173	62	60	113	32	<0.001	0.536	<0.005	0.25			1.98	2.62	4.2	6.8	0.03	33	
14/01/23		3.46	816	7.45	-53	19.9	314	34.6	24/01/23	17/02/23	9	2	76	62	34	62	18	<0.001	1.80	0.015	0.64	<0.01		0.10	0.05	1.1	1.2	0.03	23	
09/07/23		6.40	674	7.66	+86	13.0	307	43.2	18/07/23	07/08/23	6	5	78	50	33	58	16	<0.001	0.496	0.008	0.11	<0.01		0.13	1.11	1.3	2.4	<0.01	17	
23/11/23		6.88	527	7.47	+79	21.4	173	28.8	07/12/23	29/12/23	18	6	51	39	24	42	12	<0.001	0.487	0.007	0.11	<0.01		0.06	0.13	1.1	1.2	0.06	17	
GSQ	6 monthly							NR	GSQ																					
17/02/20		5.11	346	7.65	-14	23.1	113		04/03/20	24/03/20	<5	4	32	15	11	29	7	<0.001	0.064	0.007	<0.05			0.28	0.68	1.6	2.3	0.15	13	
08/05/20		8.28	389	7.94	+40	16.0	127		19/05/20	08/06/20	<5	4	39	22	15	37	7	<0.001	0.023	<0.005	<0.05			0.09	0.35	1.2	1.6	0.09	12	
07/09/20		9.33	437	8.33	+172	14.4	153		16/09/20	06/10/20	5	4	41	28	17	37	7	<0.001	0.068	<0.005	<0.05			0.25	0.47	1.1	1.6	0.04	12	
24/01/20		7.76	499	8.62	+22	25.3	180		03/02/21	23/02/21	6	2	58	33	20	44	9	<0.001	0.008	<0.005	<0.05			0.10	0.02	1.7	1.7	0.09	15	
25/04/21		6.58	263	8.63	+127	15.7	147		06/05/21	26/05/21	<5	<1	24	16	10	21	6	<0.001	0.164	0.007	0.16			0.26	0.06	1.6	1.7	0.20	17	
10/08/21		11.47	229	7.95	+149	12.1	77		19/08/21	08/09/21	<5	3	18	12	7	17	5	<0.001	0.026	0.037	0.56			0.06	0.32	0.6	0.9	0.06	13	
08/10/21		9.12	235	7.51	+57	21.6	83		18/10/21	05/11/21	6	5	23	14	8	17	4	<0.001	0.016	0.007	0.10			0.01	<0.01	0.9	0.9	0.08	14	
18/01/22		7.19	236	7.68	+75	29.4	86		28/01/22	18/02/22	12	6	21	16	10	19	5	<0.001	0.096	0.018	0.24			0.04	0.20	1.0	1.2	0.08	16	
24/04/22		6.56	316	7.42	+163	16.5	113		09/05/22	27/05/22	9	5	25	20	13	25	6	<0.001	0.524	0.008	0.15			0.53	0.68	2.1	2.8	0.13	14	
18/07/22		8.85	323	7.57	+126	11.9	111		29/07/22	18/08/22	10	5	26	21	14	25	6	<0.001	0.045	0.009	0.17	0.30		0.07	1.06	1.4	2.5	0.11	14	<5
19/09/22		8.82	300	8.21	+106	18.8	107		04/10/22	24/10/22	5	5	26	16	11	23	5	<0.001	0.047	<0.005	0.06	0.01	2.72	0.02	0.45	1.0	1.4	0.06	14	
14/01/23		6.78	347	7.97	+68	21.2	120		24/01/23	17/02/23	10	6	22	23	14	26	6	<0.001	0.251	0.007	<0.05	<0.01	1.93	0.09	0.05	1.2	1.2	0.07	15	<5
01/04/23		6.12	318	7.38	+139	19.1	117		13/04/23	02/05/23	12	5	25	22	13	23	6	<0.001	0.660	<0.005	0.06	0.02	2.24	0.24	0.17	1.0	1.2	0.05	13	7
09/07/23		9.61	343	7.65	-149	11.7	140		18/07/23	07/08/23	<5	4	30	24	15	27	6	<0.001	0.402	<0.005	<0.05	<0.01	2.50	0.25	0.47	1.1	1.6	0.02	13	<5
15/09/23		12.52	391	8.74	+73	18.4	147		26/09/23	17/10/23	3	32	32	27	17	32	7	0.002	0.178	<0.005	<0.05	<0.01	0.23	0.09	0.46	1.2	1.7	0.03	14	<5
23/11/23		7.33	418	8.32	+19	21.1	167		07/12/23	29/12/23	24	3	41	34	18	38	7	<0.001	0.010	0.013	<0.05	0.03	1.28	0.10	0.14	1.8	1.9	0.11	16	<5

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: Methane is occasionally detected on covered areas of the landfill, and is remediated with soil cover, usually by the next day.

Table 3: Methane detections (surface or building)

Frequency required by licence	Detection locations	Methane (CH_4) by volume in air	Methane (CH_4) by volume in air	Methane (CH_4) as % LEL (Lower Explosive Limit)	Accessible on Council website
Measure		ppm CH_4 in air	% CH_4 in air	% LEL	
3 monthly					
17/02/20	Nil detects				24/03/20
08/05/20	Nil detects				08/06/20
08/09/20	Nil detects				06/10/20
24/01/21	Nil detects				23/02/21
25/04/21	Nil detects				26/05/21
10/08/21	Nil detects				08/09/21
07/10/21	Nil detects				05/11/21
19/01/22	Nil detects				18/02/22
24/04/22	Nil detects				27/05/22
19/07/22	Nil detects				18/08/22
20/09/22	Nil detects				24/10/22
14/01/23	Nil detects				17/02/23
02/04/23	Nil detects				02/05/23
10/07/23	Nil detects				07/08/23
15/09/23	Green striped polypipe adjacent to leachate sump	≥50,000	5.0	100.0	17/10/23
24/11/23	Extraction pipe installed over polypipe - Nil detects				29/12/23

Note: 500 ppm CH_4 by volume in air = 0.05% CH_4 by volume in air = 1% LEL

Table 4a: Leachate quality – field analytes, and laboratory analytes (a) – concentrated (GL1), treated (GL2), overflow (GL3)

	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	VFR
Measure		mg/L	µS/cm	1-14	mV	ºC	mg/L	kL/ day
GL1	3 monthly							NR
17/02/20		0.35	7050	7.65	-116	36.6	2800	
08/05/20		1.17	8030	7.57	+61	26.7	2460	
08/09/20		0.60	7545	7.52	+101	28.1	2400	
24/01/21		0.92	7385	7.61	+49	38.4	2380	
25/04/21		4.44	3965	7.18	+117	20.0	1340	
10/08/21		5.25	4895	7.38	+61	22.6	1730	
07/10/21		1.83	6800	7.47	-6	26.3	2500	
19/01/22		7.61	6345	7.56	+95	23.8	2600	
24/04/22		4.64	4775	7.36	+73	18.7	1700	
19/07/22		3.50	5140	7.48	+92	17.1	2050	
20/09/22		2.85	4940	7.35	+179	25.1	1850	
14/01/23		0.66	4105	7.21	-119	31.1	1480	
02/04/23		18.82	2010	8.38	+79	22.9	560	
10/07/23		2.43	6425	7.50	+86	25.4	2333	
15/09/23		2.12	6020	7.37	+94	28.5	2400	
24/11/23		1.71	3500	7.19	+6	23.5	1600	
GL2	6 monthly							NR
17/02/20		7.22	987	7.88	+119	28.3	133	
08/09/20		13.35	1251	7.71	+227	15.1	147	
25/04/21		10.07	1494	8.07	+178	12.2	433	
07/10/21		7.28	1426	7.06	+59	17.6	387	
24/04/22		6.56	1257	8.01	+174	17.4	480	
20/09/22		9.34	1703	7.99	+270	23.2	500	
02/04/23		7.97	1477	8.23	+171	21.2	433	
15/09/23		7.58	1812	8.03	+262	18.9	507	
GL3	overflow	NR			NR	NR		
20/09/16			508	7.86			168	17.28

	Received from laboratory	Accessible on Council website	SS	SO_4	Cl	Ca	Mg	Na	K	As	Cd	Cr	Cu	Pb	Mn	Ni	Zn	Fe
Measure			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL1			NR															
17/02/20	04/03/20	24/03/20		<20	561	262	148	397	318	0.049	0.0005	0.059	0.017	0.015	3.61	0.062	0.355	2.97
08/05/20	19/05/20	08/06/20		<10	905	218	174	752	403	0.016	<0.0001	0.028	0.002	0.013	1.05	0.072	0.046	5.64
08/09/20	16/09/20	06/10/20		<5	923	199	159	587	297	0.024	<0.0001	0.024	0.002	<0.001	1.37	0.058	0.021	6.33
24/01/21	03/02/21	23/02/21		<10	1050	162	156	622	319	0.018	<0.0001	0.026	0.003	0.006	1.02	0.070	0.093	7.77
25/04/21	06/05/21	26/05/21		10	446	144	84	248	98	0.176	0.0004	0.005	0.002	0.014	1.58	0.014	0.110	13.5
10/08/21	19/08/21	08/09/21		12	537	140	98	333	149	0.097	<0.0001	0.011	0.003	0.002	1.34	0.025	0.098	6.41
07/10/21	18/10/21	05/11/21		<10	1010	162	146	512	246	0.236	<0.0001	0.020	<0.001	0.001	1.18	0.058	0.056	9.68
19/01/22	28/01/22	18/02/22		111	765	235	175	538	261	0.049	<0.0001	0.028	0.002	0.008	1.18	0.052	0.159	2.97
24/04/22	09/05/22	27/05/22		254	708	194	137	410	176	0.117	<0.0001	0.012	<0.001	<0.001	1.78	0.030	0.060	12.0
19/07/22	29/07/22	18/08/22		102	709	192	145	475	220	0.064	<0.0001	0.014	0.002	<0.001	1.48	0.028	0.022	8.49
20/09/22	04/10/22	24/10/22		32	689	139	117	400	187	0.072	<0.0001	0.011	0.001	<0.001	1.27	0.025	0.017	7.84
14/01/23	24/01/23	17/02/23		84	544	147	105	321	131	0.099	<0.0001	0.008	0.003	<0.001	1.15	0.019	0.037	7.98
02/04/23	13/04/23	02/05/23		33	347	63	79	226	97	0.039	<0.0001	0.003	0.002	<0.001	0.350	0.012	0.013	0.52
10/07/23	18/07/23	07/08/23		8	869	156	154	561	269	0.016	<0.0001	0.017	<0.001	<0.001	0.930	0.035	0.039	3.93
15/09/23	26/09/23	17/10/23		1	77	154	157	575	263	0.019	<0.0001	0.018	<0.001	<0.001	0.969	0.036	0.057	5.28
24/11/23	07/12/23	29/12/23		16	586	155	110	354	155	0.106	0.0005	0.008	0.003	<0.001	1.20	0.020	0.057	8.61
GL2			NR			NR	NR	NR	NR	NR	NR	NR	NR	NR		NR		
17/02/20	04/03/20	24/03/20		146	82										0.088		0.009	0.84
08/09/20	16/09/20	06/10/20		281	140										0.026		<0.005	0.06
25/04/21	06/05/21	26/05/21		89	227										0.464		<0.005	0.38
07/10/21	18/10/21	05/11/21		63	254										0.053		0.013	0.33
24/04/22	09/05/22	27/05/22		19	159										0.399		0.009	0.42
20/09/22	04/10/22	24/10/22		102	306										0.158		0.007	0.62
02/04/23	13/04/23	02/05/23		24	301										0.185		<0.005	0.29
15/09/23	26/09/23	17/10/23		36	372										0.233		<0.005	0.54
GL3										NR	NR		NR	NR		NR		
20/09/16	29/10/16	25/10/16	8	12	51	28	17	40	17			0.002			0.130		0.008	1.44

Table 4b: Leachate quality – laboratory analytes (b) – concentrated (GL1), treated (GL2), overflow (GL3)

	Frequency required by licence	Hg	NH_3	NO_x	TKN	TN	TP	TOC	Total cyanide	PAH	BTEX 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
GL1	3 monthly						NR				
17/02/20		<0.0001	247.0	0.01	319.0	319.0	5.62	740	0.006	ND	Toluene 0.002; Ethylbenzene 0.002; Xylenes 0.002
08/05/20		<0.0001	260.0	0.03	279.0	279.0	2.29	202	0.006	Naphthalene 0.0104	ND
08/09/20		<0.0001	216.0	0.16	252.0	252.0	2.21	209	<0.004	Naphthalene 0.0151	ND
24/01/21		<0.0001	239.0	<0.05	279.0	279.0	2.30	249	0.008	Naphthalene 0.014	ND
25/04/21		<0.0001	57.6	<0.01	90.6	90.6	1.09	96	<0.004	Naphthalene 0.001	ND
10/08/21		<0.0001	171.0	0.02	179.0	179.0	1.30	164	<0.004	Naphthalene 0.0015	ND
07/10/21		<0.0001	294.0	<0.01	297.0	297.0	1.82	302	<0.004	Naphthalene 0.005	ND
19/01/22		<0.0001	282.0	<0.05	281.0	281.0	1.78	216	<0.004	Naphthalene 0.0044	ND
24/04/22		<0.0001	189.0	0.02	200.0	200.0	1.08	135	<0.004	Naphthalene 0.0046	ND
19/07/22		<0.0001	204.0	0.10	228.0	228.0	1.17	146	<0.004	Naphthalene 0.005	ND
20/09/22		<0.0001	186.0	0.02	196.0	196.0	0.94	178	<0.004	ND	ND
14/01/23		<0.0001	138.0	0.05	149.0	149.0	1.19	84	0.005	Naphthalene 0.002	ND
02/04/23		<0.0001	25.4	0.12	31.9	32.0	0.33	85	<0.004	ND	ND
10/07/23		<0.0001	274.0	<0.01	322.0	322.0	1.62	232	<0.004	Naphthalene 0.004	ND
15/09/23		<0.0001	246.0	<0.50	236.0	236.0	1.98	267	<0.020	Naphthalene 0.008	ND
24/11/23		<0.0001	152.0	0.05	155.0	155.0	1.27	141	<0.004	Naphthalene 0.0015	ND
GL2	6 monthly	NR							NR		NR
17/02/20			<0.01	<0.01	2.6	2.6	0.07	30		ND	
08/09/20			0.02	<0.01	1.4	1.4	0.02	25		ND	
25/04/21			13.2	0.71	17.2	17.9	0.17	67		ND	
07/10/21			1.98	6.89	4.7	11.6	0.05	44		ND	
24/04/22			17.8	0.34	23.1	23.4	0.07	43		ND	
20/09/22			15.7	3.55	21.4	25.0	0.05	53		ND	
02/04/23			1.12	0.13	4.6	4.7	0.07	52		ND	
15/09/23			0.75	0.52	5.0	5.5	0.06	61		ND	
GL3	overflow	NR							NR	NR	
20/09/16			0.08	0.18	1.2	1.4	0.04	29			ND