Gunnedah Landfill

Location: Quia Road, Gunnedah NSW 2380 Environment Protection Licence (EPL) Number: 5940 Activities: Waste disposal to land and waste processing
Licensee under Protection of Environment Operations Act 1997 (POEO Act): Gunnedah Shire Council, PO Box 63, Gunnedah NSW 2380

The internet link to Licence No. 5940 is https://apps.epa.nsw.gov.au/prpoeoapp/Detail.aspx?instid=5940&id=5940&option=licence&searchrange=general&range=POEO%20licence&prp=no&status=Issued

Council is required to monitor groundwater, surface water, leachate and methane 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.

Sampling point locations from July 2023 are shown on the adjacent figure. Historical names are used: GL = Gunnedah Landfill; OV = Overflow; GL03-GL11 refers to groundwater monitoring wells; L = Leachate; T = Tannery well: BORR = Borrow Pits. The corresponding Environment Protection Authority (EPA) Identification Numbers are provided in white for those required to be sampled under EPL 5940. A few EPA ID numbers are missing due to changes since initial licensing of the landfill.

Monitoring results for sampling points listed under EPL 5940 as updated 18 December 2023 are presented on the following pages for the last four years – 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 groundwater, surface water and landfill leachate.

The left hand table provides the field test results. The field tests are conducted on the same date that a sample is collected.
The right hand table provides analytical results from the NATA registered laboratory. The date the laboratory issued the results is first, followed by the date by which results were placed on the Gunnedah Shire Council website.

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

Alk = Alkalinity measured as mg/L $CaCO_3$ equivalent; Cl = Chloride; Cr = Chromium; D = Depth to groundwater from top of internal well PVC casing; DO = Dissolved Oxygen; EC = Electrical Conductivity also called conductivity; Eh = Redox Potential; Fe = Iron; Mn = Manganese; ND = Nil Detected; NH_3 = Ammonia as a measure of ammonium ions; NO_x = Nitrite + Nitrate; NR = Not required; OC & OP = Organochlorine and Organophosphorus; RL = water level converted to Reduced Level relative to mean sea level; SO_4 = Sulphate; SS = Total suspended solids; Temp = Temperature; TKN = Total Kjeldahl Nitrogen (organic nitrogen + ammonia); TN = Total Nitrogen; TOC = Total Organic Carbon.

Measures:

mg/L = milligram per litre (equivalent to ppm); µS/cm = microSiemens per centimetre; mV = millIvolts; ºC= degrees Celsius; ppm = parts per million; < = less than.

Choice of water quality analytes:

Some analytes are tested because they give a general understanding of groundwater, surface water and leachate quality. Often the concentrations are 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 Gunnedah 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 Gunnedah 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 Benzene, Toluene, Ethylbenzene, Xylene (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: Nitrate concentrations in on-site wells GL03, GL09 and GL10 are too high, but the nitrate concentrations in the most downgradient well GL11 are low. Leachate in the sump is saline and often high in ammonium ions.

Table 1a: Groundwater quality & depth (GL03, GL04A)

	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
GL03	3 monthly								
06/02/20		0.40	4755	6.85	+127	21.8	2.38	270.28	600
13/05/20		0.42	4933	6.92	+143	20.4	1.98	270.68	573
26/08/20		0.42	5065	6.92	+112	18.9	2.10	270.56	487
14/12/20		0.35	4948	6.79	+166	23.3	2.01	270.65	613
28/03/21		0.44	4945	6.80	+123	27.3	1.34	271.32	620
21/06/21		0.75	4925	6.78	+119	19.9	1.24	271.42	620
16/09/21		0.52	4853	6.70	+106	21.0	0.85	271.81	613
12/01/22		0.33	4655	6.79	+52	22.3	0.43	272.23	627
21/04/22		0.38	4803	6.65	+192	22.1	0.85	271.81	627
29/06/22		0.56	4578	6.52	+88	19.3	0.98	271.68	607
10/12/22		0.55	4113	6.69	+106	21.1	0.30	272.36	607
05/03/23		0.33	4265	6.53	+113	23.6	0.73	271.93	620
14/07/23		0.69	4038	6.63	+166	18.8	0.34	272.32	633
20/09/23		0.87	3395	6.67	+163	22.7	0.48	272.18	600
13/01/24		0.52	3095	6.70	+132	24.0	0.48	272.18	607
17/03/24		0.67	5270	6.68	+142	23.7	1.12	271.54	592
GL04A	6 monthly								
07/02/20		DRY							
13/05/20		DRY							
26/08/20		7.60	17610	7.51	+128	14.5	3.16	269.75	927
14/12/20		DRY							
28/03/21		2.24	10605	6.90	-117	27.0	1.98	270.93	653
21/06/21		5.13	4595	7.36	-29	17.3	1.67	271.24	188
12/01/22		2.30	5790	6.77	-209	23.7	1.37	271.54	560
29/06/22		3.00	4915	7.09	+134	17.3	2.11	270.80	427
10/12/22		3.55	4650	6.78	-152	22.7	1.29	271.62	400
14/07/23		4.88	6555	6.79	+113	17.8	0.84	272.07	367
13/01/24		3.51	4265	6.75	-196	26.7	0.84	272.07	353

	Received from laboratory	Accessible on Council website by	SO_4	Cl	Cr	Mn	Fe	NH_3	NO_x	TKN	TN	TOC	OC/OP Pesticides
			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
GL03													Annually
06/02/20	24/02/20	13/03/20	362	1180	<0.001	0.064	<0.05	<0.01	18.6	1.9	20.5	10	NR
13/05/20	20/05/20	09/06/20	336	1140	<0.001	0.047	<0.05	0.02	18.6	2.4	21.0	2	NR
26/08/20	09/09/20	29/09/20	384	1180	<0.001	0.057	0.07	<0.01	19.9	1.7	21.6	14	ND
14/12/20	23/12/20	11/01/21	377	1260	<0.001	0.074	<0.05	0.14	20.3	1.1	21.4	11	NR
28/03/21	09/04/21	29/04/21	384	1230	<0.001	0.050	<0.05	<0.01	19.6	2.9	22.5	10	ND
21/06/21	30/06/21	21/07/21	383	1200	<0.001	0.049	<0.05	0.01	19.3	2.1	21.4	6	NR
16/09/21	28/09/21	19/10/21	373	1220	0.001	0.050	<0.05	0.10	21.1	2.2	23.3	10	NR
12/01/22	24/01/22	14/02/22	377	1260	<0.001	0.049	<0.05	<0.01	22.4	1.6	24.0	4	NR
21/04/22	09/05/22	27/05/22	366	1240	<0.001	0.053	<0.05	0.06	22.9	1.8	24.7	9	ND
29/06/22	13/07/22	02/08/22	407	1270	<0.001	0.052	<0.05	0.07	24.7	3.8	28.5	7	NR
10/12/22	30/12/22	25/01/23	367	1150	<0.001	0.056	<0.05	<0.01	21.7	2.9	24.6	1	NR
05/03/23	15/03/23	04/04/23	390	1290	<0.001	0.057	<0.05	<0.01	29.4	0.6	30.0	7	NR
14/07/23	26/07/23	15/08/23	391	1240	<0.001	0.055	<0.05	<0.01	24.5	<10.0	24.5	8	ND
20/09/23	09/10/23	27/10/23	411	1260	<0.001	0.056	<0.05	0.01	24.0	4.6	28.6	7	NR
13/01/24	23/01/24	13/02/24	408	1210	<0.001	0.059	<0.05	<0.01	23.5	<2.0	23.5	4	NR
17/03/24	05/04/24	26/05/24	407	1280	<0.001	0.060	<0.05	0.01	26.3	5.1	31.4	9	NR
GL04A													Annually
07/02/20													
13/05/20													
26/08/20	09/09/20	29/09/20	96	6750	<0.001	7.73	<0.05	0.35	0.15	3.4	3.6	18	ND
14/12/20													
28/03/21	09/04/21	29/04/21	41	4080	<0.001	1.78	8.66	0.06	<0.01	1.1	1.1	19	ND
21/06/21	30/06/21	21/07/21	61	1480	<0.001	0.880	0.66	<0.01	0.01	0.4	0.4	6	NR
12/01/22	24/01/22	14/02/22	33	2000	<0.001	2.87	3.61	0.12	<0.01	0.5	0.5	9	ND
29/06/22	13/07/22	02/08/22	22	1840	<0.001	0.687	0.27	0.02	<0.01	0.7	0.7	9	NR
10/12/22	30/12/22	25/01/23	42	1810	<0.001	5.21	2.49	0.10	0.02	0.6	0.6	8	NR
14/07/23	26/07/23	15/08/23	44	3920	<0.001	10.2	<0.05	0.04	0.01	0.8	0.8	14	ND
13/01/24	23/01/24	13/02/24	39	3710	0.001	16.4	4.32	0.18	0.13	1.7	1.8	18	NR

Table 1b: Groundwater quality & depth (GL05A, GL06, T7)

	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk	Received from laboratory	Accessible on Council website by	SO_4	Cl	Cr	Mn	Fe	NH_3	NO_x	TKN	TN	TOC	OC/OP Pesticides
Measure		mg/L	µS/cm	1-14	mV	ºC	m	m	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	mg/L	mg/L
GL05A	6 monthly									GL05A												Annually
07/02/20		DRY																				
13/05/20		DRY																				
26/08/20		DRY																				
14/12/20		DRY																				
28/03/21		DRY																				
21/06/21		DRY																				
16/09/21		3.13	4250	7.12	-98	25.9	4.74	276.65	1027	28/09/21	19/10/21	211	950	0.002	1.22	10.6	0.12	<0.01	3.3	3.3	39	ND
12/01/22		2.12	3730	7.68	-236	25.8	3.85	277.54	533	24/01/22	14/02/22	156	944	<0.001	1.23	0.47	0.08	<0.01	0.2	0.2	5	ND
29/06/22		2.63	4425	7.15	-85	20.1	4.00	277.39	1007	13/07/22	02/08/22	69	1110	<0.001	1.14	0.05	<0.01	<0.01	0.3	0.3	1	NR
10/12/22		2.77	4440	7.06	-181	22.6	2.39	279.00	827	30/12/22	25/01/23	145	1200	<0.001	1.37	1.30	0.03	<0.01	0.3	0.3	4	NR
15/07/23		4.22	5735	7.20	-55	20.6	2.85	278.54	1493	26/07/23	15/08/23	211	1840	<0.001	1.17	<0.05	0.09	<0.01	1.4	1.4	31	ND
13/01/24		5.15	4815	7.22	+38	27.6	3.25	278.14	1293	23/01/24	13/02/24	158	1940	<0.001	1.59	<0.05	0.06	<0.01	3.1	3.1	21	NR
GL06	6 monthly									GL06												Annually
06/02/20		0.17	17223	6.27	+78	23.2	4.35	272.64	1176	24/02/20	13/03/20	53	6350	0.003	15.20	0.10	0.29	0.03	6.9	6.9	64	NR
26/08/20		0.25	15375	6.71	+116	23.1	4.10	272.89	773	09/09/20	29/09/20	59	5660	0.002	7.15	<0.05	0.10	2.33	4.2	6.5	30	ND
28/03/21		0.19	11385	6.81	+97	23.9	3.31	273.68	940	09/04/21	29/04/21	66	3900	0.001	2.83	<0.05	0.05	0.90	3.0	3.9	39	ND
16/09/21		0.37	10825	6.74	+84	19.5	3.02	273.97	813	28/09/21	19/10/21	46	3760	0.001	2.65	0.05	0.02	0.94	2.7	3.6	36	NR
21/04/22		0.31	10735	6.71	+142	24.4	2.87	274.12	800	09/05/22	27/05/22	39	4070	0.001	4.72	<0.05	0.08	0.30	2.7	3.0	41	ND
10/12/22		0.34	9168	6.68	+122	22.2	2.12	274.87	820	30/12/22	25/01/23	44	3880	0.001	4.01	<0.05	<0.01	0.40	2.1	2.5	20	NR
14/07/23		0.31	10118	6.65	+85	20.6	2.08	274.91	827	26/07/23	15/08/23	35	4240	0.002	3.09	<0.05	0.03	0.02	2.6	2.6	30	ND
13/01/24		0.26	7960	6.57	-197	26.1	2.74	274.25	1160	23/01/24	13/02/24	41	5980	0.004	13.9	0.18	0.16	<0.01	6.7	6.7	75	NR
T7	6 monthly									T7												Annually
06/02/20		0.16	11120	6.45	+132	20.5	3.76	269.10	680	24/02/20	13/03/20	184	3710	<0.001	0.229	<0.05	0.01	7.73	1.2	8.9	5	NR
27/08/20		1.00	10613	6.82	+568	22.9	3.37	269.49	787	09/09/20	29/09/20	200	3750	<0.001	0.038	<0.05	0.01	7.67	1.0	8.7	17	ND
29/03/21		0.41	10693	6.68	+87	22.70	2.23	270.63	747	09/04/21	29/04/21	218	3650	<0.001	0.576	<0.05	0.44	5.70	1.3	7.0	14	ND
17/09/21		1.03	10050	6.84	+547	19.50	1.37	271.49	673	28/09/21	19/10/21	191	3470	<0.001	0.090	<0.05	0.10	5.76	1.1	6.9	12	NR
22/04/22		0.18	9215	6.71	+143	22.85	2.07	270.79	753	09/05/22	27/05/22	196	3610	<0.001	0.581	<0.05	0.90	5.50	2.1	7.6	17	ND
09/12/22		0.17	8060	6.56	+48	21.78	0.88	271.98	740	30/12/22	25/01/23	197	3660	<0.001	0.613	<0.05	<0.01	6.10	0.3	6.4	4	NR
14/07/23		0.26	7893	6.68	+354	20.60	1.20	271.66	807	26/07/23	15/08/23	201	3660	<0.001	0.148	<0.05	0.28	6.03	0.7	6.7	11	ND
13/01/24		0.22	4650	6.66	+130	22.98	2.14	270.72	680	23/01/24	13/02/24	203	3700	<0.001	0.489	<0.05	<0.01	6.27	1.1	7.4	2	NR

Table 1c: Groundwater quality & depth (GL09)

	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
GL09	3 monthly								
06/02/20		0.85	5688	6.84	+157	20.7	0.00	274.75	613
12/05/20		2.13	5638	7.07	+174	20.4	0.00	274.75	600
27/08/20		2.61	5975	6.89	+138	20.7	0.00	274.75	587
14/12/20		1.21	5835	6.77	+187	21.5	0.00	274.75	573
29/03/21		3.24	5630	6.89	+134	23.1	0.00	274.75	593
21/06/21		2.17	5678	6.84	+191	20.7	0.00	274.75	584
17/09/21		2.77	5770	6.93	+135	16.8	0.00	274.75	547
11/01/22		4.47	5370	6.95	+61	25.7	0.00	274.75	547
22/04/22		4.00	5288	7.21	+173	21.9	0.00	274.75	553
30/09/22		3.09	4980	7.26	+120	20.1	0.00	274.75	573
09/12/22		1.90	4295	6.66	+114	20.9	0.00	274.75	533
06/03/23		1.76	4013	6.63	+148	23.0	0.00	274.75	533
14/07/23		3.25	4383	6.76	+366	20.9	0.00	274.75	540
20/09/23		3.38	3663	6.82	+214	21.8	0.00	274.75	533
12/01/24		3.76	3078	6.89	+115	22.9	0.00	274.75	540
18/03/24		2.61	5905	6.68	+175	21.0	0.00	274.75	541

	Received from laboratory	Accessible on Council website by	SO_4	Cl	Cr	Mn	Fe	NH_3	NO_x	TKN	TN	TOC	OC/OP Pesticides
			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
GL09													Annually
06/02/20	24/02/20	13/03/20	446	1330	<0.001	0.434	<0.05	<0.01	23.9	2.0	25.9	4	NR
12/05/20	20/05/20	09/06/20	380	1290	<0.001	0.201	<0.05	0.02	25.0	2.1	27.1	<2	NR
27/08/20	09/09/20	29/09/20	510	1470	<0.001	0.002	<0.05	<0.01	35.9	4.3	40.2	11	ND
14/12/20	23/12/20	11/01/21	486	1500	<0.001	0.369	<0.05	<0.01	30.6	<0.5	30.6	9	NR
29/03/21	09/04/21	29/04/21	488	1440	<0.001	0.253	<0.05	0.02	29.3	5.4	34.7	7	ND
21/06/21	30/06/21	21/07/21	480	1440	<0.001	0.016	<0.05	<0.01	31.9	<0.5	31.9	3	NR
17/09/21	28/09/21	19/10/21	484	1510	<0.001	0.017	<0.05	<0.01	35.4	4.7	40.1	8	NR
11/01/22	24/01/22	14/02/22	557	1660	<0.001	0.013	<0.05	0.08	56.1	5.0	61.1	4	NR
22/04/22	09/05/22	27/05/22	547	1600	<0.001	0.024	<0.05	0.02	58.1	<0.5	58.1	12	ND
30/09/22	13/07/22	02/08/22	558	1590	<0.001	0.020	<0.05	<0.01	63.9	9.6	73.5	<1	NR
09/12/22	30/12/22	25/01/23	593	1450	<0.001	0.007	<0.05	<0.01	56.2	6.6	62.8	2	NR
06/03/23	15/03/23	04/04/23	552	1510	<0.001	0.014	<0.05	<0.01	64.1	0.8	64.9	7	NR
14/07/23	26/07/23	15/08/23	527	1410	<0.001	0.005	<0.05	<0.01	49.8	<10.0	49.8	7	ND
20/09/23	09/10/23	27/10/23	529	1420	<0.001	0.008	<0.05	0.01	46.8	6.3	53.1	4	NR
12/01/24	23/01/24	13/02/24	520	1350	<0.001	0.006	<0.05	<0.01	42.3	8.7	51.0	<2	NR
18/03/24	05/04/24	26/05/24	844	1210	<0.001	0.006	<0.05	0.02	48.4	6.0	54.4	6	NR

Table 1d: Groundwater quality & depth GL10 & GL11

	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk	Received from laboratory	Accessible on Council website by	SO_4	Cl	Cr	Mn	Fe	NH_3	NO_x	TKN	TN	TOC	OC/OP Pesticides
Measure		mg/L	µS/cm	1-14	mV	ºC	m	m	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	mg/L	mg/L
GL10	3 monthly									GL10												Annually
06/02/20		0.21	6710	6.79	+138	18.7	4.72	268.66	640	24/02/20	13/03/20	240	1760	<0.001	0.236	<0.05	0.02	19.9	1.8	21.7	12	NR
12/05/20		0.17	6483	6.97	+118	23.9	4.56	268.82	687	20/05/20	09/06/20	245	1680	<0.001	0.227	<0.05	0.02	20.0	1.9	21.9	2	NR
27/08/20		0.20	6363	6.86	+119	21.9	4.61	268.77	773	09/09/20	29/09/20	248	1720	<0.001	0.251	<0.05	<0.01	21.7	1.2	22.9	15	ND
14/12/20		0.35	6363	6.90	+294	22.1	4.68	268.70	720	23/12/20	11/01/21	294	1680	<0.001	0.101	<0.05	<0.01	22.9	0.8	23.7	8	NR
29/03/21		0.42	6328	6.84	+80	23.0	3.91	269.47	700	09/04/21	29/04/21	301	1650	<0.001	0.237	<0.05	<0.01	21.9	3.1	25.0	9	ND
21/06/21		0.27	6280	6.81	+120	22.5	3.79	269.59	693	30/06/21	21/07/21	272	1620	<0.001	0.238	<0.05	0.01	21.5	1.6	23.1	<1	NR
17/09/21		1.40	5600	6.90	+123	17.8	2.50	270.88	633	28/09/21	19/10/21	395	1420	<0.001	0.033	<0.05	<0.01	26.6	2.3	28.9	8	NR
11/01/22		0.50	5318	6.80	+33	23.4	2.17	271.21	687	24/01/22	14/02/22	387	1530	<0.001	0.071	<0.05	0.07	28.3	1.8	30.1	6	NR
22/04/22		0.31	5395	6.86	+64	22.4	2.91	270.47	720	09/05/22	27/05/22	339	1530	<0.001	0.092	<0.05	0.02	26.8	1.5	28.3	14	ND
30/09/22		0.40	5193	6.84	+91	20.9	2.92	270.46	680	13/07/22	02/08/22	382	1550	<0.001	0.079	<0.05	<0.01	28.1	3.6	31.7	<1	NR
09/12/22		0.49	4328	6.66	+151	21.8	1.76	271.62	593	30/12/22	25/01/23	369	1560	0.001	0.098	<0.05	<0.01	26.0	4.6	30.6	2	NR
06/03/23		0.64	4100	6.60	+122	23.5	2.81	270.56	587	15/03/23	04/04/23	361	1760	<0.001	0.020	<0.05	<0.01	26.5	0.9	27.4	6	NR
15/07/23		1.18	4990	6.68	+252	22.2	1.85	271.53	573	26/07/23	15/08/23	355	1940	<0.001	0.010	<0.05	0.02	23.9	3.2	27.1	6	ND
20/09/23		1.53	3985	6.76	+210	21.8	2.16	271.22	533	09/10/23	27/10/23	368	1980	<0.001	0.012	<0.05	<0.01	23.3	4.7	28.0	6	NR
12/01/24		0.62	3985	6.76	+100	23.0	2.71	270.67	553	29/01/24	19/02/24	345	1980	<0.001	0.019	<0.05	<0.01	23.2	3.1	26.3	6	NR
18/03/24		0.48	7523	6.75	+135	21.9	3.12	270.26	533	05/04/24	26/05/24	347	2170	<0.001	0.036	<0.05	0.02	25.4	4.4	29.8	NR	<0.001
GL11	6 monthly									GL11												Annually
07/02/20		0.26	4890	6.74	-46	22.7	3.44	268.50	873	24/02/20	13/03/20	483	1040	<0.001	1.340	2.77	<0.01	0.06	0.2	0.3	5	NR
27/08/20		0.32	4918	6.86	-23	21.9	3.41	268.53	1000	09/09/20	29/09/20	488	1020	<0.001	1.330	3.52	0.04	0.02	0.1	0.1	19	ND
29/03/21		0.27	4913	6.85	-37	24.3	2.87	269.07	920	09/04/21	29/04/21	490	1040	<0.001	1.010	4.05	0.01	0.04	0.2	0.2	18	ND
17/09/21		0.28	4800	6.88	-45	18.0	2.30	269.64	887	28/09/21	19/10/21	448	1020	<0.001	1.110	3.87	0.01	0.02	0.2	0.2	15	NR
22/04/22		0.29	4550	6.79	-50	23.2	2.18	269.76	893	09/05/22	27/05/22	428	1060	<0.001	0.779	2.47	0.03	0.15	0.2	0.4	22	ND
09/12/22		1.09	2205	10.66	-29	25.6	1.54	270.40	267	30/12/22	25/01/23	125	695	0.004	<0.001	<0.05	0.14	1.13	0.4	1.5	3	NR
15/07/23		0.50	2990	7.22	+257	22.3	1.62	270.32	280	26/07/23	15/08/23	256	851	<0.001	0.072	<0.05	0.07	0.17	0.1	0.3	11	ND
12/01/24		0.47	3393	7.16	+15	26.7	1.97	269.97	427	23/01/24	13/02/24	330	880	<0.001	0.111	0.07	<0.01	<0.01	0.2	0.2	17	NR

Table 2: Surface water quality (GLOV1 on overflow)

	Frequency required by licence	EC	pH	Alk	SS
Measure		µS/cm	1-14	mg/L	mg/L
GLOV1	overflow, then wkly				
30/03/19		81	6.98	22	238
22/12/20		140	7.33	33	111
08/11/21		490	7.63	50	91
24/11/21		2080	7.67	130	12
09/12/21		2960	7.88	135	13
22/09/22		2250	7.81	89	<5
21/10/22		3240	7.93	103	6

Received from laboratory	Accessible on Council website by	SO_4	Cl	Mn	Fe	Cr	NH_3	TKN	NO_x	TN	TOC	OC/OP Pesticides
		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
GLOV1												
10/04/19	30/04/19	3	10	0.58	32.3	0.032	0.26	2.5	0.62	3.1	7	ND
05/01/21	11/01/21	5	15	0.16	12.3	0.008	0.08	1.3	0.51	1.8	6	ND
16/11/21	06/12/21	17	107	0.08	6.39	0.007	0.26	1.9	1.71	3.6	12	ND
06/12/21	24/12/21	99	539	0.04	0.20	0.001	0.40	3.8	12.6	16.4	24	ND
23/12/21	14/01/22	162	854	0.11	0.07	0.002	0.53	3.6	6.51	10.1	31	ND
07/10/22	27/10/22	56	693	0.27	0.03	0.001	0.37	2.8	4.23	7.0	14	ND
01/11/22	21/11/22	97	904	0.04	0.45	0.006	0.20	2.1	4.20	6.3	20	ND

Table 3: Leachate quality (GLL1)

	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk
Measure		mg/L	µS/cm	1-14	mV	ºC	mg/L
GLL1	6 monthly						
26/01/18		1.97	563	7.43	+111	26.5	91
05/08/18		0.79	18740	6.99	-192	16.4	2360
09/01/19		1.74	5925	7.33	-100	27.1	580
20/06/19		3.28	3015	6.37	+193	17.9	110
07/02/20		0.53	16675	7.05	-157	24.1	2560
26/08/20		1.59	13800	7.59	-74	21.8	1800
29/03/21		3.16	430	6.89	+88	21.8	350
16/09/21		1.05	14785	7.23	-107	22.6	3200
22/04/22		0.24	13640	6.96	-129	26.5	2400
05/03/23		0.22	12015	7.04	-122	29.6	2800
20/09/23		2.45	11720	6.91	+39	27.5	2520
17/03/24		0.51	18455	7.30	-117	26.8	2700

Received from laboratory	Accessible on Council website by	SO_4	Cl	Cr	Mn	Fe	NH_3	NO_x	TKN	TN	TOC	OC&OP Pesticides
		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
GLL1												
06/02/18	26/02/18	9	85	0.004	0.632	0.46	1.5	6.46	4.0	10.5	10	ND
20/08/18	07/09/18	<1	1070	0.168	5.65	31.3	428.0	0.03	417.0	417.0	309	ND
22/01/19	22/02/19	5	1420	0.036	2.22	8.36	112.00	9.43	112.0	121.0	80	ND
28/06/19	18/07/19	12	841	0.003	1.58	0.37	2.93	13.8	6.0	19.8	15	ND
24/02/20	13/03/20	<20	4640	0.363	2.72	21.9	473.00	2.15	538.0	540.0	434	ND
09/09/20	29/09/20	<20	4070	0.228	4.41	26.3	355.00	0.54	368.0	368.0	210	ND
09/04/21	29/04/21	10	50	0.004	0.086	0.86	6.68	0.43	9.6	10.0	12	ND
28/09/21	19/10/21	57	3680	0.408	2.37	15.2	583.0	1.38	678.0	679.0	374	ND
09/05/22	27/05/22	<20	5270	0.374	5.83	36.4	469.0	0.15	520.0	520.0	326	ND
15/03/23	04/04/23	11	5000	0.422	4.18	32.5	498.0	<0.05	536.0	536.0	353	ND
09/10/23	27/10/23	<100	4590	0.696	4.64	36.9	589.0	<5.00	705.0	705.0	561	ND
05/04/24	26/05/24	8	5530	0.478	3.81	35.2	811.0	<0.05	710.0	710.0	463	ND

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 rarely detected at the Gunnedah Landfill or surrounds. When detected, remediation is promptly undertaken.

Table 4: 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 by
Measure		ppm CH_4 in air	% CH_4 in air	% LEL	
3 monthly					
6&7/02/20	no reportable detections at any sampling location				13/03/20
12&13/05/20	no reportable detections at any sampling location				09/06/20
26&28/08/20	no reportable detections at any sampling location				29/09/20
15/12/20	no reportable detections at any sampling location				11/01/21
28&29/03/21	no reportable detections at any sampling location				29/04/21
21/06/21	no reportable detections at any sampling location				21/07/21
16&17/09/21	no reportable detections at any sampling location				19/10/21
11&12/01/22	no reportable detections at any sampling location				14/02/22
21&22/04/22	no reportable detections at any sampling location				27/05/22
29&30/06/22	no reportable detections at any sampling location				02/08/22
9&10/01/22	no reportable detections at any sampling location				25/01/23
06/03/22	no reportable detections at any sampling location				04/04/23
14&15/07/23	no reportable detections at any sampling location				15/08/23
20/09/23	no reportable detections at any sampling location				27/10/23
12&13/01/24	no reportable detections at any sampling location				13/02/24
17&18/03/24	no reportable detections at any sampling location				26/05/24

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