

Wollongong City Council

Helensburgh Waste
Disposal Depot
Annual Report

Period 01 June 2013 – 31 May 2014

Reference: Z14/248286



wollongong
city of innovation

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ABBREVIATIONS

ANZECC	Australian and New Zealand Environment Conservation Council
Ca	Calcium
CaCO ₃	Calcium Carbonate
CFU	Colony Forming Units
CH ₄	Methane
Cl	Chloride
Cr	Chromium
DC	Development Consent
DO	Dissolved Oxygen
EPL	Environmental Protection Licence
K	Potassium
LEMP	Landfill Environmental Management Plan
Mg	Magnesium
Na	Sodium
NH ₃	Ammonia
OEH	The Office of Environment & Heritage
Ppm	Parts per Million
SO ₄	Sulfate
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSS	Total Suspended Solids
Zn	Zinc

1 INTRODUCTION

1.1 BACKGROUND

The city of Wollongong is located 80 kilometres south of Sydney and is Australia's 9th largest city. The Wollongong City Council (Council) governance area occupies a relatively narrow coastal strip bordered by the Royal National Park to the north, the Windang Bridge and Yallah to the south, the Tasman Sea to the east and the escarpment to the west.

Council ceased accepting waste at the Helensburgh Waste Disposal Depot (the site) after 30 June 2012. Subsequent to closure the site has been capped with no less than 300mm of cover material in anticipation of a full site rehabilitation construction commencing in early 2015. The rehabilitation construction will incorporate an impervious liner into the site cap to reduce leachate infiltration levels and to aid the speed at which the sites waste contamination levels stabilise.

The site is located on Nixon Place, Helensburgh on NSW Department of Lands titled land for which Council holds a licence agreement. The site is situated at the northern extent of Council's governance area and is located on approximately 6.4 hectares of land extending across portions of Lots 621 and 915 of DP 752033.

Council holds an Environmental Protection Licence (EPL) number 5861, for 'Waste Disposal - Application to Land' for the site. Despite the sites closure on 30 June 2012, Council still operates in accordance with the sites Landfill Environmental Management Plan (LEMP) in accord with the requirements of the sites EPL and Development Consent (DC).

1.2 SITE HISTORY

The site has operated for over forty years. Prior to the establishment of waste disposal operations, the site was vacant bushland. In the initial years of operation, the site functioned as a trench and fill operation, with a significant amount of waste incinerated within the trenches. It is understood that from the 1960's until approximately the early 1990's, the site operated as a sanitary depot accepting mainly nightsoil and putrescible wastes. Limited environmental controls were in-place at this time. The site continued to accept these types of waste until 1991, when putrescible waste ceased to be accepted. From 1991 to 2012, the site was only permitted by Council to accept "General Solid Non Putrescible" style wastes e.g. furniture, wood, paper, plastics etc. (although the EPL allows the site to accept putrescible wastes if required). In regard to the sites landform, following completion of the trench and fill operations, landfilling operations shifted to land raise operations which

involved the construction of a small mound created from the deposited waste materials. Final land raising operations were completed in the site's central and southern area towards the end of the sites functional life.

In its final year of operation, the site received approximately 7,463 tonnes of waste, of which approximately 2,222 tonnes was sent to landfill (excluding cover material). The remainder (approximately 5,241 tonnes) was recycled. Material used for daily covering of the waste was mainly obtained from a combination of clean fill materials delivered to the site and material sourced on the site. Council also used landfill lids on the site in order to reduce the amount of daily cover required. The lids comprised a portable rigid steel frame covered by heavy duty fabric, which were be lifted on and off partly filled areas of waste at the end of each day's operations, reducing daily cover requirements at this site by approximately half. Since closure the lids have been transferred to Whytes Gully for continued beneficial use.

1.3 OBJECTIVES OF THE ANNUAL REPORT

Condition R1.9 of the EPL specifies that Council must provide an Annual Report to accompany the Annual Return for the site. The objective of this report is to provide this review.

1.4 RELEVANT DOCUMENTS

This annual report refers to information and data from the following documents;

- Helensburgh Waste Disposal Depot – Annual Return for Period 01 June 2012 to 31 May 2013. By Wollongong City Council July 2013.
- Helensburgh Waste Disposal Depot – Annual Return for Period 01 June 2011 to 31 May 2012. By Wollongong City Council July 2012
- Helensburgh Waste Disposal Depot – Annual Return for Period 01 June 2010 to 31 May 2011. By Wollongong City Council July 2011.
- Helensburgh Waste Disposal Depot – Annual Report for Period 01 June 2009 to 31 May 2010. By GHD July 2010.

2.1 ENVIRONMENTAL PROTECTION LICENCE ANNUAL RETURNS

The Environment Protection Agency NSW (EPA) has issued an *Environmental Protection Licence* (Licence No. 5861) for the landfill and recycling operations on site. The licence, issued under the *Protection of the Environment Operations Act 1997*, requires an annual return to be submitted to the EPA, detailing;

- a) Statement of compliance; and
- b) Monitoring and complaints summary.
- c) Tabulated results of all monitoring data required by the licence.
- d) A graphical presentation of the data for at least three years (if available).
- e) Notations made regarding any statistically significant variations or anomalies.
- f) An analysis and interpretation of all monitoring data.
- g) Identification of any deficiencies in environmental performance and action taken.
- h) Recommendations on improving the sites environmental performance.

The EPL Annual Returns for the 2009 to 2013 reporting periods were reviewed to provide a background to this report. The Annual Returns can be summarised as follows:

01 June 2009 to 31 May 2010

B1. Pollution complaints - One.

B2. Concentration monitoring summary - Complete.

B3. Volume or mass monitoring summary - None required.

C1. Compliance with licence condition - Ten non compliances

C2. Details of non-compliance

- 1. Three missed conductivity measurements*
- 2. One round of groundwater monitoring missed*
- 3. Two missed ammonia measurements*
- 4. One round of groundwater monitoring missed*
- 5. Two missed ammonia measurements*
- 6. One round of groundwater monitoring missed*
- 7. Two missed ammonia measurements*
- 8. One round of surface water monitoring missed*
- 9. Two missed ammonia, faecal coliforms and dissolved oxygen tests*
- 10. Four missed potassium tests*

01 June 2010 to 31 May 2011

B1. Pollution complaints - Four.

B2. Concentration monitoring summary - Complete.

B3. Volume or mass monitoring summary - None required.

C1. Compliance with licence condition - Nil non compliances.

C2. Details of non-compliance - N/A

01 June 2011 to 31 May 2012

B1. Pollution complaints - Eleven.

B2. Concentration monitoring summary - Complete.

B3. Volume or mass monitoring summary - None required.

C1. Compliance with licence condition - Nil non compliances.

C2. Details of non-compliance - N/A

01 June 2012 to 31 May 2013

B1. Pollution complaints - Nil.

B2. Concentration monitoring summary - Complete.

B3. Volume or mass monitoring summary - None required.

C1. Compliance with licence condition - Nil non-compliance.

C2. Details of non-compliance - N/A

A potential problem existed prior to 2011 with seemingly regular missed analytical testing regimes over the previous two years. Subsequently, Council formally tendered for the environmental testing at the site, which now ensures regular testing routines are in place under contract performance requirements.

The EPL has had several variations applied to it in recent years. These changes include:

- Incorporation of additional ground water monitoring wells, gas migration monitoring wells and final closure capping profile on 20 May 2013.
- Scheduled Activity and Waste Classification structure altered on 17 October 2008.
- Environmentally sensitive or inappropriate landfilling classification removed from licence on 12 June 2008.
- Environmentally sensitive or inappropriate landfilling classification added to licence on 18 March 2008.
- Clarification of noise appropriated operating hours on 16 May 2006.
- Slag and asphalt chippings added to appropriate cover materials list on 17 May 2005

3.1

GROUND WATER MONITORING

3.1.1 *Tabulated Results*

Analyte	Units/ Ref	22 August 2013							
		5	6	7	12	13	14	15	16
Alkalinity	mg/L	<1	75	<1	10	1	28	8	<1
Calcium	mg/L	20	19	<1	7	7	11	11	4
Chloride	mg/L	74	34	145	14	51	21	20	50
Magnesium	mg/L	16	10	6	7	6	6	4	4
Nitrogen	mg/L	0.76	.01	<0.01	<0.01	0.03	0.02	0.04	0.01
Potassium	mg/L	<1	2	1	4	8	3	36	<1
Sodium	mg/L	42	41	119	30	32	11	12	28
Water Level	m	3.31	3.02	2.77	2.72	2.77	2.4	2.32	2.1
Sulfate	mg/L	106	43	91	76	36	20	58	4.31
TDS	mg/L	286	198	362	149	142	97	167	135
TOC	mg/L	5	8	2	4	4	2	4	1
pH	pH	5	6.4	4.3	4.9	4.7	5.7	5.2	4.4

Table 3.1.1(a) Quarterly analyte testing results for August 2013

Analyte	Units/ Ref	14 November 2013							
		5	6	7	12	13	14	15	16
Alkalinity	mg/L	<1	45	<1	13	2	17	2	<1
Calcium	mg/L	18	15	<1	8	7	10	9	3
Chloride	mg/L	65	41	97	20	46	34	13	48
Magnesium	mg/L	14	8	5	6	5	5	4	5
Nitrogen	mg/L	0.27	<0.02	0.09	<0.01	0.01	0.19	0.02	<0.02
Potassium	mg/L	<1	3	2	2	3	3	24	<1
Sodium	mg/L	40	42	92	27	28	16	8	25
Water Level	m	3.94	3.4	4.3	3.05	3.26	3.14	3.04	6.1
Sulfate	mg/L	109	61	99	68	37	20	34	24
TDS	mg/L	259	224	298	149	120	117	151	122
TOC	mg/L	11	14	28	27	10	11	12	4
pH	pH	5.2	6.3	4.2	5.1	4.7	5.4	4.7	4.5

Table 3.1.1(b) Quarterly analyte testing results for November 2013

Analyte	17 February 2014								
	Units/ Ref	5	6	7	12	13	14	15	16
Alkalinity	mg/L	7	28	<1	8	10	20	4	<1
Calcium	mg/L	22	13	<1	7	9	9	8	3
Chloride	mg/L	76	40	95	24	23	25	14	47
Magnesium	mg/L	17	7	5	6	5	4	4	5
Nitrogen	mg/L	0.28	0.01	0.004	<0.01	<0.01	0.24	0.02	<0.01
Potassium	mg/L	<1	5	<1	<1	3	3	30	<1
Sodium	mg/L	50	46	97	41	25	17	11	30
Water Level	m	4.17	3.85	5.3	3.22	3.71	3.67	3.32	6.38
Sulfate	mg/L	106	53	88	70	32	17	39	20
TDS	mg/L	367	169	288	14.3	117	74	119	81
TOC	mg/L	2	7	2	1	3	1	3	<1
pH	pH	?	5.7	4.5	5	5.4	5.8	5.5	5.2

Table 3.1.1(c) Quarterly analyte testing results for February 2014

Analyte	14 May 2014								
	Units/ Ref	5	6	7	12	13	14	15	16
Alkalinity	mg/L	4	123	<1	14	6	16	2	<1
Calcium	mg/L	30	29	<1	7	8	7	9	4
Chloride	mg/L	107	20	118	13	56	13	11	43
Magnesium	mg/L	23	14	5	6	6	4	4	5
Nitrogen	mg/L	0.54	<0.01	0.19	0.04	0.02	0.01	<0.01	0.01
Potassium	mg/L	<1	2	<1	<1	5	3	25	<1
Sodium	mg/L	48	16	90	24	32	10	8	24
Water Level	m	3.26	2.37	3.11	2.77	2.84	2.59	2.42	4.41
Sulfate	mg/L	122	14	92	60	32	16	36	24
TDS	mg/L	4	184	281	126	147	85	145	109
TOC	mg/L	275	10	2	13	3	2	5	2
pH	pH	5.2	6.9	4.4	5	5	5.7	4.9	4.6

Table 3.1.1(d) Quarterly analyte testing results for May 2014

Analyte	Units /Ref	August 2013							
		5	6	7	12	13	14	15	16
Aluminium	mg/L	0.98	0.24	2.58	7.76	50.4	1.05	0.07	0.67
Arsenic	mg/L	<0.008	<0.005	<0.001	0.002	0.003	0.001	<0.001	<0.001
Barium	mg/L	0.027	0.034	0.019	0.008	0.024	0.006	<0.006	0.009
Benzene	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	mg/L	0.0003	0.0001	0.0003	<0.0001	0.0002	0.0002	<0.0001	0.0007
Chromium (hex.)	mg/L	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (total)	mg/L	0.001	0.002	0.001	<0.001	<0.072	<0.002	<0.001	<0.001
Cobalt	mg/L	0.005	0.003	0.001	<0.001	<0.001	<0.005	<0.001	0.015
Copper	mg/L	0.006	0.011	0.008	0.004	0.016	<0.01	0.001	0.012
Ethyl Benzene	µg/L	<2	<2	<2	<2	<2	<2	<2	<2
Fluoride	mg/L	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	mg/L	<0.008	0.001	0.003	0.002	0.02	<0.002	<0.001	0.001
Manganese	mg/L	0.063	0.173	0.046	0.003	0.01	<0.042	<0.047	0.053
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Nitrate	mg/L	<0.01	0.09	0.66	0.09	0.02	<0.08	5.28	0.41
Nitrite	mg/L	<0.01	<0.01	0.66	<0.01	<0.01	<0.01	<0.01	0.41
OCP	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
OPP	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAH	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	<2	<2	<2	<2	<2	<2	<2	<2
Total Phenolics	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TPH	µg/L	<50	<50	<50	<50	<50	<50	<50	<50
Xylene	µg/L	<2	<2	<2	<2	<2	<2	<2	<2
Zinc	mg/L	0.541	0.028	0.051	<0.007	0.042	0.062	0.009	0.039

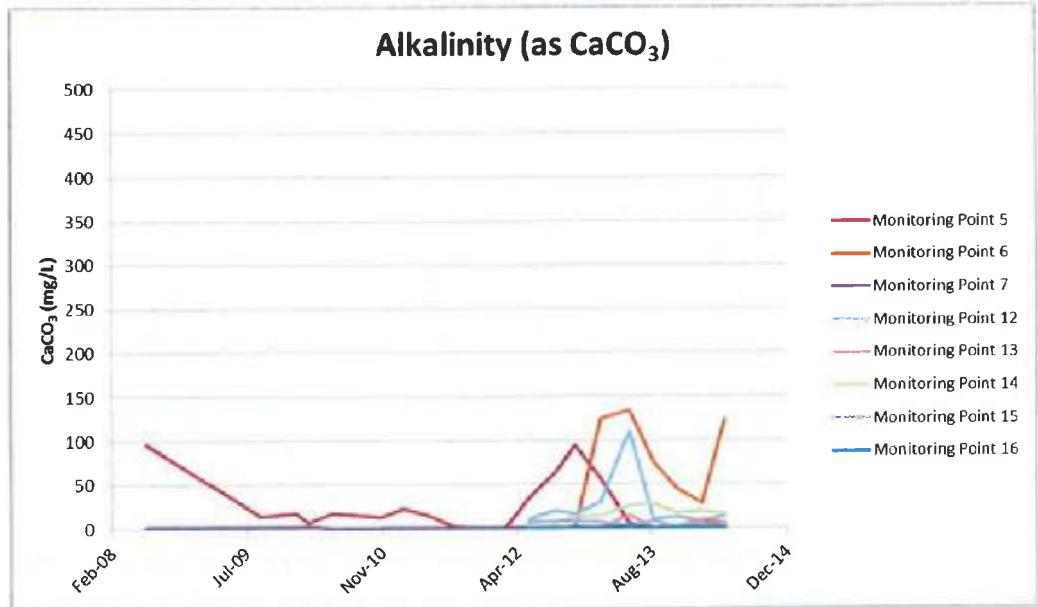
Table 3.1.1(e) Annual analyte testing August 2013 results

Pursuant to the recommendations contained in Helensburgh's 2010/2011 Annual Environmental Management Report, six additional groundwater monitoring bores were installed in 2011 whose data is analysed throughout this Section 3. Please note that due to the infancy of these installations the history of available data is relatively small.

Site investigations by GHD in 2011 have confirmed a predominant approximate west to east groundwater flow direction towards the adjacent Hacking River. The groundwater flow direction should be used to contextualise monitoring bore locations and elevated results, please refer to the sites Environmental Monitoring Locations located in Annexure A of this document

3.1.2 Data Presentation - Quarterly Monitoring

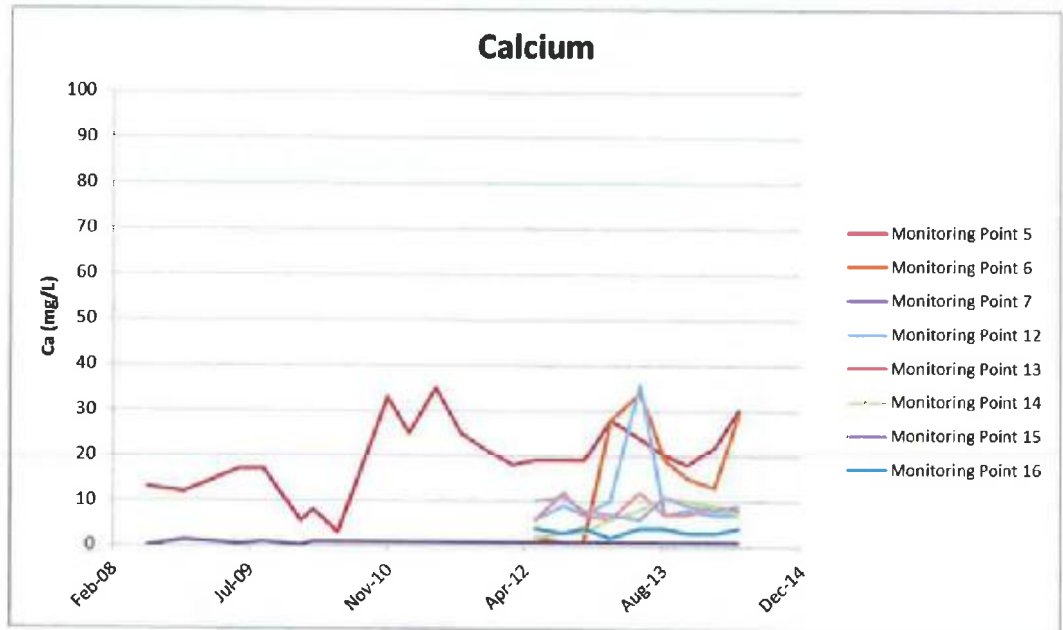
Alkalinity results presentation.



Increased alkalinity levels can be caused by many chemical processes including the denitrification process common in landfill leachate. Denitrification is the anaerobic biological reduction of nitrate (NO_3) to nitrogen (N_2) in its gaseous form. Under anoxic conditions microorganisms consume the oxygen in the nitrate and liberate the nitrogen. This process produces calcium carbonate as a by-product.

Monitoring point 6 is potentially displaying early signs of an elevating trend. However, monitoring points 5 and 12 have also displayed elevated results in the recent past and have since returned to lower historic levels. Further monitoring of point 6 should be closely scrutinised to determine if a trend is emerging. It should however be noted that monitoring points 5 and 12 are indicative of groundwater entering the site whilst point 6 is indicating of groundwater departure from the site.

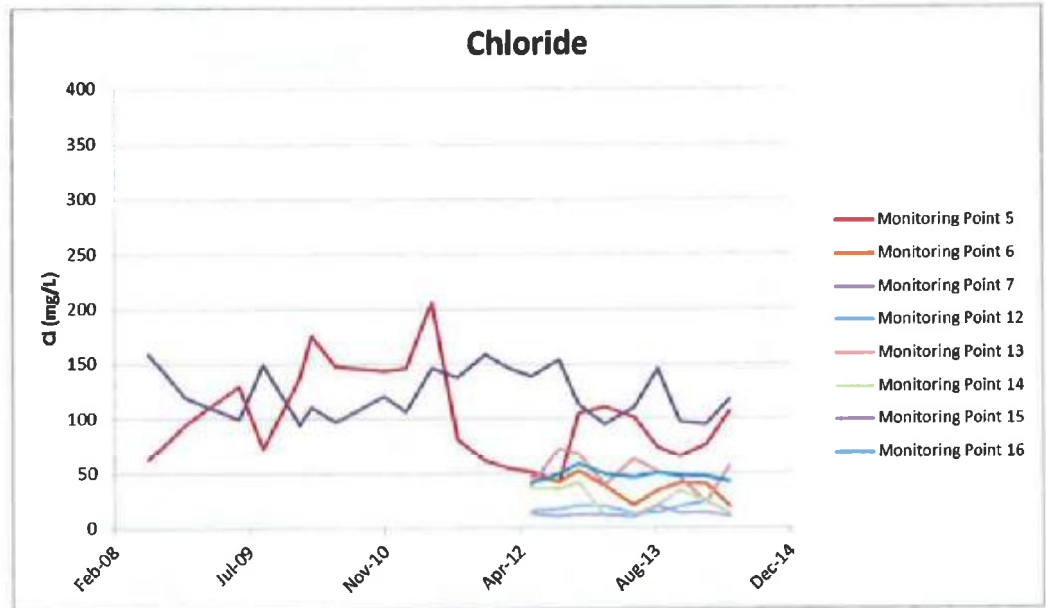
Calcium results presentation.



The groundwater monitoring wells show individually stable trends for calcium levels. The calcium levels sampled would be considered 'soft' in the 0-60mg/L area. 'Hard' water would be considered in the region of 120-180mg/L.

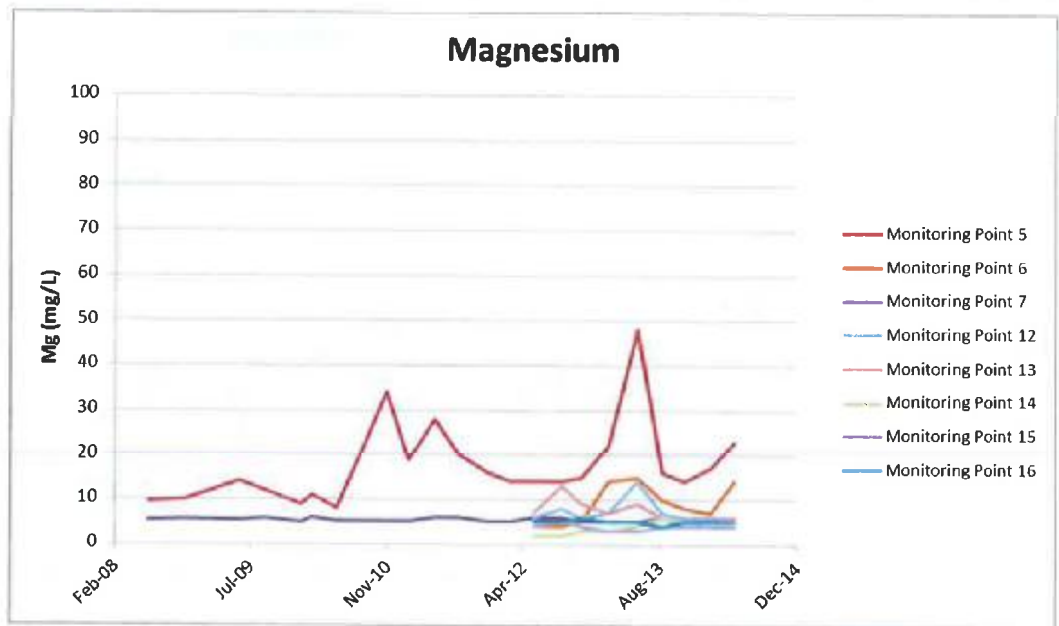
Monitoring points 5 and 12 (incoming) and 6 (outgoing) show relatively higher levels, but still at levels that are considered to be low.

Chloride results presentation.



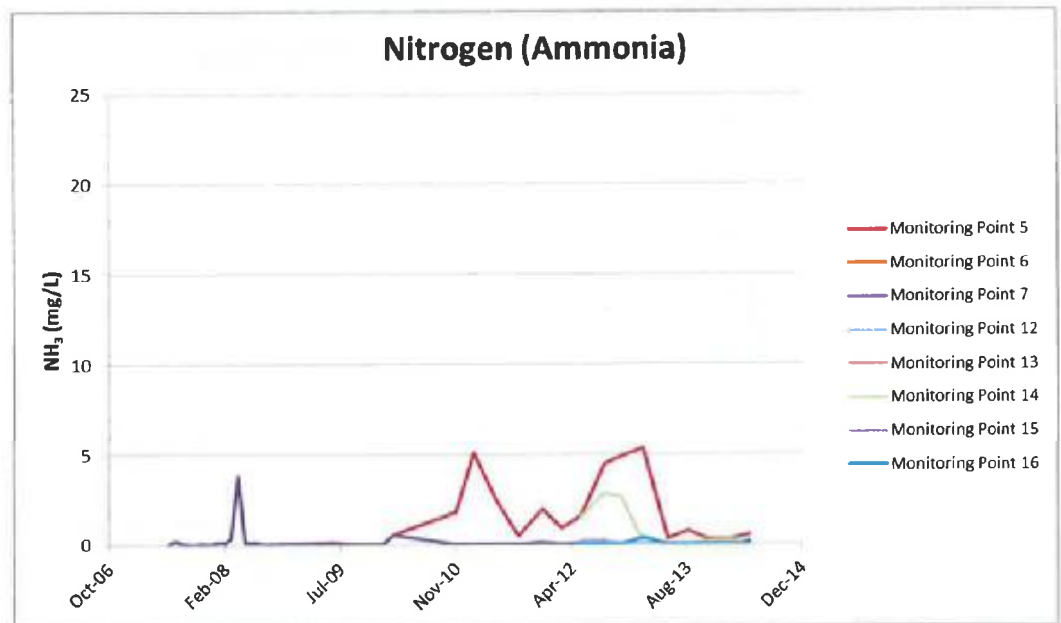
The trends for chloride monitoring have been in line or lower than the historical levels over the data range available. Large quantities of inorganic ions such as chloride can be an indicator of leachate contamination of groundwater. A sudden increase in these ions can act as early warning system. The sampling history for chloride suggests that it does not indicate leachate presence in the groundwater. In fact the chloride levels are below the 250mg/L aesthetic criteria that are described in the 2011 *Australian Drinking Water Guidelines* 6.

Magnesium results presentation.



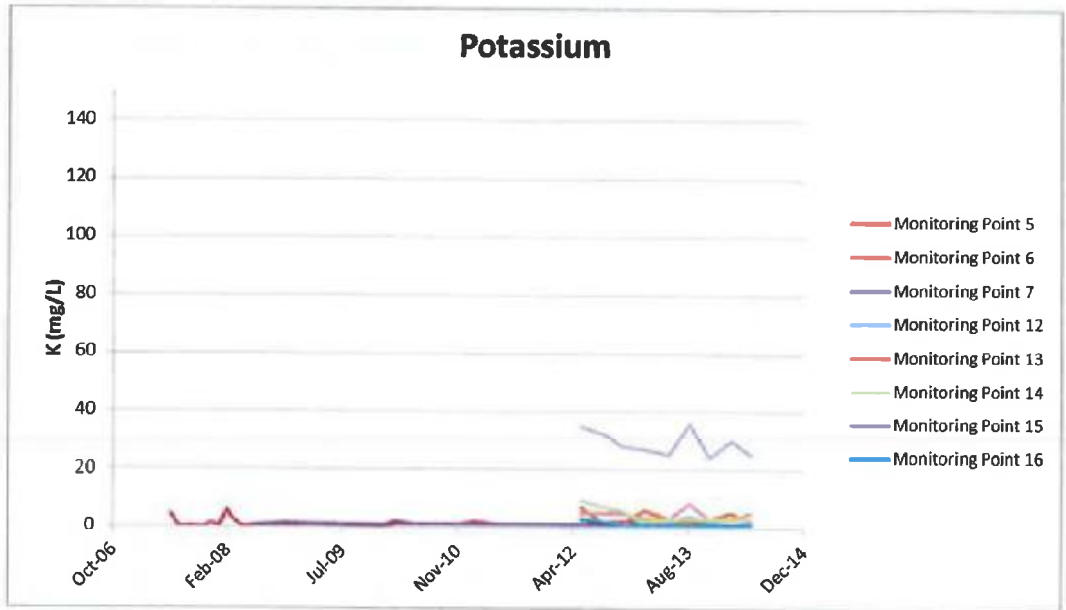
Groundwater monitoring well results are in line with historical levels and have maintained consistent levels with the exception of point 5, which is located up gradient of the site. However, point 5 is still considered to be at relative low levels. The magnesium levels sampled would be considered 'soft' in the 0-60mg/L area. 'Hard' water would be considered in the region of 120-180mg/L

Nitrogen as ammonia results presentation.



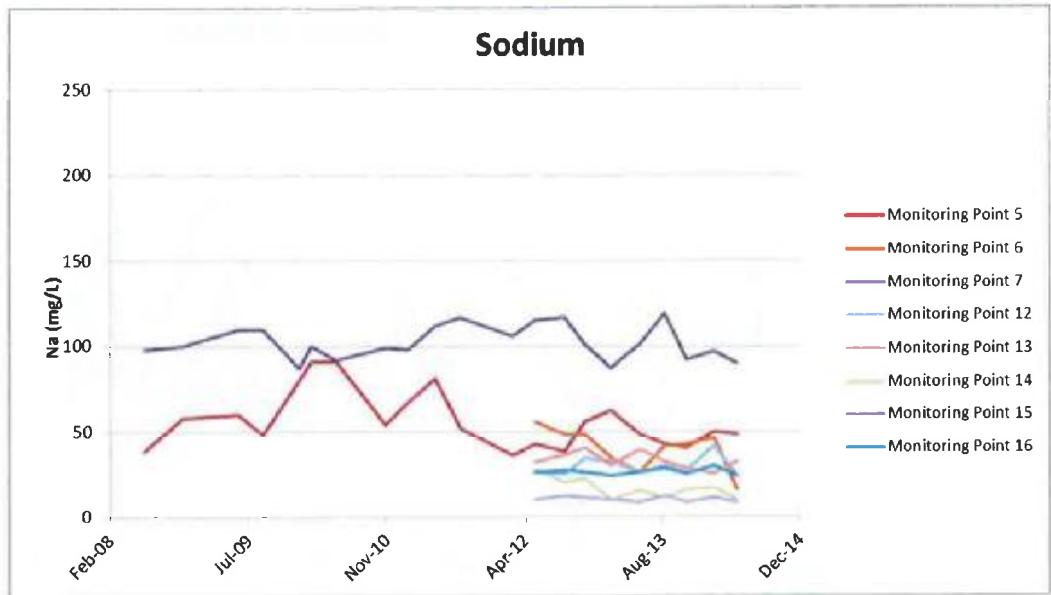
The groundwater monitoring wells indicate that ammonia levels in the groundwater are consistent over a long results period with the exception of seemingly anomalous rounds of testing in March 2008 and May 2012 derived from Bore 1, located up gradient from the site and indicative of the groundwater coming into the site. The relatively low results for ammonia in down gradient Bores 4, 6 and LGMB 4 indicate that the groundwater departing the site is not affected by Ammonia, which is perhaps the clearest signature of leachate.

Potassium results presentation.



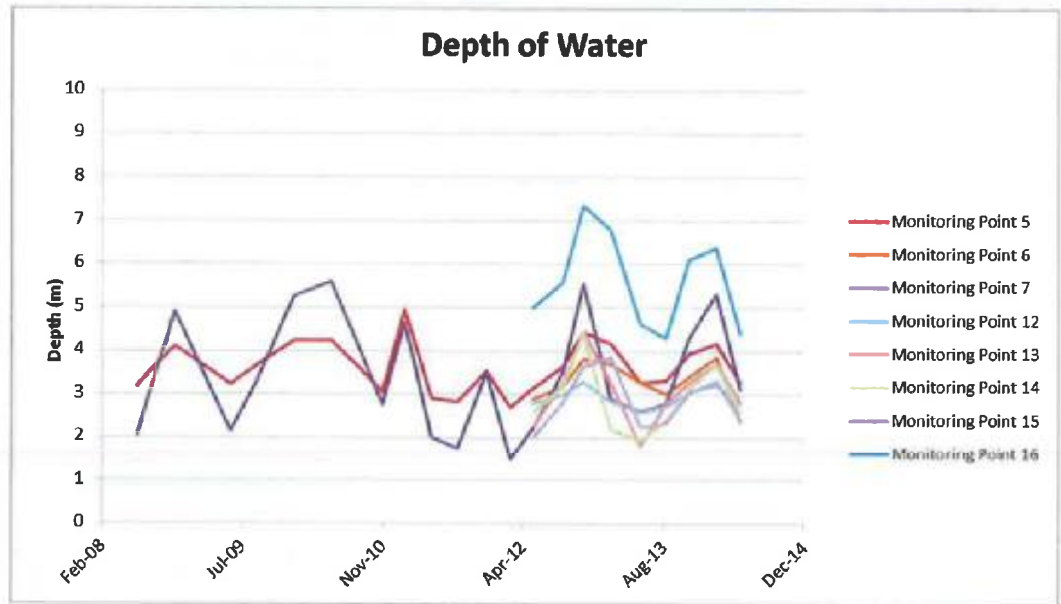
Potassium is present in groundwater systems outside coastal areas generally through weathering of clays and agricultural purposes (leaching of fertiliser). Potassium may also be present in the breakdown of glass and especially cathode ray tubes. Groundwater monitoring wells indicate that potassium levels in the groundwater have not increased relative to historic levels over the available results period. The breakdown of clay materials on the down gradient slope towards the Hacking River may be the reason for the relative elevation of potassium in monitoring point 15.

Sodium results presentation.



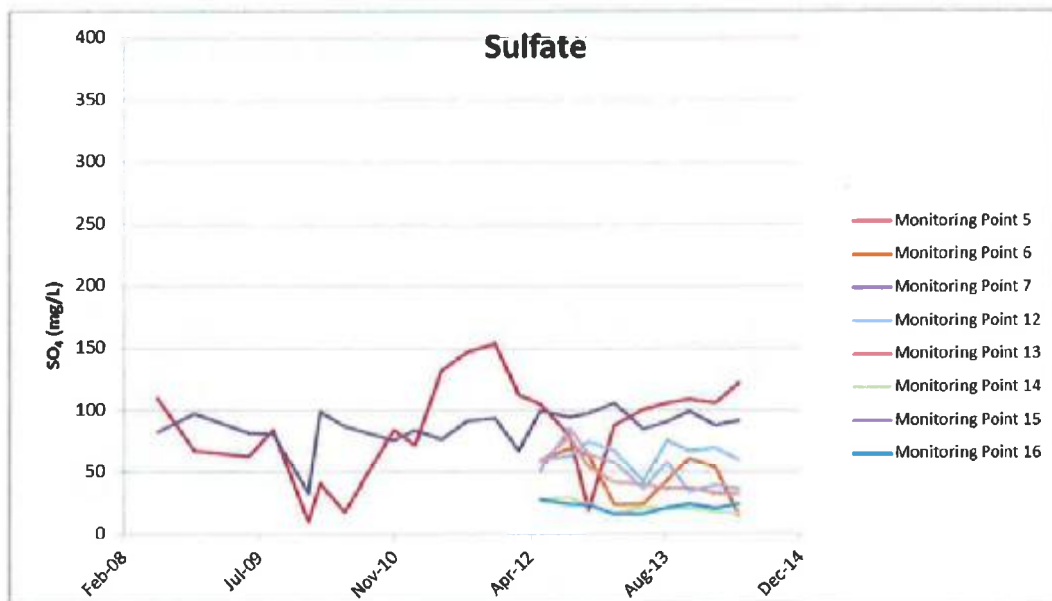
The trend for sodium has been stable over the history of available results. High sodium levels are another indicator of leachate infiltrating the groundwater. The 2011 Australian Drinking Water Guidelines 6 set a maximum level of sodium in drinking water at 180mg/L for aesthetic reasons. The sodium results experienced in the groundwater at Helensburgh indicate that the groundwater is not contaminated by leachate.

Standing water level presentation.



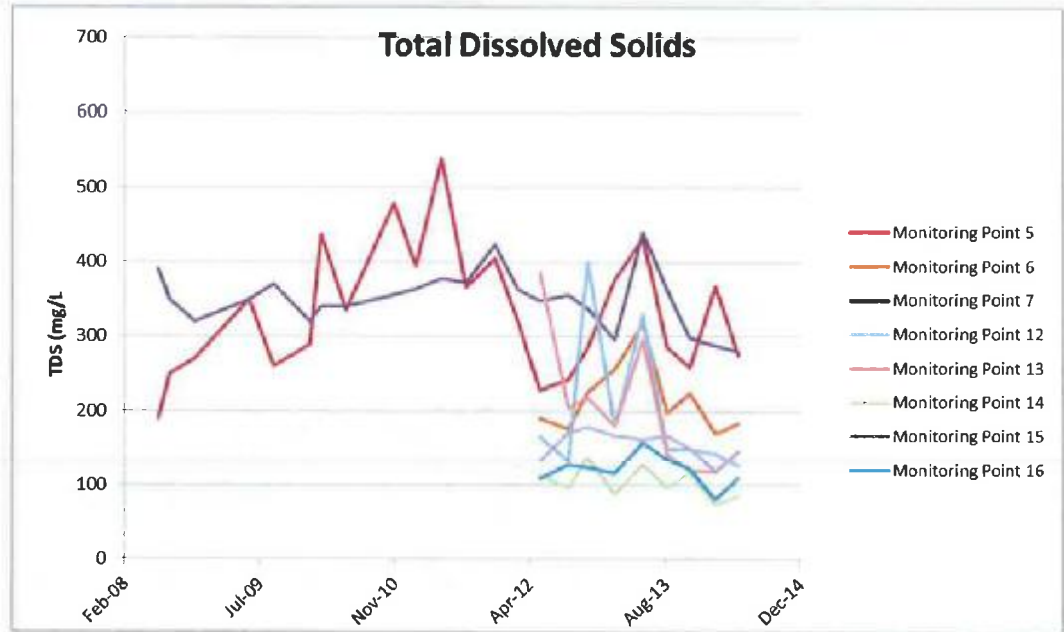
Groundwater level trends have been fairly stable, with the fluctuation over the 5 year testing period being a maximum of about 3.6m in monitoring point 7. The peaks and troughs presented appear consistent across the numerous monitoring points.

Sulfate results presentation.



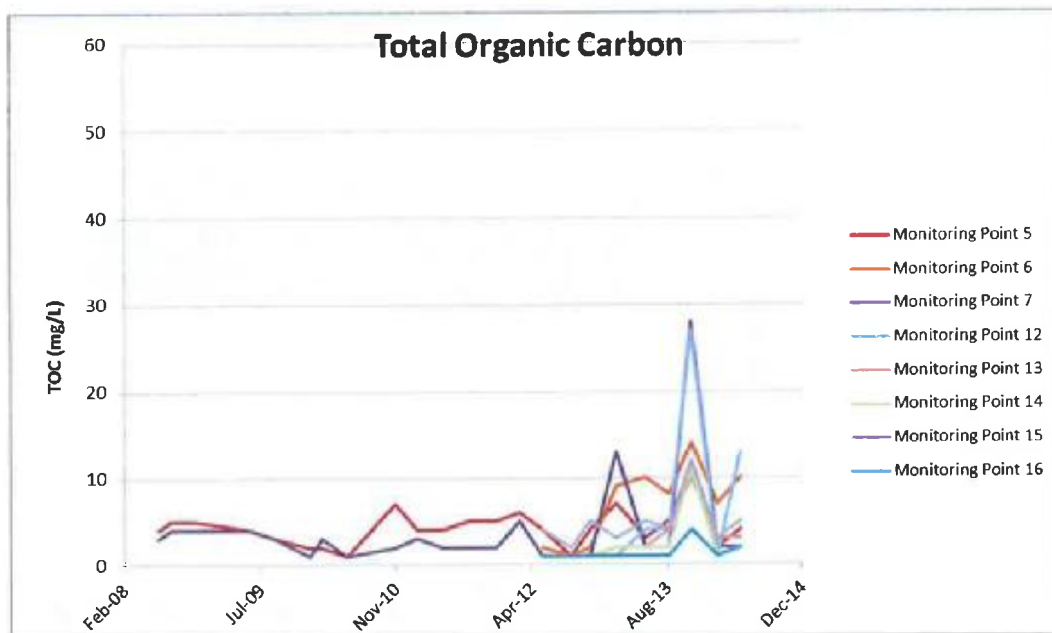
The 2011 *Australian Drinking Water Guidelines 6* sets maximum sulfate levels in drinking water as 500mg/L. The sulfate levels in the groundwater monitoring wells are in line with the historical levels and are below the drinkable water maximum standard. Inorganic ions such as sulfate provide a good indication of groundwater contamination by landfill leachate. A sudden increase in these ions can act as early warning system.

Total dissolved solids results presentation.



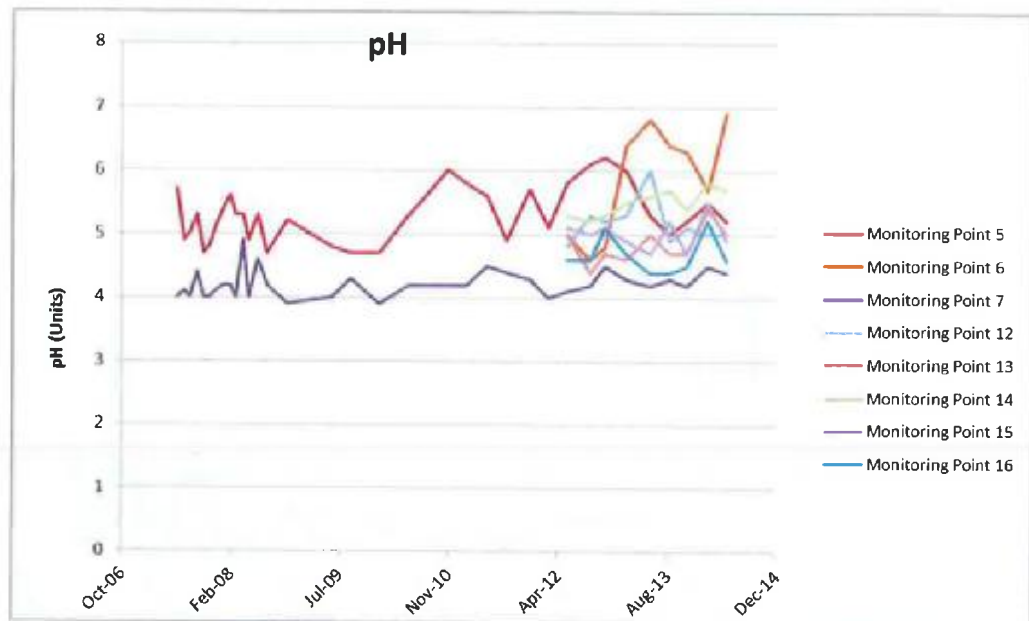
The 2011 Australian Drinking Water Guidelines 6 states that total dissolved solids levels of less than 600mg/L indicate good quality drinking water. The dissolved solids levels in the groundwater monitoring wells are in line with historical trends. High levels of dissolved solids can be sourced from salts derived from leachate infiltration.

Total organic carbon results presentation.



Microbial degradation of organic matter can increase the total organic carbon content in water and may provide evidence of groundwater contamination by organic compounds derived from the landfilling of organic matter. The amount of total organic carbon has remained consistently stable over the 5 year results period, with the exception of a multiple relatively high result in November 2013. The relatively higher incidents have returned to normal since the spike result. The relatively inconsistency in results between the up gradient and down gradient bores provides inconclusive detail. It should also be noted that organic materials have not been landfilled at the Helensburgh site since 1991.

pH results presentation



The pH levels indicated in the groundwater monitoring wells have been extremely stable over the seven year sample period. The fluctuations have been very small except with minor anomalies that invariably return to a stable trend. The groundwater monitoring wells indicate that the historical pH of the groundwater has been maintained over the seven year sample period. The relatively low pH found naturally in the groundwater on site give an increased propensity for heavy metals to breakdown and travel through the system.

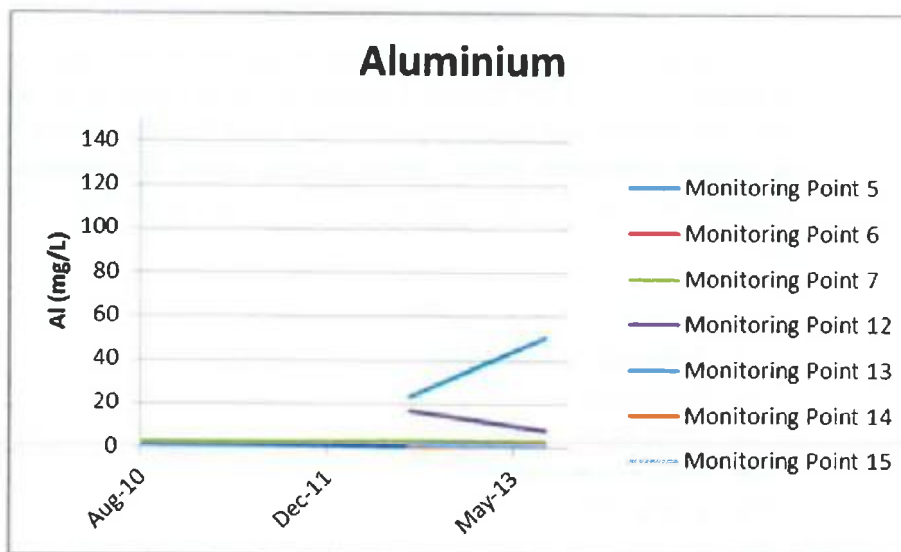
Monitoring point 6 should be closely monitored upon the receipt of future samples to ensure that an upward (basic) trend does not develop.

There is now four years' worth of annual groundwater regime sampling data available. Many of the sampled analytes over the four year sampling period have displayed such low contamination level that the results have been near or below detectable limits. There is little sense in graphically displaying analytes that hover on or below laboratory detectable limits. These analytes are:

- Arsenic
- Benzene
- Cadmium
- Chromium (hexavalent)
- Chromium (total)
- Cobalt
- Copper
- Ethyl benzene
- Fluoride
- Lead
- Mercury
- Nitrite
- Organochlorine pesticides
- Organophosphate pesticides
- Polycyclic aromatic hydrocarbons
- Toluene
- Total phenolics
- Total petroleum hydrocarbons
- Xylene

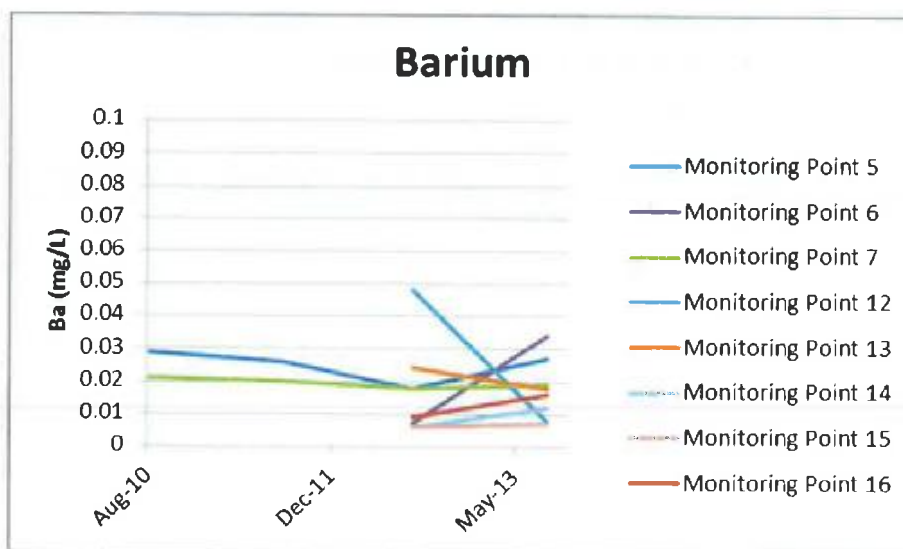
There is therefore little to gain from modelling aforementioned analytes. Only analytes with tangible results are modelled.

Aluminium results presentation.



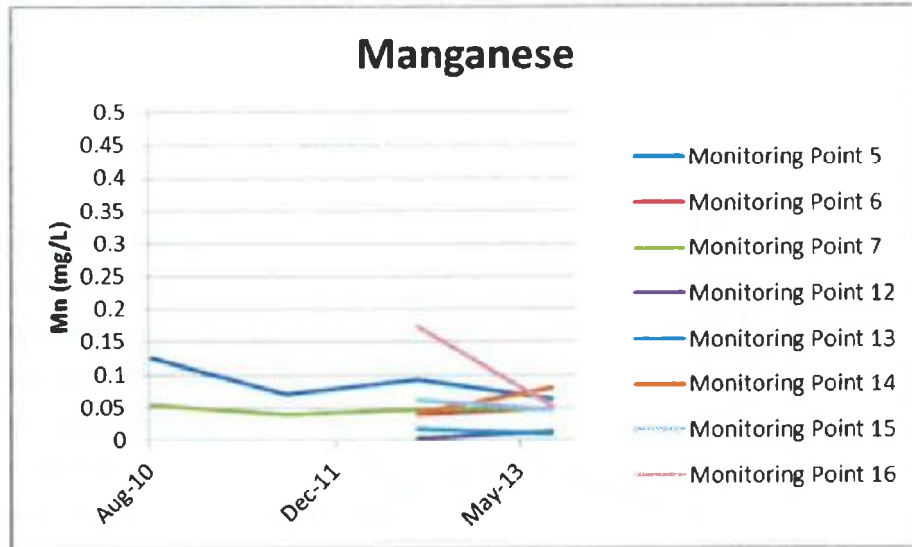
Aluminium levels in the sampled groundwater monitoring wells have traditionally been maintained at a consistent low level. However, relative higher levels of aluminium have been detected in Monitoring Points 12 and 13 which both represent the groundwater flow prior to intercepting the former landfill site. Anthropogenic sources of aluminium in groundwater are generally related to low pH runoff and colliery based leachate.

Barium results presentation



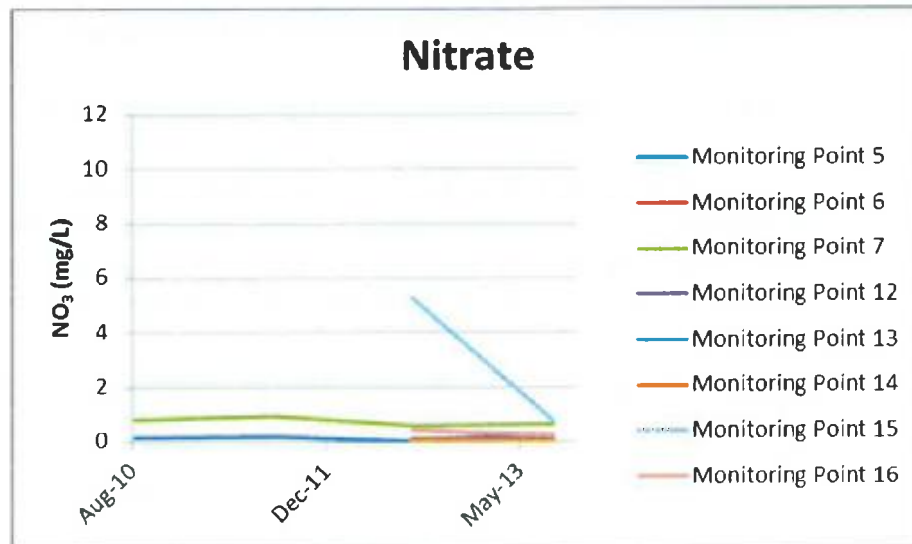
The 2011 Australian Drinking Water Guidelines 6 states that a maximum of 2 mg/L of barium is safe for consumption. Anthropogenic sources of barium in groundwater include bleaches, dyes and drillers mud. Barium levels are therefore extremely low and relatively stable in the sites groundwater.

Manganese results presentation



The 2011 Australian Drinking Water Guidelines 6 states that a maximum of 0.5 mg/L of manganese is safe for consumption. Manganese can be a strong indicator of landfill leachate in groundwater leached from hazardous waste sites and often derived from battery disposal. The extremely low manganese results particularly in downstream monitoring points 6, 7 and 15 provide that leachate infiltration into the surrounding groundwater is unlikely.

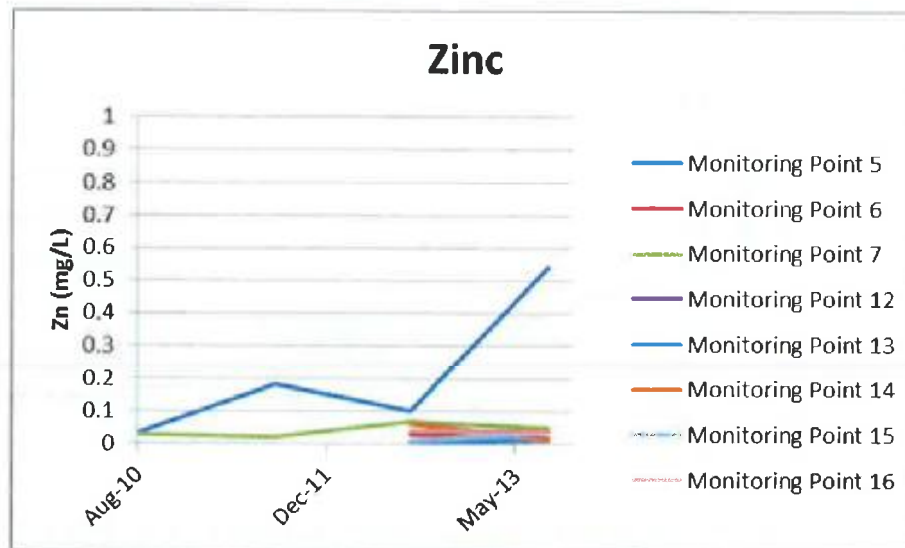
Nitrate results presentation



The 2011 Australian Drinking Water Guidelines 6 states that a maximum of 50 mg/L of nitrate is safe for consumption. Denitrification is a process common in leachate treatment with the anaerobic biological reduction of nitrate (NO_3) to nitrogen (N_2) in its gaseous form. Under anoxic conditions microorganisms consume the oxygen in the nitrate and liberate the nitrogen. The relatively

low levels of nitrate sampled particularly in downstream monitoring points 6, 7 and 15, indicate that landfill leachate is not present in the groundwater.

Zinc results presentation



The 2011 Australian Drinking Water Guidelines 6 states that for aesthetic reasons a maximum of 3 mg/L of zinc is desirable for consumption. Landfill sites can be an anthropogenic source of zinc in groundwater, however the extremely low levels of zinc detected indicate that landfill leachate is not intercepting the groundwater system around the site.

Unfortunately for all annually sampled analytes, trends have not been fully established as yet due to the lack of historical data available.

3.1.4 Groundwater Testing Results Interpretation

Results indicate that there has been no definitive increase in concentration levels for any of the analytes detailed when compared to the historical results and trends (where available). The following table indicates the analytes that should be closely monitored for developing trends over the next twelve months:

Analyte	Monitoring Point	Regime	Next Sample
Alkalinity	6	Quarterly	August 2014
pH	6	Quarterly	August 2014

On reflection, key indicators of landfill leachates potential ingress into ground water including ammonia, nitrate, nitrite levels and other less poignant indicators as tested do not conclude that that landfill leachate is entering the surrounding ground water system.

3.2 SURFACE WATER MONITORING

3.2.1 Tabulated Results

As per the sites EPL, stormwater overflow events and the Pony Club stormwater detention pond were monitored with the following results:

Analyte	28/06/2013	17/09/2013	18/11/2013	26/03/2014
Suspended Solids	5	16	10	28
pH	7.3	8	7.5	9

Table 3.2.1(a) Showing stormwater overflow monitoring results

Analyte	Unit	Aug-13	Nov-13	Feb-14	May-14
Conductivity	µS/cm	1205	1070	880	1080
Dissolved Oxygen	mg/L	6.47	5.03	7.39	6.08
Faecal Coliforms	CFU/100mL	<2	110	2400	410
Nitrogen (Ammonia)	mg/L	13.5	11.4	6	9.49
Potassium	mg/L	40	35	32	34
Redox Potential	mV	49	36	56	63
Total Dissolved Solids	mg/L	612	598	432	459
Total Organic Carbon	mg/L	27	51	16	14
pH	pH	7.4	7.3	7	?

Table 3.2.1(b) Showing quarterly stormwater quality in the pony club pond

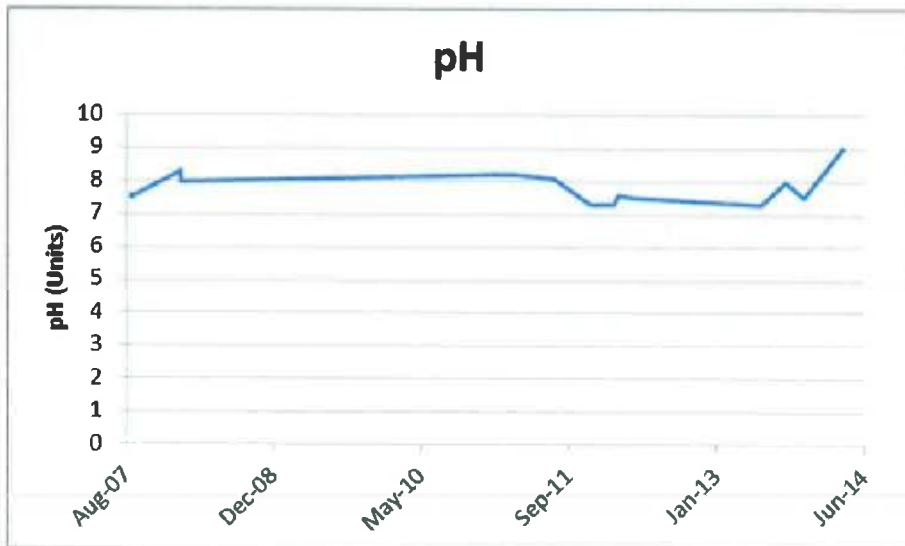
3.2.2 Data Presentation

Total Suspended Solids in stormwater overflow data presentation.



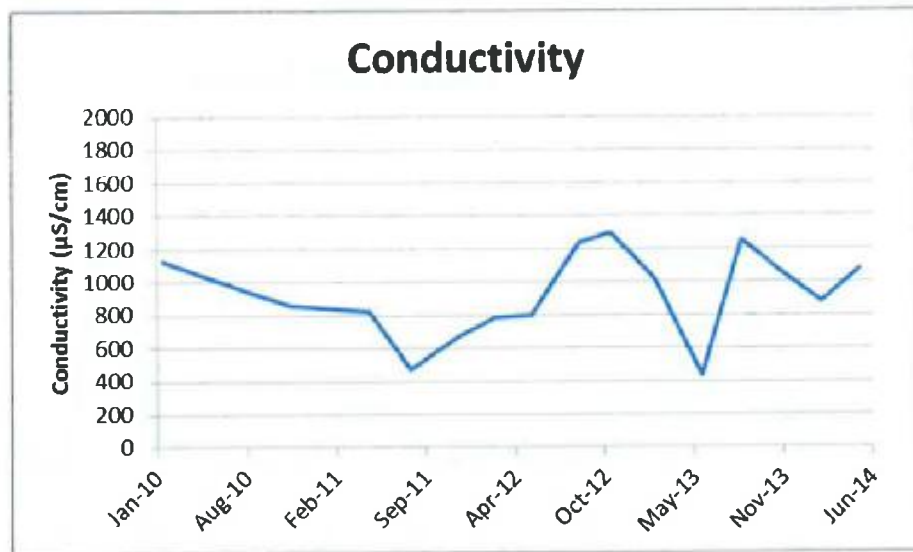
Apart from an individual spike in July 2011, the onsite stormwater treatment meets EPL requirements.

pH in stormwater overflow data presentation.

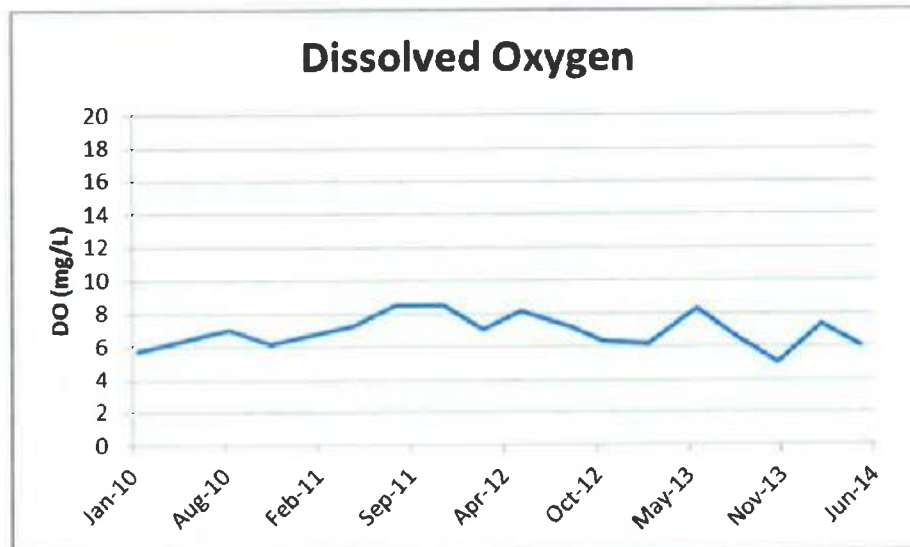


The pH derived from onsite stormwater has traditionally performed well within EPL requirements. A slight spike is apparent in the March 2014 result. The pH should therefore be monitored to ensure a return to more familiar levels.

Conductivity and dissolved oxygen in Pony Club Pond data presentation.

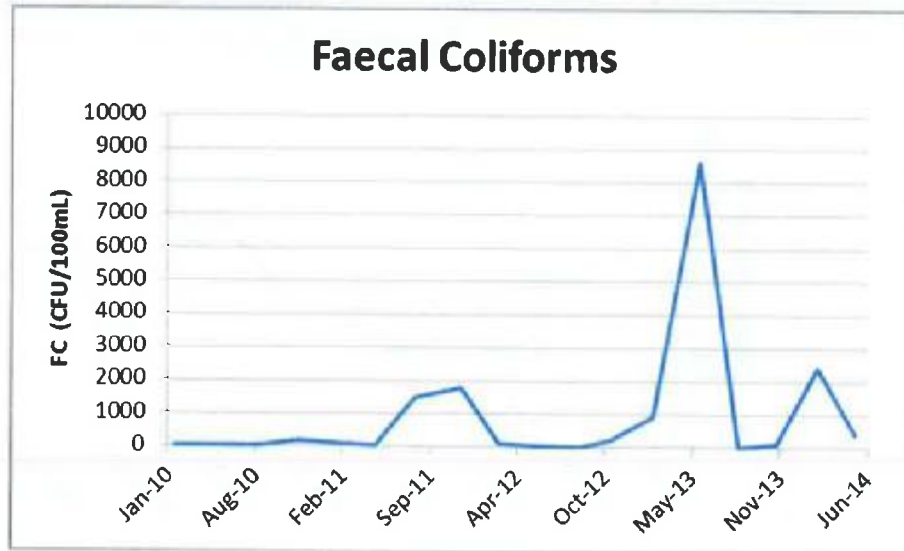


Conductivity is a measure of the waters ability to pass electrical current, usually though positively or negatively charged inorganic dissolved solids (e.g. sodium, magnesium, calcium, iron). The conductivity results for the Pony Club pond have been stable.



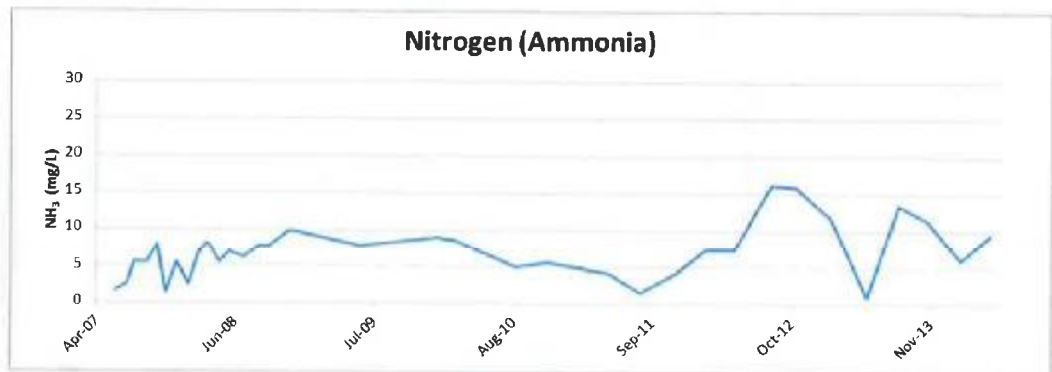
Dissolved oxygen levels can be depleted by biological activity associated with the nitrification process (common in leachate). The dissolved oxygen levels have been stable over the history of available results indicating leachate is not entering the Pony Club stormwater pond.

Faecal coliforms data presentation.



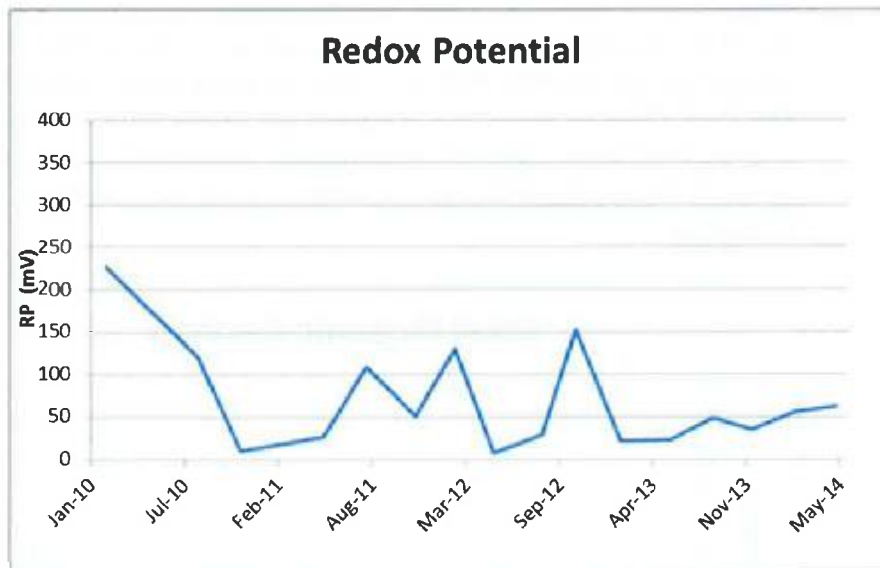
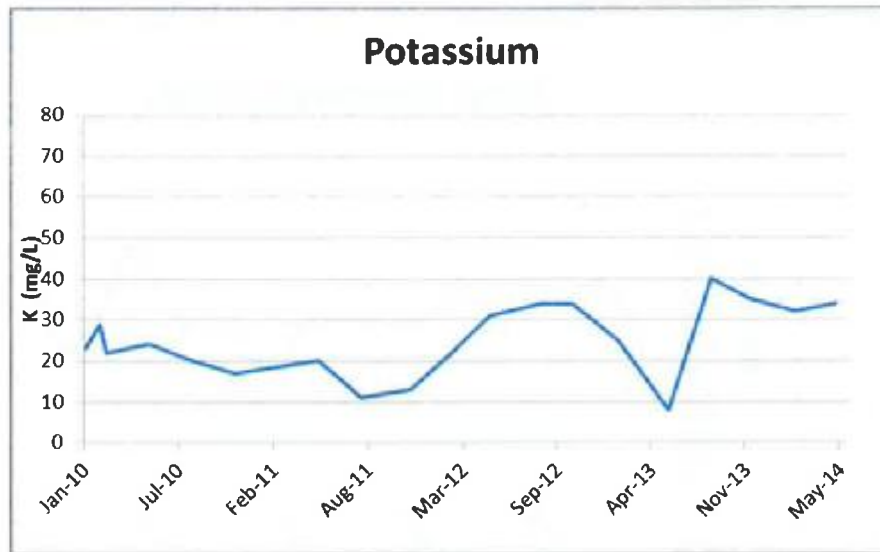
Coliforms are bacteria that live in animal intestines that can be found in excrement. The results displayed indicate that animal excrement may have been present in the pond in late 2011, May 2013 and again in February 2014. The site is exposed to off leash dogs, horses (as a Pony Club) and deer.

Nitrogen as ammonia data presentation.



Nitrogen (as Ammonia) has a relatively long history available for comparison. The trend has been ultimately stable over time fluctuating at a maximum between 2 and 17 mg/L. Therefore, there is no indication that leachate is entering the Pony Club pond.

Potassium and redox potential in Pony Club Pond data presentation.



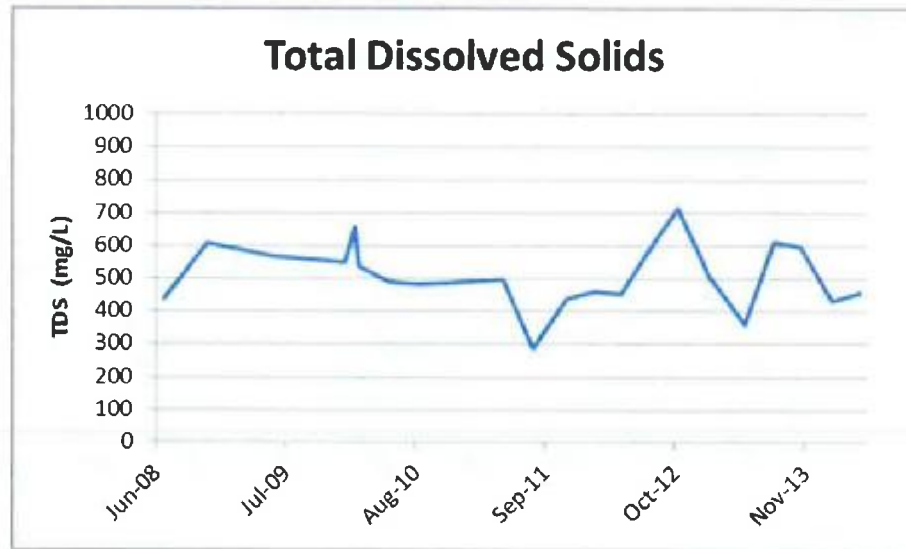
Both potassium and redox potential trends have been generally in line with historical trends.

Potassium is present in bodies of water outside coastal areas generally through weathering of clays and agricultural purposes (leaching of fertiliser).

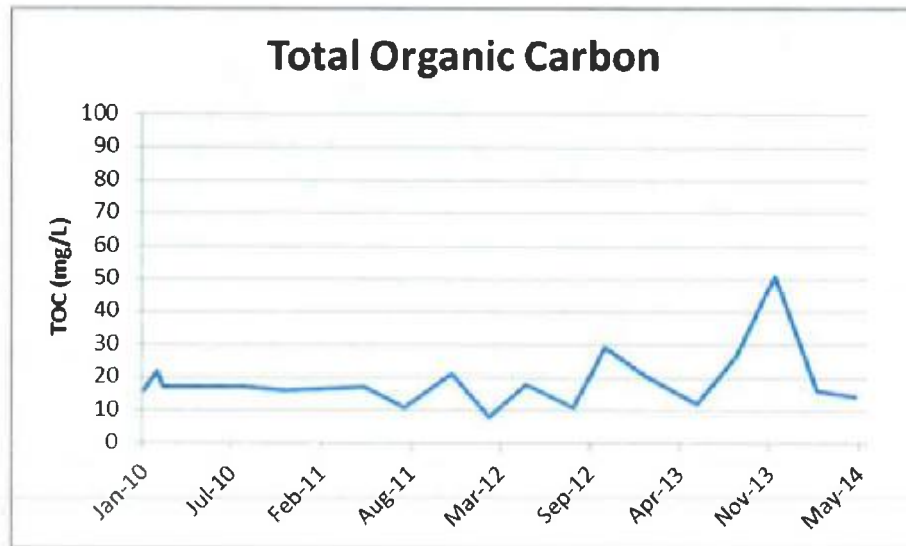
Redox reactions involve the transfer of electrons from a donor to a receptor and can be useful in determining if aerobic or anaerobic activity is occurring in a system.

Both potassium and redox potential levels sampled are considered to be within normal historical ranges.

Total dissolved solids and total organic carbon in Pony Club Pond data presentation.

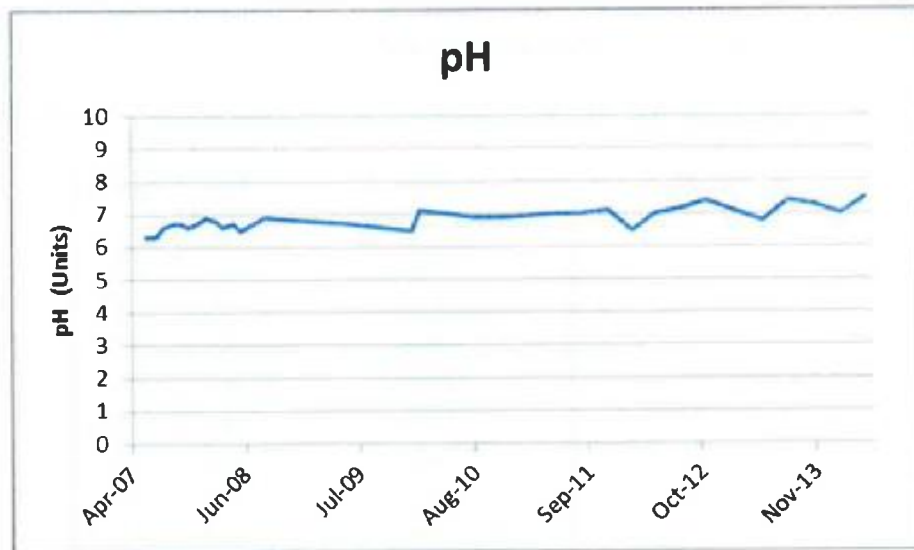


The 2011 Australian Drinking Water Guidelines 6 states that total dissolved solids levels of less than 600mg/L indicate good quality drinking water. The dissolved solids in the Pony Club pond are in line with historical trends and at levels considered good for consumption in terms of dissolved solids. High levels of dissolved solids can be sourced from salts derived from leachate infiltration.



Microbial degradation of organic matter can increase the total organic carbon content in water and may provide evidence of contamination by natural compounds derived from the landfilling of organic matter. The amount of total organic carbon has remained consistently stable over the sites history. It should also be noted that organic materials have not been landfilled at the Helensburgh site since 1991. The results displayed are similar to the TOC results found in the sites groundwater.

pH levels in Pony Club Pond data presentation.



Over relatively long history of data presented (7 years) the pH levels in the Pony Club pond have been ultimately stable and within optimal levels for the natural environment.

3.2.3 Stormwater Results Interpretation

From the data analysed for the Pony Club stormwater pond, all results are stable over the time period of available data. Despite the exhaustive list of analytes required to be tested in this ultimately minor stormwater pond, no abnormal results have been encountered. Therefore, the leachate system on site is not considered to be affecting the stormwater quality in the nearby Pony Club stormwater detention pond. Further, it can be accordingly demonstrated that the sites sediment and stormwater pond infrastructure is performing adequately and as desired.

3.3

LEACHATE POND MONITORING

3.3.1 Tabulated Results

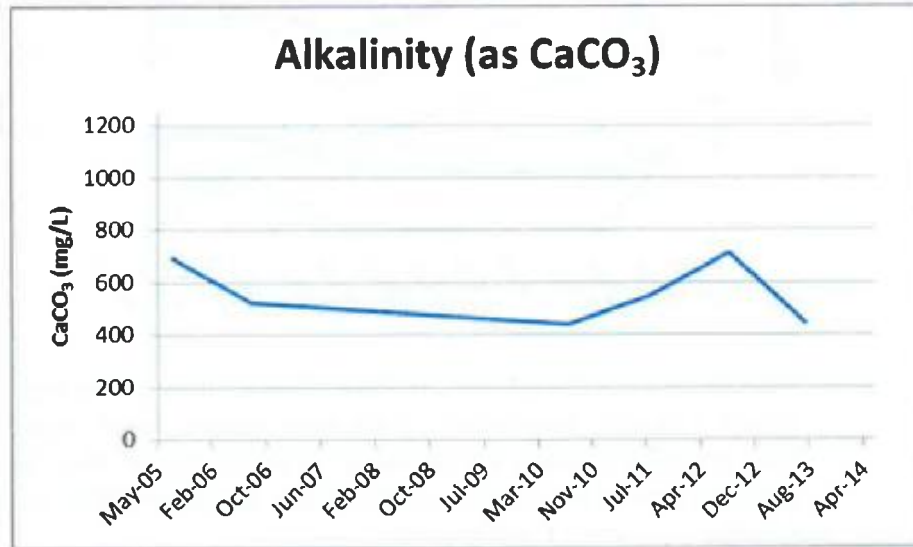
As per the EPL, the leachate pond was monitored with the following results:

Analyte	Units	Aug 2013
Alkalinity (as Calcium Carbonate)	mg/L	445
Aluminium	mg/L	<0.01
Arsenic	mg/L	<0.001
Barium	mg/L	0.162
Benzene	µg/L	<1
Cadmium	mg/L	<0.0001
Calcium	mg/L	96
Chloride	mg/L	73
Chromium (Hexavalent)	mg/L	<0.01
Chromium (Total)	mg/L	0.001
Cobalt	mg/L	0.001
Conductivity	µS/cm	1140
Copper	mg/L	0.009
Ethyl Benzene	µg/L	<2
Fluoride	mg/L	0.24
Lead	mg/L	<0.001
Magnesium	mg/L	43
Manganese	mg/L	0.009
Mercury	mg/L	<0.0001
Nitrate	mg/L	4.06
Nitrite	mg/L	4.09
Nitrogen (Ammonia)	mg/L	0.09
Organochlorine pesticides	µg/L	<0.5
Organophosphate pesticides	µg/L	<0.5
Phosphorus (Total)	mg/L	0.04
Polycyclic Aromatic Hydrocarbons	µg/L	<1
Potassium	mg/L	45
Sodium	mg/L	80
Sulfate	mg/L	48
Toluene	µg/L	<2
Total Phenolics	mg/L	<0.05
Total Dissolved Solids	mg/L	675
Total Organic Carbon	mg/L	24
Total Petroleum Hydrocarbons	µg/L	<50
Total Suspended Solids	mg/L	<5
Xylene	µg/L	<2
Zinc	mg/L	0.005
pH	pH	8

3.3.2 Data Presentation

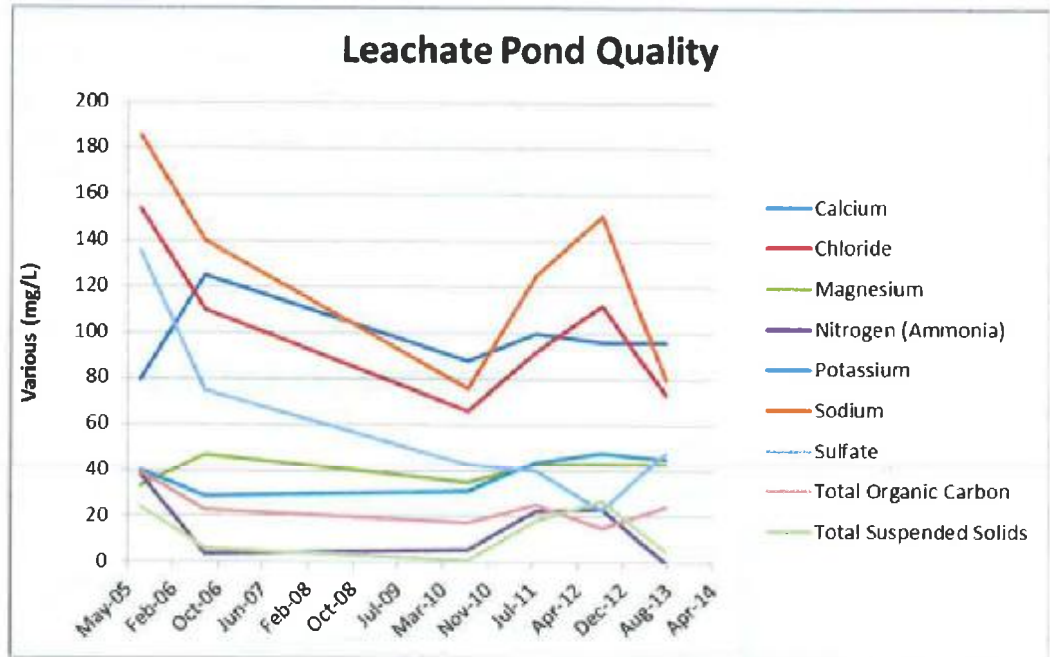
There is minimal history available for many of the analytes tested in the leachate dam at the Helensburgh Waste Disposal Depot. The data presented is only where there is a documented history of any results to draw comparisons to. All analytes that are sampled but not modelled are either near or below testable laboratory limits or isolated results that do not have historical data with which to compare.

Alkalinity as Calcium Carbonate results presentation.



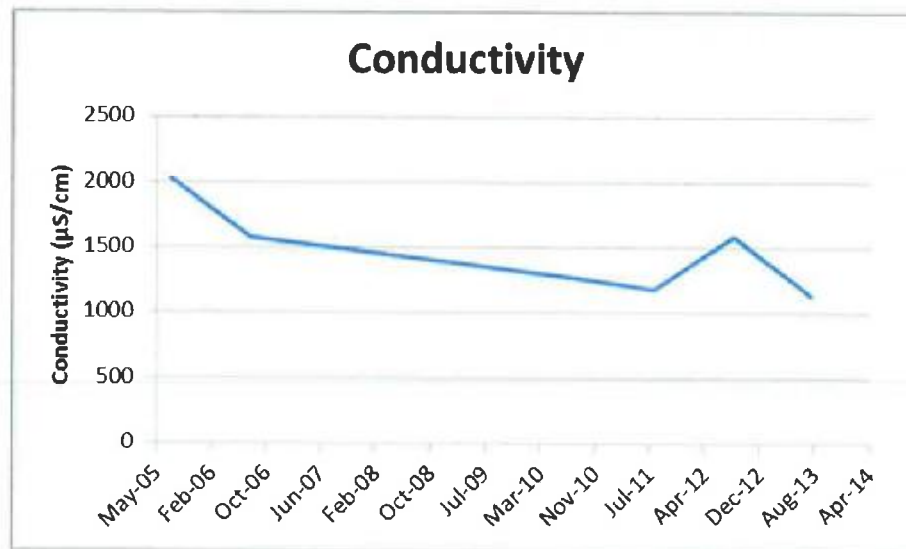
Alkalinity levels in the sites leachate are approximately 4 times higher than the highest groundwater result. Therefore indicating that leachate is probably not escaping the storage pond.

Multiple analytes results presentation



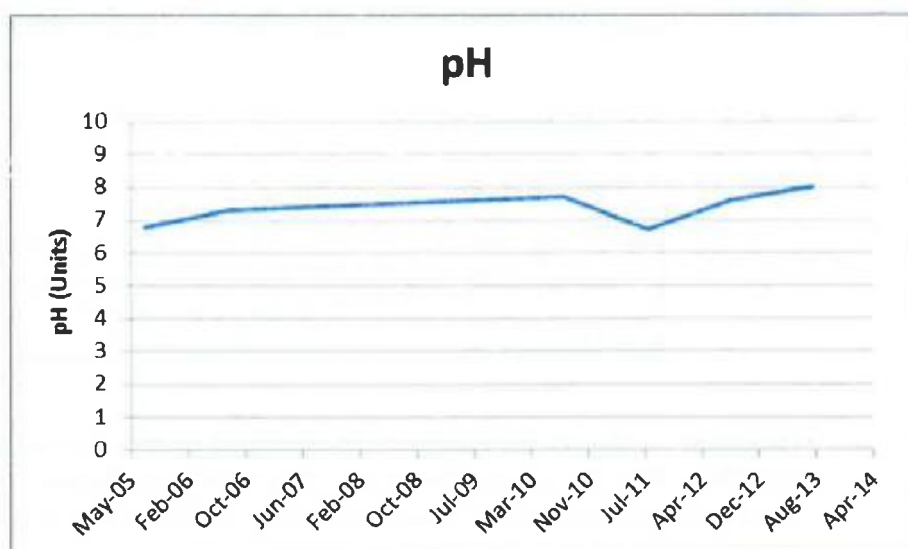
Data history for the plotted analytes shows either consistent or downward trends. Calcium, magnesium, potassium, sodium, total organic carbon and total suspended solids are all found at levels higher than the surrounding groundwater or the surface water pond, suggesting that leachate is being effectively contained and treated.

Conductivity results presentation.



Electrical conductivity levels are higher than the surrounding stormwater pond, suggesting that leachate is being effectively contained and treated.

pH results presentation.



pH levels in the leachate pond have remained stable over a relatively long sample period. The pH averages around 7.5 which would foster the aerobic nitrification process in the leachate.

3.3.3 *Leachate Pond Results Interpretation*

The results for the leachate pond water shows that the composition of the leachate may have improved slightly in regard to environmental consequence over the last seven years. This would reflect the increased environmental controls implemented on site and the ban on putrescible waste types many years prior. However, the lack of background data makes it difficult to draw any definitive conclusion. Further, the benefits of sampling leachate quality in a leachate pond are minimal aside from potential comparison to surrounding stormwater pond quality. But even in this instance, the extent of the analytes tested is far more onerous than would be used to indicate cross contamination.

3.4

AIR EMISSIONS MONITORING

3.4.1 *Tabulated Results*

Table 3.4.1(a) Methane monitoring results.

Date	Results Above Recommended Threshold 500ppm	Accumulation Above Recommended Threshold 1250ppm
Aug-13	0	0

Presented results are the numbers of individual results derived from monthly sampling that are above the EPA Benchmark Technique recommended threshold levels for further action regarding surface emissions (500 ppm) and accumulation levels (1,250 ppm).

Table 3.4.1(b) Methane monitoring results in Migration Monitoring Assets

Methane Concentration (ppm) - Landfill Gas Migration Monitoring Bores		
Monitoring Point Number	August 2012 (ppm)	August 2013 (ppm)
4	0.6	1.3
9	<0.1	0.5
10	70.6	3.5
11	1.7	2.3

Presented results are the methane concentration measured in the strategically placed gas migration monitoring bores for the previous two reporting periods.

3.4.2 *Data Presentation*

No data has been presented due to the fact that no emissions above EPA threshold levels for recommended further investigation were found on the site, nor have any results above these thresholds ever been found despite monthly testing completed voluntarily in past years.

3.4.3 *Air Emissions Monitoring Results Interpretation*

The site does not seem to be producing significant amounts of landfill gas, which is as expected for a recently former non-putrescible site. Resultant of the methane levels reported in the 2010-2011 Annual Environmental Management Report, Council now sample the site annually as prescribed in the sites EPL.

To address a potential problem identified in the 2010-2011 Annual Environmental Management Report regarding a lack of data able to be

ascertained from properties within 250m of the landfill footprint due to refused entry, Council installed four gas monitoring bores in 2011. The bores are strategically positioned as directed by GHD's landfill gas team and will provide evidence of the migration of landfill gas offsite towards residences. Testing completed indicates that gas migration is not evident.

3.5.1 *Tabulated Results*

Year	Environmental Complaints
2009/2010	1
2010/2011	4
2011/2012	11
2012/2013	0
2013/2014	0

Table 3.5.1 Tabulated complaints for the reporting period and historically

3.5.2 *Environmental Complaints Results Interpretation*

There were no environment related complaints that were attributed to the site in the previous two reporting period. This is as expected due to the site being closed.

4 *SITE SUMMATION*

4.1 *DEFICIENCY IDENTIFICATION & REMEDIATION*

No deficiencies were identified in the presented Annual Environmental Management Report. However, some further observations are recommended.

4.1.1 *Boreholes Indicating Potentially Imperfect Trend Stability*

As discussed in Section 3.1.4, monitoring well 6 has provided individual and incidental analytical results that require an increased level of scrutiny upon future measurements to ensure negative trends are not establishing. Whilst it is common for individual analytical results to vary from time to time, the prudent course of action is to provide an increased level of vigilance for these analyte and borehole combinations until such time the results return to historic levels or further action is required.

4.2 *CONCLUSION*

The site is performing adequately within the individual criteria and limits assigned to it in regard to environmental performance. The lack of deficiencies and nil non compliance's in conjunction with low levels of environmentally disruptive pollutants shows that Council has maintained good environmental performance considering the fact that the landfill is unlined. Council will continue to monitor the site in accordance with the sites EPL despite the fact that the site is now closed.

Annexure A

*A.1.1 Environmental Monitoring
Locations*

Environmental Monitoring
Locations



HELENSBURGH PLACE

ROAD

NIXON

HILLS

BLAKE

SURFACE GAS MONITORING

Predominant Groundwater Flow Direction



7

2

1

6

8

11 : 15

10 : 14

9 : 13

4 : 12

5

16

Helensburgh Waste Disposal Depot Environmental Monitoring Locations



Our Reference: Licence No. 5861

WOLLONGONG CITY COUNCIL
LOCKED BAG 8821
WOLLONGONG NSW 2500

29-May-2014

LICENCE ANNIVERSARY NOTICE

I refer to Environment Protection Licence No. 5861, issued to WOLLONGONG CITY COUNCIL by the Environment Protection Authority (EPA), under the *Protection of the Environment Operations Act 1997*.

This letter is to remind you of the annual licensing obligations, in particular the requirement to submit an Annual Return and annual licence fees.

Please find attached a customised Annual Return form that covers the period 29-May-2013 to 28-May-2014. The Annual Return is a declaration where you advise the EPA whether you complied or did not comply with the requirements of your licence. Where monitoring is required by your licence, you must enter a summary of the results in the Annual Return, using the table(s) provided. Please refer to <http://www.epa.nsw.gov.au/licensing> for guidance on completing annual returns.

All licensees must also provide specific information on the following:

Pollution Incident Response Management Plan (PIRMP)

In accordance with section 153A of the *Protection of the Environment Operations Act 1997*, all licensees are required to prepare and maintain a Pollution Incident Response Management Plan. In your Annual Return you must certify whether you have complied with the requirements to prepare and maintain a PIRMP.

For more information about the PIRMP requirements refer to the EPA's website at <http://www.epa.nsw.gov.au/legislation/20120227egpreppirmp.htm>.

Publication of Pollution Monitoring Data

In accordance with section 66(6) of the *Protection of the Environment Operations Act 1997*, all licensees who maintain a website are required to make any pollution monitoring data collected in compliance with monitoring conditions attached to their licence publicly available on the that website. If you operate a website you must clearly indicate the address of the website where the monitoring data can be accessed. In your Annual Return you must certify whether you have complied with these requirements.



For more information about the EPA's requirements for publishing pollution monitoring data, refer to EPA's website at

<http://www.epa.nsw.gov.au/legislation/20120263regpubomdata.htm>.

The completed Annual Return must be supplied to the EPA on or before 27-Jul-2014

An Annual Licence Tax Invoice/Statement indicating the licence administrative fee is attached, please note that this fee must be paid to the EPA by 28-Jul-2014. The licence administrative fee is based on the highest applicable administrative fee relevant to your Activity Type(s) minus any relevant credits that may be in your account. If your activity type or scale has changed you must apply for a variation of your licence using the form located at <http://www.epa.nsw.gov.au/licensing/licenceforms.htm>.

If the activities authorised by the licence are subject to Load-Based Licensing (LBL), payment of a load-based fee may also be required. Section A in the Annual Return will indicate whether the licensed activities have assessable pollutants. If this is the case, LBL applies to the licence. The load-based fees are calculated using the worksheets found in section D of the Annual Return. We do not need to see the load calculation workings, only the final load figures. However, you are required to keep records of the load calculations for auditing by the EPA.

If your licence is subject to load-based licence fees, there is an LBL Load Calculation Protocol that sets out the methods that may be used to calculate your emissions of assessable pollutants. The LBL Load Calculation Protocol is located at <http://www.epa.nsw.gov.au/licensing/lblprotocol/index.htm>.

It is important to note that the load based fee must not be paid at this time. A separate invoice for the load based fee will be issued once the EPA receives the Annual Return and load data. This load based fee must be submitted to the EPA **90 days after 28-May-2014**.

You are reminded that it is a condition of Licence No. 5861 that the Annual Return is submitted by the due date. It is an offence to:

- fail to complete the Annual Return;
- fail to return the Annual Return by the due date;
- provide false or misleading information in the Annual Return; or
- fail to provide monitoring data if required by a condition of your licence.

Failure to return your Annual Return to the EPA on or before 27-Jul-2014 may result in the issue of a Penalty Notice with a penalty payable of \$750 (individual) or \$1500 (corporation), or prosecution.

If the licence administrative fee is not paid to the EPA on or before 28-Jul-2014, a penalty will be imposed in accordance with section 57 (4) of the *Protection of the Environment Operations Act 1997*. The penalty is 5% of the outstanding amount and will continue to accrue at the rate of 5% simple interest every two weeks until the outstanding amount and penalty is paid in full. In accordance with section 79 of the *Protection of the Environment Operations Act 1997* the EPA may suspend or revoke the licence if the outstanding licence fee is not paid in full by the due date.



The Annual Return must be sent to the following address:

Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232

We are committed to assisting the licensed community to meet its obligations under the *Protection of the Environment Operations Act 1997*. If you have any questions relating to payment and calculation of fees or the submission of the Annual Return, please contact the EPA on 02 9995 5700.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Christopher Kelly', written in a cursive style.

CHRISTOPHER KELLY
Head Regulatory and Compliance Support Unit
Environment Protection Authority

TAX INVOICE / STATEMENT

The fees on this statement are exempt from GST by the Treasurer's determination under Division 81 of A New Tax System Act, 1999



For all invoice/statement enquiries phone (02) 9995 5700

WOLLONGONG CITY COUNCIL
LOCKED BAG 8821
WOLLONGONG NSW 2500

Statement Date

29.05.2014

Customer No: 300277 Licence/Notice No: 5861

Description	Date	Reference No.	Debit	Credit	Balance	Due Date
Carried Forward			0.00		0.00	
Admin Fee (Anniv)	29.05.2013	0390105612	3,616.00		3,616.00	28.07.2013
ISEMS-Direct Deposit LK	25.07.2013	0399643842		3,616.00	0.00	
Admin Fee (Anniv)	29.05.2014	0390108711	3,616.00		3,616.00	28.07.2014

Page 1 of 2

Total Amount Owing

\$ 3,616.00

Remittance Advice

Customer
WOLLONGONG CITY COUNCIL

Customer Number
300277

Licence/Notice No.
5861

Page 1 of 2

Total Amount Owing

\$ 3,616.00

The fees on this statement are exempt from GST by the Treasurer's determination under Division 81 of A New Tax System Act, 1999.

PAYMENT METHODS ARE LISTED ON THE LAST PAGE OF THIS INVOICE

Cheque or Money Order

If making payment by cheque or money order, please make cheques payable to the **Environment Protection Authority** and post your payment, with the **Remittance Advice**, to:

**Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232**

Electronic Funds Transfer (EFT)

Payments made by EFT must be deposited to the following account:

Bank: **Westpac Banking Corporation**
Account Name: **EPA Remit Account**
BSB: **032 001**
Account No: **205 469**

If you make payment(s) by EFT you **MUST** provide the following details to the Department on the day that payment is made, either by

Fax (02) 9995 5922
Email poeo.licensing@epa.nsw.gov.au

Licence Holder: **WOLLONGONG CITY COUNCIL**
Licence/Notice No: **5861**
Customer No: **300277**

Amount Paid: _____
Date of Payment: _____
Contact Person: _____
Telephone No: _____

PLEASE NOTE

If you do not submit this information when payment is made, the payment will not be receipted to your account and PENALTY INTEREST may accrue.

Environment Protection Authority DOES NOT accept payment of Environment Protection Licence fees by credit card.

FOR ALL INVOICE/STATEMENT ENQUIRIES PHONE (02) 9995 5700

Annual Return

WOLLONGONG CITY COUNCIL



ANNUAL RETURN

LICENCE NO	5861
LICENCE HOLDER	WOLLONGONG CITY COUNCIL
REPORTING PERIOD	29-May-2013 to 28-May-2014

If your licence has been transferred, suspended, surrendered or revoked by the EPA during this reporting period, cross out the dates above and specify the new dates to which this Annual Return relates below:

REVISED REPORTING PERIOD ____ / ____ / ____ to ____ / ____ / ____

(Note: the revised reporting period also needs to be entered in Section E)

THIS ANNUAL RETURN MUST BE RECEIVED BY THE EPA ON OR BEFORE 27-Jul-2014

Your Annual Return must be completed, including certification in Section E, and supplied to the EPA no later than 60 Days after the end of the reporting period for your licence.

Failure to submit this Annual Return within 60 days after the reporting period ends may result in:

- the issue of a Penalty Notice for \$750 (individuals) or \$1500 (corporations);
- OR
- prosecution.

Please send your completed Annual Return by **Registered Post** to:

**Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232**

It is an offence to supply any information in this form to the EPA that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect.

THERE IS A MAXIMUM PENALTY OF \$250,000 FOR A CORPORATION OR \$120,000 FOR AN INDIVIDUAL.

Details provided in this Annual Return will be available on the EPA's Public Register in accordance with section 308 of the *Protection of the Environment Operations Act 1997*.

Annual Return

WOLLONGONG CITY COUNCIL



Use the checklist below to ensure that you have completed your Annual Return correctly.
(✓ the boxes)

CHECKLIST	
<input type="checkbox"/>	Section A: All licence details are correct
<input type="checkbox"/>	Section B1: You have entered the correct number in the complaints table
<input type="checkbox"/>	Section B2 – B3: If there are tables, you have provided the required details
<input type="checkbox"/>	Section C: You have answered question 1, and 2 if applicable
<input type="checkbox"/>	Section D: If applicable, you have completed all load calculation worksheets
<input type="checkbox"/>	Section E: You have answered question 1, 2, 3, 4, 5 and 6 if applicable
<input type="checkbox"/>	Section F: You have answered question 1, 2 and 3 if applicable
<input type="checkbox"/>	Section G: The Annual Return has been signed by appropriate person(s) and, if applicable, the revised reporting period entered
<input type="checkbox"/>	Make a copy of the completed Annual Return and keep it with your licence records
<input type="checkbox"/>	Attach a cheque (unless you have paid separately) for the payment of the administrative fee for the next licence fee period

Please send your completed Annual Return by **Registered Post** to:

**Regulatory and Compliance Support Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232**

Annual Return

WOLLONGONG CITY COUNCIL



A Statement of Compliance - Licence Details

ALL licence holders must check that the licence details in Section A are correct

If there are changes to any of these details you must advise the EPA and apply as soon as possible for a variation to your licence or for a licence transfer.

Licence variation and transfer application forms are available on the EPA website at: <http://www.epa.nsw.gov.au/licensing>, or from regional offices of the EPA, or by contacting us on telephone 02 9995 5700.

If you are applying to vary or transfer your licence you must still complete this Annual Return.

A1 Licence Holder

Licence Number 5861
Licence Holder WOLLONGONG CITY COUNCIL
Trading Name (if applicable)
ABN 63 139 525 939

A2 Premises to which Licence Applies (if applicable)

Common Name (if any) HELENSBURGH WASTE DISPOSAL DEPOT
Premises NIXON PLACE HELENSBURGH NSW 2508

A3 Activities to which Licence Applies

Waste Disposal (application to land)

A4 Other Activities (if applicable)

A5 Fee-Based Activity Classifications

Note that the fee based activity classification is used to calculate the administrative fee.

Fee-based activity	Activity scale	Unit of measure
Waste disposal by application to land		annual capacity

A6 Assessable Pollutants (Not Applicable)

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B Monitoring and Complaints Summary

B1 Number of Pollution Complaints

<p>Number of complaints recorded by the licensee during the reporting period.</p> <p>If no complaints were received enter nil in the attached box, otherwise complete the table below.</p>	NIL
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Pollution Complaint Category	Number of Complaints
Air	
Water	
Noise	
Waste	
Other	

B2 Concentration Monitoring Summary

For each monitoring point identified in your licence complete all the details for each pollutant listed in the tables provided below.

If concentration monitoring is not required by your licence, no tables will appear below.

Note that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

Discharge & Monitoring Point 1

Overflow drain, DP1 - Overflow from stormwater pond as specified in Drawing No 500 of City of W'gong, Helensburgh Waste Depot Ext, Leachate Disposal Syst, Site Plan, 10.11.95

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
pH	pH	1	4	7.3	7.95	9

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Total suspended solids	milligrams per litre	1	4	5	14.75	28
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Monitoring Point 2

Leachate Dam, Leachate Dam

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	1	1	445	445	445
Aluminium	milligrams per litre	1	1	0.01	0.01	0.01
Arsenic	milligrams per litre	1	1	0.001	0.001	0.001
Barium	milligrams per litre	1	1	0.162	0.162	0.162
Benzene	milligrams per litre	1	1	1	1	1
Cadmium	milligrams per litre	1	1	0.0001	0.0001	0.0001
Calcium	milligrams per litre	1	1	96	96	96
Chloride	milligrams per litre	1	1	73	73	73
Chromium (hexavalent)	milligrams per litre	1	1	0.01	0.01	0.01
Chromium (total)	milligrams per litre	1	1	0.001	0.001	0.001
Cobalt	milligrams per litre	1	1	0.001	0.001	0.001
Conductivity	microsiemens per centimetre	4	4	1140	1320	1510

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Copper	milligrams per litre	1	1	0.009	0.009	0.009
Ethyl benzene	milligrams per litre	1	1	2	2	2
Fluoride	milligrams per litre	1	1	0.24	0.24	0.24
Lead	milligrams per litre	1	1	0.001	0.001	0.001
Magnesium	milligrams per litre	1	1	43	43	43
Manganese	milligrams per litre	1	1	0.009	0.009	0.009
Mercury	milligrams per litre	1	1	0.0001	0.0001	0.0001
Nitrate	milligrams per litre	1	1	4.06	4.06	4.06
Nitrite	milligrams per litre	1	1	4.09	4.09	4.09
Nitrogen (ammonia)	milligrams per litre	1	1	0.09	0.09	0.09
Organochlorine pesticides	milligrams per litre	1	1	0.5	0.5	0.5
Organophosphate pesticides	milligrams per litre	1	1	0.5	0.5	0.5
pH	pH	1	1	8	8	8
Phosphorus (total)	milligrams per litre	1	1	0.04	0.04	0.04
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	1	1	1
Potassium	milligrams per litre	1	1	45	45	45

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Sodium	milligrams per litre	1	1	80	80	80
Sulfate	milligrams per litre	1	1	48	48	48
Toluene	milligrams per litre	1	1	2	2	2
Total dissolved solids	milligrams per litre	1	1	675	675	675
Total organic carbon	milligrams per litre	1	1	24	24	24
Total petroleum hydrocarbons	milligrams per litre	1	1	50	50	50
Total Phenolics	milligrams per litre	1	1	0.05	0.05	0.05
Total suspended solids	milligrams per litre	1	1	5	5	5
Xylene	milligrams per litre	1	1	2	2	2
Zinc	milligrams per litre	1	1	0.005	0.005	0.005

Monitoring Point 3

Landfill gas monitoring, Areas where intermedlate or final cover has been placed

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Methane	percent by volume	1	1	0.00014	0.000309	0.00862

Monitoring Point 4

Landfill gas monitoring, LFGMB1 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

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Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Methane	percent by volume	1	1	0.00025	0.000209	0.00035

Monitoring Point 5

Ground water monitoring, BH1 - bore hole as shown on Plan 20298/SK 02 Site Plan

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	1	3.25	7
Aluminium	milligrams per litre	1	1	0.98	0.98	0.98
Arsenic	milligrams per litre	1	1	< 0.008	< 0.008	< 0.008
Barium	milligrams per litre	1	1	0.27	0.27	0.27
Benzene	milligrams per litre	1	1	< 1	< 1	< 1
Cadmium	milligrams per litre	1	1	0.003	0.003	0.003
Calcium	milligrams per litre	4	4	18	22.5	30
Chloride	milligrams per litre	4	4	65	80.5	107
Chromium (hexavalent)	milligrams per litre	1	1	< 0.1	< 0.1	< 0.1
Chromium (total)	milligrams per litre	1	1	0.001	0.001	0.001
Cobalt	milligrams per litre	1	1	0.005	0.005	0.005

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Copper	milligrams per litre	1	1	0.06	0.06	0.06
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	0.2	0.2	0.2
Lead	milligrams per litre	1	1	<0.008	<0.008	<0.008
Magnesium	milligrams per litre	4	4	14	17.50	23
Manganese	milligrams per litre	1	1	0.063	0.063	0.063
Mercury	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Nitrate	milligrams per litre	1	1	<0.01	<0.01	<0.01
Nitrite	milligrams per litre	1	1	<0.01	<0.01	<0.01
Nitrogen (ammonia)	milligrams per litre	4	4	0.27	0.46	0.76
Organochlorine pesticides	milligrams per litre	1	1	0.5	0.5	0.5
Organophosphate pesticides	milligrams per litre	1	1	0.5	0.5	0.5
pH	pH	4	4	5	5.23	5.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	1	1	1
Sodium	milligrams per litre	4	4	40	45	50

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Standing Water Level	metres	4	4	3.26	3.67	4.17
Sulfate	milligrams per litre	4	4	106	110.75	122
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	259	296.75	367
Total organic carbon	milligrams per litre	4	4	2	5.50	11
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	.541	.541	.541

Monitoring Point 6

Ground water monitoring, GWMB6 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	28	67.75	123
Aluminium	milligrams per litre	1	1	0.24	0.24	0.24
Arsenic	milligrams per litre	1	1	<0.005	<0.005	<0.005
Barium	milligrams per litre	1	1	0.034	0.034	0.034

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Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	.0001	.0001	.0001
Calcium	milligrams per litre	4	4	13	19	29
Chloride	milligrams per litre	4	4	20	33-75	41
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	.002	.002	.002
Cobalt	milligrams per litre	1	1	.003	.003	.003
Copper	milligrams per litre	1	1	0.011	0.011	0.011
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	.001	.001	.001
Magnesium	milligrams per litre	4	4	7	9-75	14
Manganese	milligrams per litre	1	1	.173	.173	.173
Mercury	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Nitrate	milligrams per litre	1	1	0.01	0.01	0.01
Nitrite	milligrams per litre	1	1	<0.01	<0.01	<0.01

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Nitrogen (ammonia)	milligrams per litre	4	4	0.001	0.001	0.002
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
pH	pH	4	4	5.7	6.33	6.9
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	2	3	5
Sodium	milligrams per litre	4	4	16	36.25	46
Standing Water Level	metres	4	4	2.37	3.16	3.85
Sulfate	milligrams per litre	4	4	14	42.75	61
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	169	193.75	224
Total organic carbon	milligrams per litre	4	4	7	9.75	14
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	.028	.028	.028

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Monitoring Point 7

Ground water monitoring, BH4 - bore hole as shown on Plan 20298/SK 02 Site Plan

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	1	1	1
Aluminium	milligrams per litre	1	1	2.58	2.58	2.58
Arsenic	milligrams per litre	1	1	<0.001	<0.001	<0.001
Barium	milligrams per litre	1	1	0.019	0.019	0.019
Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	0.003	0.003	0.003
Calcium	milligrams per litre	4	4	1	1	1
Chloride	milligrams per litre	4	4	95	113.75	145
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	0.001	0.001	0.001
Cobalt	milligrams per litre	1	1	0.001	0.001	0.001
Copper	milligrams per litre	1	1	0.008	0.008	0.008
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1

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Lead	milligrams per litre	1	1	0.003	0.003	0.003
Magnesium	milligrams per litre	4	4	5	5-25	6
Manganese	milligrams per litre	1	1	0.046	0.046	0.046
Mercury	milligrams per litre	1	1	<0.001	<0.001	<0.001
Nitrate	milligrams per litre	1	1	0.66	0.66	0.66
Nitrite	milligrams per litre	1	1	0.66	0.66	0.66
Nitrogen (ammonia)	milligrams per litre	4	4	.01	.08	0.19
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
pH	pH	4	4	4.2	4.35	4.5.
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	1	1-25	2
Sodium	milligrams per litre	4	4	90	99.5	119
Standing Water Level	metres	4	4	2.77	3.87	5.3
Sulfate	milligrams per litre	4	4	88.	92-50	99
Toluene	milligrams per litre	1	1	<2	<2	<2

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Total dissolved solids	milligrams per litre	4	4	281	307-25	362
Total organic carbon	milligrams per litre	4	4	2	8.5	28
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.051	0.051	0.051

Monitoring Point 8

Surface water monitoring, WCC ref - Pony Club as shown on Plan 20298/SK 02 Site Plan

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Conductivity	microsiemens per centimetre	4	4	880	1070	1250
Dissolved Oxygen	milligrams per litre	4	4	5.03	6.24	7.39
Faecal Coliforms	colony forming units per 100 millilitres	4	4	2	730.5	2400
Nitrogen (ammonia)	milligrams per litre	4	4	6	10.10	13.5
pH	pH	4	4	7	7.3	7.5
Potassium	milligrams per litre	4	4	32	35.25	40
Redox potential	millivolts	4	4	36	51	63

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Total dissolved solids	milligrams per litre	4	4	432	525.25	612
Total organic carbon	milligrams per litre	4	4	14	27	51

Monitoring Point 9

Landfill gas monitoring, LFGMB2 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Methane	percent by volume	1	1	0.5	0.5	0.5

Monitoring Point 10

Landfill gas monitoring, LFGMB3 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Methane	percent by volume	1	1	3.5	3.5	3.5

Monitoring Point 11

Landfill gas monitoring, LFGMB4 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Methane	percent by volume	1	1	2.3	2.3	2.3

Monitoring Point 12

Groundwater monitoring, LFGMB1 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

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Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	8	11.25	14
Aluminium	milligrams per litre	1	1	7.76	7.76	7.76
Arsenic	milligrams per litre	1	1	0.002	0.002	0.002
Barium	milligrams per litre	1	1	0.008	0.008	0.008
Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Calcium	milligrams per litre	4	4	7	7.25	8
Chloride	milligrams per litre	4	4	13	17.75	24
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	<0.001	<0.001	<0.001
Copper	milligrams per litre	1	1	0.004	0.004	0.004
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	0.002	0.002	0.002
Magnesium	milligrams per litre	1	1	6	6.25	7

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Manganese	milligrams per litre	1	1	0.003	0.003	0.003
Mercury	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Nitrate	milligrams per litre	1	1	0.09	0.09	0.09
Nitrite	milligrams per litre	1	1	<0.01	<0.01	<0.01
Nitrogen (ammonia)	milligrams per litre	4	4	<0.01	0.02	0.04
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	1	2.25	4
Sodium	milligrams per litre	4	4	24	30.5	41
Standing Water Level	metres	4	4	2.72	2.94	3.22
Sulfate	milligrams per litre	4	4	60	68.5	76
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	126	141.75	149
Total organic carbon	milligrams per litre	4	4	1	11.25	27
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50

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Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.007	0.007	0.007

Monitoring Point 13

Groundwater monitoring, LFGMB2 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	1	4.75	10
Aluminium	milligrams per litre	1	1	50.4	50.4	50.4
Arsenic	milligrams per litre	1	1	0.003	0.003	0.003
Barium	milligrams per litre	1	1	0.024	0.024	0.024
Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	0.002	0.002	0.002
Calcium	milligrams per litre	4	4	7	7.75	9
Chloride	milligrams per litre	4	4	23	44	56
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	0.072	0.072	0.072

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Copper	milligrams per litre	1	1	0.016	0.016	0.016
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	0.02	0.02	0.02
Magnesium	milligrams per litre	4	4	5	5.5	6
Manganese	milligrams per litre	1	1	0.01	0.01	0.01
Mercury	milligrams per litre	1	1	0.0001	0.0001	0.0001
Nitrate	milligrams per litre	1	1	0.02	0.02	0.02
Nitrite	milligrams per litre	1	1	<0.01	<0.01	<0.01
Nitrogen (ammonia)	milligrams per litre	4	4	0.01	0.02	0.03
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	3	4.75	8
Sodium	milligrams per litre	4	4	25	29.25	32
Standing Water Level	metres	4	4	2.77	3.15	3.71

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Sulfate	milligrams per litre	4	4	32	34-25	37
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	117	131-5	147
Total organic carbon	milligrams per litre	4	4	3	5	10
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.042	0.042	0.042

Monitoring Point 14

Groundwater monitoring, LFGMB3 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	16	20-25	28
Aluminium	milligrams per litre	1	1	1.05	1.05	1.05
Arsenic	milligrams per litre	1	1	0.001	0.001	0.001
Barium	milligrams per litre	1	1	0.006	0.006	0.006
Benzene	milligrams per litre	1	1	<1	<1	<1

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Cadmium	milligrams per litre	1	1	0.002	0.002	0.002
Calcium	milligrams per litre	4	4	7	9-25	11
Chloride	milligrams per litre	4	4	13	23-25	34
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	0.002	0.002	0.002
Copper	milligrams per litre	1	1	0.01	0.01	0.01
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	0.002	0.002	0.002
Magnesium	milligrams per litre	4	4	4	4-75	6
Manganese	milligrams per litre	1	1	0.042	0.042	0.042
Mercury	milligrams per litre	1	1	0.0001	0.0001	0.0001
Nitrate	milligrams per litre	1	1	0.08	0.08	0.08
Nitrite	milligrams per litre	1	1	0.01	0.01	0.01
Nitrogen (ammonia)	milligrams per litre	4	4	0.01	0.12	0.24
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5

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Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	3	3	3
Sodium	milligrams per litre	4	4	10	13.5	17
Standing Water Level	metres	4	4	2-4	2-95	3-67
Sulfate	milligrams per litre	4	4	16	18.25	20
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	74	93.25	117
Total organic carbon	milligrams per litre	4	4	1	4	11
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.062	0.062	0.062

Monitoring Point 15

Groundwater monitoring, LFGMB4 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value

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Alkalinity (as calcium carbonate)	milligrams per litre	4	4	2	4	8
Aluminium	milligrams per litre	1	1	0.07	0.07	0.07
Arsenic	milligrams per litre	1	1	<0.001	<0.001	<0.001
Barium	milligrams per litre	1	1	0.006	0.006	0.006
Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Calcium	milligrams per litre	4	4	8	9-25	11
Chloride	milligrams per litre	4	4	11	14-5	20
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	<0.001	<0.001	<0.001
Copper	milligrams per litre	1	1	0.001	0.001	0.001
Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	<0.001	<0.001	<0.001
Magnesium	milligrams per litre	4	4	4	4	4
Manganese	milligrams per litre	1	1	0.047	0.047	0.047

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Mercury	milligrams per litre	1	1	<0.0001	<0.0001	<0.0001
Nitrate	milligrams per litre	1	1	5.28	5.28	5.28
Nitrite	milligrams per litre	1	1	<0.01	<0.01	<0.01
Nitrogen (ammonia)	milligrams per litre	4	4	0.01	0.02	0.04
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	24	28.75	36
Sodium	milligrams per litre	4	4	8	9.75	12
Standing Water Level	metres	4	4	2.32	2.78	3.32
Sulfate	milligrams per litre	4	4	34	41.75	58
Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	119	145.5	167
Total organic carbon	milligrams per litre	4	4	3	6	12
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05

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Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.009	0.009	0.009

Monitoring Point 16

Groundwater monitoring, GWMB5 - "Well Locations - Installation of Groundwater and Gas Monitoring Wells - Helensburgh Waste Facility, Nixon Place, Helensburgh", Douglas Partners, December 2011

Pollutant	Unit of measure	No. of samples required by licence	No. of samples you collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Alkalinity (as calcium carbonate)	milligrams per litre	4	4	1	1	1
Aluminium	milligrams per litre	1	1	0.67	0.67	0.67
Arsenic	milligrams per litre	1	1	<0.001	<0.001	<0.001
Barium	milligrams per litre	1	1	0.009	0.009	0.009
Benzene	milligrams per litre	1	1	<1	<1	<1
Cadmium	milligrams per litre	1	1	0.007	0.007	0.007
Calcium	milligrams per litre	4	4	3	3.5	4
Chloride	milligrams per litre	4	4	43	47	50
Chromium (hexavalent)	milligrams per litre	1	1	<0.01	<0.01	<0.01
Chromium (total)	milligrams per litre	1	1	<0.001	<0.001	<0.001
Copper	milligrams per litre	1	1	0.012	0.012	0.012

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Ethyl benzene	milligrams per litre	1	1	<2	<2	<2
Fluoride	milligrams per litre	1	1	<0.1	<0.1	<0.1
Lead	milligrams per litre	1	1	.001	.001	.001
Magnesium	milligrams per litre	4	4	4	4-75	5
Manganese	milligrams per litre	1	1	.053	.053	.053
Mercury	milligrams per litre	1	1	<0.001	<0.001	<0.001
Nitrate	milligrams per litre	1	1	0.41	0.41	0.41
Nitrite	milligrams per litre	1	1	0.41	0.41	0.41
Nitrogen (ammonia)	milligrams per litre	4	4	0.01	0.01	0.02
Organochlorine pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Organophosphate pesticides	milligrams per litre	1	1	<0.5	<0.5	<0.5
Polycyclic aromatic hydrocarbons	milligrams per litre	1	1	<1	<1	<1
Potassium	milligrams per litre	4	4	1	1	1
Sodium	milligrams per litre	4	4	24	26-75	30
Standing Water Level	metres	4	4	4.41	9-47	21
Sulfate	milligrams per litre	4	4	4.31	18.08	24

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Toluene	milligrams per litre	1	1	<2	<2	<2
Total dissolved solids	milligrams per litre	4	4	81	111-75	135
Total organic carbon	milligrams per litre	4	4	1	2	4
Total petroleum hydrocarbons	milligrams per litre	1	1	<50	<50	<50
Total Phenolics	milligrams per litre	1	1	<0.05	<0.05	<0.05
Xylene	milligrams per litre	1	1	<2	<2	<2
Zinc	milligrams per litre	1	1	0.039	0.039	0.039

B3 Volume or Mass Monitoring Summary

For each monitoring point identified in your licence complete the details of the volume or mass monitoring indicated in the tables provided below.

If volume or mass monitoring is not required by your licence, no tables will appear below.

Note that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

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C Statement of Compliance - Licence Conditions

C1 Compliance with Licence Conditions

(the boxes)

- 1 Were all conditions of the licence complied with (including monitoring and reporting requirements)? Yes No

(a box)

- 2 If you answered 'No' to question 1, please supply the following details for each non-compliance in the format, or similar format, provided on the following page.

Please use a separate page for each licence condition that has not been complied with.

- a) What was the specific licence condition that was not complied with?
- b) What were the particulars of the non-compliance?
- c) What were the date(s) when the non-compliance occurred, if applicable?
- d) If relevant, what was the precise location where the non-compliance occurred?

Attach a map or diagram to the Statement to show the precise location.
- e) What were the registration numbers of any vehicles or the chassis number of any mobile plant involved in the non-compliance?
- f) What was the cause of the non-compliance?
- g) What action has been, or will be, taken to mitigate any adverse effects of the non-compliance?
- h) What action has been, or will be, taken to prevent a recurrence of the non-compliance?

3. How many pages have you attached?

Each attached page must be initialled by the person(s) who signs Section G of this Annual Return

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C2 Details of Non-Compliance with Licence

Licence condition number not complied with
Summary of particulars of the non-compliance (NO MORE THAN 50 WORDS)
If required, further details on particulars of non-compliance
Date(s) when the non-compliance occurred, if applicable
If relevant, precise location where the non-compliance occurred (attach a map or diagram)
If applicable, registration numbers of any vehicles or the chassis number of any mobile plant involved in the non-compliance
Cause of non-compliance
Action taken or that will be taken to mitigate any adverse effects of the non-compliance
Action taken or that will be taken to prevent a recurrence of the non-compliance

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D Statement of Compliance - Load-Based Fee Calculation Worksheets

If you are not required to monitor assessable pollutants by your licence, no worksheets will appear below. Please go to Section E.

If assessable pollutants have been identified on your licence (see licence condition L2), complete the following worksheets for each assessable pollutant to determine your load-based fee for the licence fee period to which this Annual Return relates.

Loads of assessable pollutants must be calculated using any of the methods provided in the EPA's Load Calculation Protocol for the relevant activity. A Load Calculation Protocol would have been sent to you with your licence. If you require additional copies you can download the Protocol from the EPA's website or you can contact us on telephone 02 9995 5700.

You are required to keep all records used to calculate licence fees for four years after the licence fee was paid or became payable, whichever is the later date.

PENALTIES APPLY FOR SUPPLYING FALSE OR MISLEADING INFORMATION

D1 - D8 (Not Applicable)

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E Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan (PIRMP) Under Section 153A of the POEO Act 1997

1 Have you prepared a PIRMP as required under s153A of the Protection of the Environment Operations Act 1997?

(✓ a box)

Yes

No

SITE CLOSED
JUNE 2012

If you answered 'Yes' to question 1, please tick the appropriate box to indicate the following:

2 Is the PIRMP available at the premises?

(✓ a box)

Yes

No

3 Is the PIRMP available in a prominent position on a publicly accessible web site?

(✓ a box)

Yes

No

If the PIRMP is available on a publicly accessible web site please indicate clearly below the address of the web site where the PIRMP can be accessed:

Web site Address

4 Has the PIRMP been tested?

(✓ a box)

Yes

No

If you answered 'Yes' to question 4 please indicate clearly below the date that the PIRMP was last tested:

The PIRMP was last tested on

5 Has the PIRMP been updated?

(✓ a box)

Yes

No

If you answered 'Yes' to question 5 please indicate clearly below the date that the PIRMP was last updated:

The PIRMP was last updated on

6 How many times has the PIRMP been activated in this reporting period?

If the PIRMP has been activated, please indicate clearly below the date/s when the PIRMP was activated:

The PIRMP was activated on

The EPA's guidelines for preparation of pollution incident response management plans are available at

<http://www.epa.nsw.gov.au/legislation/20120227egpreppirmp.htm>

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F Statement of Compliance - Requirement to Publish Pollution Monitoring Data Under Section 66(6) of the POEO Act 1997

1 Are there any conditions attached to your licence that require pollution monitoring to be undertaken?

(✓ a box)

Yes

No

If you answered 'Yes' to question 1, please tick the appropriate box to indicate the following:

2 Do you operate a web site?

(✓ a box)

Yes

No

3 Is the pollution monitoring data published on your web site in accordance with the EPA's written requirements for publishing pollution monitoring data?

(✓ a box)

Yes

No

If you publish pollution monitoring data on a web site please indicate clearly below the address of the web site where the pollution monitoring data can be accessed:

Web site address

The EPA's written requirements for publishing pollution monitoring data are available at <http://www.epa.nsw.gov.au/legislation/20120263reqpubpmdata.htm>

Note - if you do not maintain a web site, you must provide a copy of any monitoring data that relates to pollution, to any person requests a copy of the data at no charge to the person requesting the data.

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G Signature and Certification

This Annual Return may only be signed by a person(s) with legal authority to sign it as set out in the categories below. Please tick (✓) the box next to the category that describes how this Annual Return is being signed.

If you are uncertain about who is entitled to sign or which category to tick, please contact us on telephone 02 9995 5700.

If the licence holder is:	the Annual Return must be signed and certified:
an individual	<input type="checkbox"/> by the individual licence holder, or <input type="checkbox"/> by a person approved in writing by the EPA to sign on the licence holder's behalf
a company	<input type="checkbox"/> by affixing the common seal in accordance with Corporations Act 2001, or <input type="checkbox"/> by 2 directors, or <input type="checkbox"/> by a director and a company secretary, or <input type="checkbox"/> if a proprietary company that has a sole director who is also the sole company secretary – by that director, or <input type="checkbox"/> by a person delegated to sign on the company's behalf in accordance with the Corporations Act 2001 and approved in writing by the EPA to sign on the company's behalf.
a public authority (other than a council)	<input type="checkbox"/> by the Chief Executive Officer of the public authority, or <input type="checkbox"/> by a person delegated to sign on the public authority's behalf in accordance with its legislation and approved in writing by the EPA to sign on the public authority's behalf.
a local council	<input type="checkbox"/> by the General Manager in accordance with s.377 of the Local Government Act 1993, or <input type="checkbox"/> by affixing the seal of the council in a manner authorised under that Act.

It is an offence to supply any information in this form that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect. There is a maximum penalty of \$250,000 for a corporation or \$120,000 for an individual.

I/We

- declare that the information in the Monitoring and Complaints Summary in section B of this Annual Return is correct and not false or misleading in a material respect, and
- certify that the information in the Statement of Compliance in sections A, C, D, E and F and any pages attached to Section C is correct and not false or misleading in a material respect.

If your licence has been transferred, suspended, surrendered or revoked by the EPA during this reporting period, cross out the dates below and specify the new dates to which this Annual Return relates below:

For the reporting period 29-May-2013 to 28-May-2014 or ___ / ___ / ___ to ___ / ___ / ___

SIGNATURE: <u>Wayde Peterson</u>	SIGNATURE: _____
NAME: (printed) <u>WAYDE PETERSON</u>	NAME: (printed) _____
POSITION: <u>WASTE SERVICES</u>	POSITION: _____
DATE: <u>26 / 07 / 2014</u>	DATE: ___ / ___ / ___

SEAL (if signing under seal)

PLEASE ENSURE THAT ALL APPROPRIATE BOXES HAVE BEEN COMPLETED AND THAT THE CHECKLIST ON PAGE 2 OF THE ANNUAL RETURN HAS BEEN COMPLETED

