Walcha Landfill

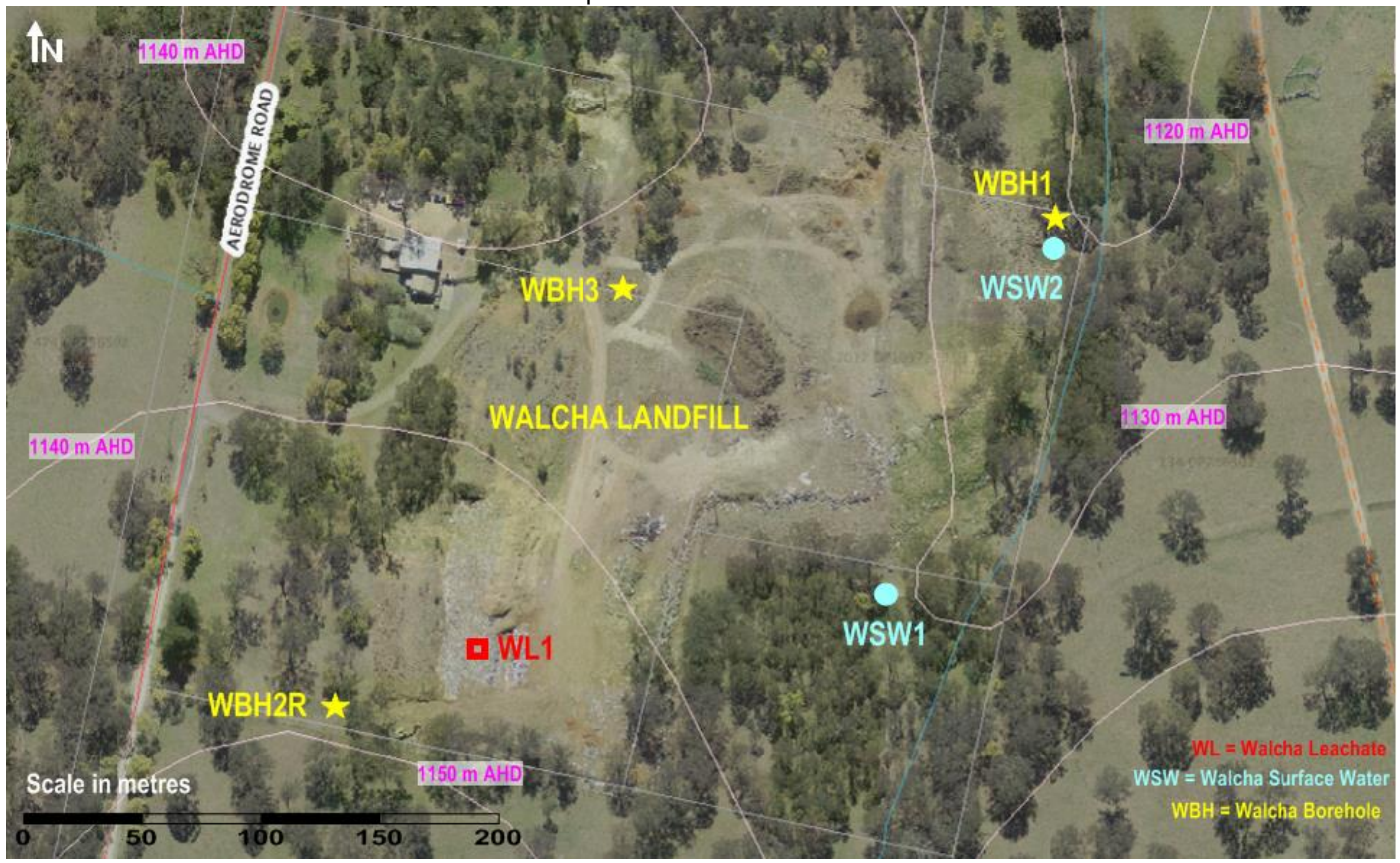
Location: 49 Aerodrome Road, Walcha NSW 2354 Environment Protection Licence Number: 6120 Activities: Waste disposal by application to land
Licensee under Protection of Environment Operations Act 1997 (POEO Act): Walcha Council, PO Box 2, Walcha NSW 2354

The internet link to Licence No. 6120 is http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31026&SYSUID=1&LICID=6120
Council is required to monitor 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.

Locations of the sampling points are shown on the adjacent figure. Historical names are used. WBH stands for Walcha Bore Hole. [A bore hole is an investigative hole. When casing and screen are installed for monitoring, it is called a monitoring well.] SW = Surface water; L = Leachate.

Corresponding Environment Protection Authority (EPA) Identification Numbers detailed on the Licence are provided below:

EPA No. 1 WSW2 (surface water pond)
EPA No. 2 WSW1 (surface water pond)
EPA No. 3 WL1 (leachate in landfill cell)
EPA No. 4 WBH2 (groundwater monitoring well)
EPA No. 5 WBH3 (groundwater monitoring well)
EPA No. 6 WBH1 (groundwater monitoring well)



Base map: SIX © NSW Department of Lands 2006, downloaded April 2010

Monitoring results for the last four years are presented on the 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 presented separately for 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 Walcha Council website.

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

Alk = Alkalinity measured as mg/L $CaCO_3$ equivalent; As = Arsenic; BTEX = Benzene, Toleune, Ethylbenzene, Xylene; Cd = Cadmium; Cl = Chloride; Cr = Chromium; Cu = Copper; D = Depth (Standing Water Level); DO = Dissolved Oxygen; EC = Electrical Conductivity also called conductivity; Eh = Redox Potential; Fe = Iron; Hg = Mercury; NC = Not continuing; ND = Nil detected; NR = Not required; Pb = Lead; Mn = Manganese; NH_3 = Ammonia as a measure of ammonium ions; NO_x = Nitrite + Nitrate; OC & OP = Organochlorine and Organophosphorus pesticides; RL = Reduced Level; SO_4 = Sulphate; SS = Total suspended solids; Temp = Temperature; TKN = Total Kjeldahl Nitrogen (organic nitrogen + ammonia); TOC = Total Organic Carbon; TP = Total Phosphorus; Zn = Zinc.

Measures:

mg/L = milligram per litre (equivalent to ppm); µS/cm = microSiemens per centimetre; mV = millivolts; ºC= degrees Celsius.

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. This is not the case in Walcha Landfill groundwater. Its EC is even at acceptable drinking water quality EC.

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: No results are a concern. Nitrate in groundwater at WBH3 has dissipated to trace concentrations over time. This nitrate may have been due to landfill leachate. Nitrogen compounds in surface water are likely due to animal dung.

Table 1: Groundwater quality & water level

Sample date	Frequency required by licence	DO	EC	pH	Eh	Temp	D	RL	Alk	Received from laboratory	Accessible on Council website by	SO_4	Cl	Mn	Fe	NH_3	NO_x	TKN	TN	TOC
Measure		mg/L	µS/cm	1-14	mV	°C	m	m	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
EPA6-WBH1	Six monthly																			
01/04/18		9.05	522	6.66	+91	24.2	25.79	1095.08	127	10/04/18	30/04/18	8	70	0.022	0.10	<0.01	1.70	0.1	1.8	1
04/01/19		3.92	514	6.20	+183	17.4	26.19	1094.68	139	21/01/19	19/02/19	8	70	0.021	0.06	0.02	2.42	0.5	2.9	5
14/06/19		4.30	524	6.15	+223	14.0	26.39	1094.48	127	25/06/19	15/07/19	5	74	0.017	0.06	0.02	2.87	0.4	3.3	2
04/10/19		4.06	505	6.20	+147	16.0	26.54	1094.33	133	16/10/19	05/11/19	5	67	0.003	<0.05	<0.01	2.99	0.5	3.5	<5
28/02/20		3.52	498	6.11	+126	17.2	26.62	1094.25	130	10/03/20	30/03/20	13	64	<0.001	<0.05	0.01	1.97	0.3	2.3	<1
27/10/20		3.90	493	6.35	+212	15.5	26.77	1094.10	130	10/11/20	30/11/20	11	66	<0.001	<0.05	0.01	2.41	0.3	2.7	7
26/05/21		4.00	493	6.02	+212	16.5	26.65	1094.22	130	04/06/21	24/06/21	9	61	<0.001	<0.05	<0.01	2.20	0.4	2.6	1
02/11/21		4.99	489	6.27	+147	15.7	26.40	1094.47	133	12/11/21	03/12/21	46	39	<0.001	<0.05	<0.01	0.52	0.1	0.6	4
07/06/22		6.04	579	6.70	+159	14.2	25.46	1095.41	163	20/06/22	08/07/22	83	30	<0.001	<0.05	<0.01	0.08	0.1	0.2	6
EPA4-WBH2R	Six monthly																			
01/04/18		2.67	272	6.44	+86	22.0	48.40	1100.80	110	10/04/18	30/04/18	9	8	0.013	<0.05	0.06	0.06	0.5	0.6	1
04/01/19		3.89	293	6.04	+202	23.5	48.58	1100.62	133	21/01/19	19/02/19	10	10	0.020	<0.05	0.02	0.05	1.4	1.4	<1
14/06/19		9.39	283	7.57	+150	15.1	48.68	1100.52	60	25/06/19	15/07/19	10	12	0.007	<0.05	0.05	0.08	2.3	2.4	10
04/10/19		2.59	284	6.16	+203	18.1	48.77	1100.43	107	16/10/19	05/11/19	9	8	0.008	<0.05	0.02	0.04	<0.1	<0.1	<1
28/02/20		2.55	259	6.07	+165	19.2	48.89	1100.31	107	10/03/20	30/03/20	9	8	0.007	<0.05	0.02	0.04	<0.1	<0.1	<1
27/10/20		2.76	264	6.42	+171	17.7	49.10	1100.10	117	10/11/20	30/11/20	9	8	<0.001	<0.05	<0.01	0.04	<0.1	<0.1	4
26/05/21		2.71	266	5.94	+213	17.1	49.22	1099.98	113	04/06/21	24/06/21	9	8	0.001	<0.05	<0.01	0.04	<0.1	<0.1	<1
02/11/21		2.81	266	6.24	+161	16.9	49.34	1099.86	120	12/11/21	03/12/21	8	8	0.001	<0.05	<0.01	0.05	<0.1	<0.1	4
07/06/22		2.63	277	6.17	+143	15.7	49.18	1100.02	117	20/06/22	08/07/22	9	8	0.002	<0.05	<0.01	0.05	<0.1	<0.1	3
EPA5-WBH3	Six monthly																			
01/04/18		4.93	249	7.01	+60	22.7	39.79	1096.65	93	10/04/18	30/04/18	5	7	0.002	<0.05	<0.01	2.22	<0.1	2.2	1
04/01/19		4.69	217	6.37	+182	21.4	40.04	1096.40	109	21/01/19	19/02/19	5	6	0.010	<0.05	0.01	2.24	0.2	2.4	1
14/06/19		9.45	233	7.40	+150	16.4	40.22	1096.22	60	25/06/19	15/07/19	4	6	0.009	<0.05	0.02	2.60	0.4	3.0	<1
04/10/19		5.43	238	6.44	+158	17.3	40.45	1095.99	73	16/10/19	05/11/19	5	5	0.002	<0.05	0.02	2.09	0.1	2.2	2
28/02/20		4.91	219	6.35	+138	18.9	40.65	1095.79	90	10/03/20	30/03/20	4	5	<0.001	<0.05	0.03	1.84	<0.1	1.8	<1
27/10/20		4.95	218	6.55	+178	17.5	40.76	1095.68	95	10/11/20	30/11/20	5	5	<0.001	<0.05	<0.01	1.62	<0.1	1.6	3
26/05/21		4.42	224	6.31	+186	18.2	40.68	1095.76	92	04/06/21	24/06/21	5	5	<0.001	<0.05	0.01	1.87	0.2	2.1	<1
02/11/21		4.53	221	6.60	+155	17.5	40.68	1095.76	97	12/11/21	03/12/21	4	5	<0.001	<0.05	<0.01	2.04	0.2	2.2	<1
07/06/22		4.52	231	6.41	+95	17.0	39.79	1096.65	93	20/06/22	08/07/22	4	4	<0.001	<0.05	0.01	2.06	0.1	2.2	<1

Table 2: Surface water quality - Field analytes

Sample date	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk
Measure		mg/L	µS/cm	1-14	mV	ºC	mg/L
WSW1	Six monthly						
01/04/18		5.36	78	6.56	+80	27.9	20
04/01/19		2.72	121	6.29	+256	21.5	33
14/06/19		4.30	114	6.42	+264	10.8	9
04/10/19	No water						
28/02/20		12.30	65	6.39	+135	22.2	11
27/10/20		6.59	84	6.70	+192	15.3	25
26/05/21		6.51	70	6.21	+218	13.7	273
02/11/21		7.92	77	6.95	+203	15.6	20
07/06/22		6.48	47	6.81	+262	8.2	14
WSW2	Six monthly						
01/04/18		3.83	1669	7.04	+116	27.2	420
04/01/19		4.00	1331	7.45	+153	23.0	377
14/06/19		8.55	992	7.43	+136	10.2	137
04/10/19	No water						
28/02/20		5.11	742	7.05	+231	23.2	203
27/10/20		2.71	739	7.31	+187	18.5	143
26/05/21		11.84	932	7.25	+232	12.4	21
02/11/21		10.34	940	7.15	+194	18.0	350
07/06/22		9.55	1018	6.55	+153	7.8	280

Table 3: Surface water quality – Laboratory analytes

Sample date	Frequency required by licence	Received from laboratory	Accessible on Council website by	SS	SO_4	Cl	As	Cd	Cr	Cu	Ni	Pb	Zn	Mn	Fe	NH_3	NO_x	TKN	TN	TP	TOC	BTEX compounds
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 as N	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L	mg/L
EPA2-WSW1	Six-monthly																					
01/04/18		10/04/18	30/04/18	19	1	6	0.003	<0.0001	<0.001	0.003	0.003	<0.001	0.024	0.115	7.11	0.08	<0.01	3.1	3.1	1.43	39	ND
04/01/19		21/01/19	19/02/19	13	2	6	0.003	<0.0001	<0.001	0.004	0.005	<0.001	0.034	0.508	3.88	<0.01	<0.01	2.6	2.6	0.54	41	ND
14/06/19		25/06/19	15/07/19	78	<1	12	0.004	<0.0001	0.002	0.007	0.006	<0.001	0.027	1.120	10.10	0.47	<0.01	7.6	7.6	2.45	49	ND
04/10/19		No water																				
28/02/20		10/03/20	30/03/20	52	<1	6	0.002	<0.0001	<0.001	0.003	<0.001	<0.001	0.007	0.336	0.82	0.14	<0.01	6.0	6.0	4.24	30	ND
27/10/20		10/11/20	30/11/20	70	1	6	0.002	<0.0001	<0.001	<0.001	0.002	<0.001	0.006	0.586	2.59	0.56	<0.01	6.3	6.3	1.72	37	ND
26/05/21		04/06/21	24/06/21	9	<1	5	0.002	<0.0001	<0.001	0.002	0.001	<0.001	0.010	0.307	1.88	1.05	<0.01	4.0	4.0	0.58	26	ND
02/11/21		12/11/21	03/12/21	30	<1	4	0.002	<0.0001	<0.001	0.004	0.003	<0.001	0.033	0.804	1.86	0.03	<0.01	5.2	5.2	1.48	33	ND
07/06/22		20/06/22	08/07/22	43	<1	2	<0.001	0.0001	<0.001	0.002	0.001	<0.001	0.009	0.037	0.98	0.25	<0.01	1.7	1.7	0.24	16	ND
EPA1-WSW2	Six-monthly																					
01/04/18		10/04/18	30/04/18	19	1750	47	<0.001	<0.0001	<0.001	0.002	0.005	<0.001	0.129	0.194	0.15	0.11	0.10	1.0	1.1	0.04	18	ND
04/01/19		21/01/19	19/02/19	<5	330	31	<0.001	<0.0001	<0.001	0.002	0.005	<0.001	0.120	0.126	0.16	0.16	0.49	1.1	1.6	0.07	16	ND
14/06/19		25/06/19	15/07/19	<5	234	47	<0.001	<0.0001	<0.001	<0.001	0.003	<0.001	0.009	0.264	0.34	0.01	<0.01	1.3	1.3	0.04	20	ND
04/10/19		No water																				
28/02/20		10/03/20	30/03/20	<5	143	12	<0.001	0.0011	<0.001	0.009	0.006	<0.001	0.852	0.050	0.06	0.02	3.39	1.2	4.6	0.05	14	ND
27/10/20		10/11/20	30/11/20	8	196	26	0.001	<0.0001	<0.001	0.002	0.003	<0.001	0.010	0.347	0.10	0.01	<0.01	1.2	1.2	0.09	17	ND
26/05/21		04/06/21	24/06/21	<5	241	24	<0.001	<0.0001	<0.001	<0.001	0.003	<0.001	0.063	0.005	<0.05	<0.01	<0.01	0.7	0.7	0.03	12	ND
02/11/21		12/11/21	03/12/21	<5	222	28	<0.001	0.0002	<0.001	0.003	0.003	<0.001	0.082	0.012	<0.05	0.01	2.03	0.9	2.9	0.03	9	ND
07/06/22		20/06/22	08/07/22	10	236	42	<0.001	0.0001	<0.001	0.002	0.005	<0.001	0.195	0.008	<0.05	<0.01	1.34	1.1	2.4	0.03	11	ND

Table 4: Leachate quality – Field analytes

	Frequency required by licence	DO	EC	pH	Eh	Temp	Alk	TOC
Measure		mg/L	µS/cm	1-14	mV	ºC	mg/L	mg/L
WL1	Annually							
01/04/18		No leachate available						
04/01/19		No leachate available						
14/06/19		No leachate available						
04/10/19		No leachate available						
28/02/20		No leachate available						
27/10/20		No leachate available						
26/05/21		No leachate available						
02/11/21		No leachate available						
07/06/22		No leachate available						

Table 5: Leachate quality – Laboratory analytes

	Frequency required by licence	Received from laboratory	Accessible on Council website by	SO_4	Cl	As	Cd	Cr	Cu	Ni	Pb	Zn	Mn	Fe	Hg	NH_3	NO_x	TKN	TN	TP	BTEX compounds
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 as N	mg/L as N	mg/L as N	mg/L as N	mg/L	mg/L
WL1	Annually																				
01/04/18		NA	NA	No leachate available																	
04/01/19		NA	NA	No leachate available																	
14/06/19		NA	NA	No leachate available																	
04/10/19		NA	NA	No leachate available																	
28/02/20		NA	NA	No leachate available																	
27/10/20		NA	NA	No leachate available																	
26/05/21		NA	NA	No leachate available																	
02/11/21		NA	NA	No leachate available																	
07/06/22		NA	NA	No leachate available																	