

**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

**ENVIRONMENTAL
PERMIT EA WML 34183**

**Annual Environmental
Monitoring Report**

Report Number 1343r1v1d0415

Commissioned by
Carmarthenshire County Council
Stephens Way
Pensarn
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Prepared by
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1 INTRODUCTION

Carmarthenshire County Council (CCC) maintains Nant y Caws (NYC) Phase I Landfill which is located east of Carmarthen and west of Cross Hands (see Figure 1). The landfill is in Aftercare and has not accepted waste since March 1997. The landfill has been partially restored, with a full FML (Flexible Membrane Liner) placed over the capped area. The site is regulated by Natural Resources Wales (NRW) through Permit No. EA WML 34183.

The Permit requires routine environmental monitoring to be undertaken. Geotechnology Ltd (Geotechnology) has been commissioned by CCC to undertake the monitoring since April 2013 and to report the results. This annual review of the monitoring data is based on data gathered up to March 2015.

This report includes data provided to Geotechnology by third parties.

2 OVERVIEW OF SITE ACTIVITY

Key dates relating to the operation, closure, capping and regulatory control of the landfill are provided in Table 2-1. A detailed site plan showing surface topography and monitoring infrastructure is provided in Figure 2.

Table 2-1 Summary of Key Dates

Date	Activity
1984	Phase 1 Landfill designed
12 Dec 1985	Waste Disposal Plan (WDP) issued by Carmarthen District Council
1 May 1994	WDP converted to a Waste Management Licence (WML)
1997	Cessation of landfilling operations
1998	Installation of gas and groundwater monitoring infrastructure
Dec 1999	Final FML capping completed
1 January 2002	Modification to WML by Environment Agency
2002/2003	Geotechnology undertakes hydrogeological risk assessment and prepare monitoring action plans based on limited data set
2009	Leachate Breakout on Southern Bund – Remedial measures implemented
6 April 2010	WML automatically became an Environmental Permit in accordance with the Environmental Permitting Regulations (England and Wales) 2010
2010	Leachate treatment system undergoing improvements
20 Jan 2015	Landfill formally taken into Aftercare by NRW

2.1 Landfilling

The landfill was designed in 1984 by W.S. Atkins and Partners and was based on a containment principle, however there are no details available to demonstrate that any form of engineered containment was adopted. Instead, the design relies on the in-situ glacial till to provide an impermeable base. A series of leachate interceptor drains are shown on the original site plans. The design drawings also show that Phase 1 was divided into a series of working cells, a total of 25 are shown on the plan.

This original plan also describes the working method, which involved vertical layering with working faces of 2 to 2.5m which are then capped over with 300mm of inert fill. Subsequent working faces are pushed over each completed layer to form four layers, giving a total landfill thickness of between approximately 8 and 10m. This data is broadly confirmed in subsequent drilling for internal gas wells in 1998, though a maximum waste thickness of 14m was obtained. It is known that over-tipping and further waste layering was undertaken at the site in late 1994 and early 1995 which may account for the increased thickness observed. The original design also shows that at the site boundary a cut-off ditch was constructed which is further isolated from the refuse by a clay bund.

Landfilling ceased in March 1997 and the landfill has not received any wastes since then.

2.2 Capping

During the operational period measures were undertaken to reduce the leachate yield from the site in the form of FML applications to the flanks. Initially, a 0.5mm polypropylene membrane was used on the southwestern flank though this has been replaced by a 2mm double textured HDPE. All the flanks of the landfill now have a 2mm textured HDPE cover, which is in turn welded to a 1mm smooth HDPE liner on the plateau cap. Prior to the final capping work being completed in December 1999, an intermediate layer of 0.5m of clay soil cover was placed, though it is locally thicker in hollows.

The Phase 1 landfill has therefore been capped since December 1999.

2.3 Restoration

The agricultural restoration of the Phase 1 landfill continued from 1999 up until 2003, although there are no precise records. The restoration process involved the importation of sub-soils from a number of extraneous sources. Geotechnology undertook a soil audit of the areas completed up till November 2002. This is documented in Geotechnology report 237/0/1102 issued in November 2002. Geotechnology was not involved in the final stages of restoration at the landfill.

Agricultural post and wire fencing was placed and seeded to encourage surface soil stabilisation on the restored cap. The fields created by the fences are present today. The vegetation within the fields is, however, overgrown and does not appear to be being grazed or managed in accordance with the Post Closure Working Plan.

2.4 Leachate Management

The leachate at the site is collected by a gravity fed under waste drainage system comprising a 225mm diameter spine drain receiving inflows from 150mm diameter spur drains. The drainage system is accessed from the landfill surface by leachate inspection chambers, which rise through the waste. The chambers allow inspection of the leachate system and permit access for routine maintenance, leachate level measurement and cleaning. The position of each chamber has recently been re-surveyed by Geotechnology and is shown on Figure 2. Leachate inspection chambers 9 and 16 could not be found during the survey.

In addition to the under drainage works undertaken during the infilling, further leachate drains were installed at the toe of the flanks, specifically to intercept perched leachate which was historically observed to break out along the flanks. This work was completed during the capping period of the restoration in 1999. Both the toe drain and under drain system flow under gravity to the pumping sump from where the leachate is pumped, either to the nearby concrete lined leachate lagoon or the treatment plant. Following treatment, the leachate is discharged to the Afon Bantwen under discharge consent.

3 MONITORING NETWORK PERFORMANCE

To demonstrate that the site is functioning as designed, a monitoring programme is being implemented. The current programme is managed by CCC with the monitoring of leachate, downgradient groundwater, surface water and external landfill gas now undertaken by Geotechnology. Upgradient groundwater wells are sampled by the current operators of the adjacent operational landfill, CWM Environmental. Monitoring data for the upgradient wells has been requested from CWM but has not yet been received. The available monitoring infrastructure is shown on Figure 2.

3.1 Monitoring Network

Each time Geotechnology undertakes the monitoring, an audit of the monitoring infrastructure is also completed. Since 2013, clearance of vegetation along the northwestern edge of the landfill had taken place. Routine control of the vegetation significantly aids the safe collection of samples.

Other minor repairs have been undertaken to the headworks of several wells with further work to be completed in 2015.

3.2 Sample Analysis & Laboratory Performance

Samples collected for laboratory testing were submitted to UKAS registered Chemtest laboratories in cooler boxes. The results from the laboratory analysis have been compiled and graphically illustrated as follows:

- Appendix 1: Laboratory Certificates
- Appendix 2: Leachate chemistry
- Appendix 3: Groundwater chemistry
- Appendix 4: Surface water chemistry

3.3 Site Observations

During the first round of sampling in April 2013 an oil sheen was noticed on the surface of the sample taken from BH104. This has not been observed since.

The restored landfill cap is largely covered by good vegetative cover and appears largely visibly stable. On the eastern flanks and the majority of the plateau, the landfill is parcelled into grassed fields. In some areas, drainage appears to be poor with reeds developing.

The western and northern portions of the landfill are no longer covered by grass as the area was, until recently, used by the adjacent site operators for storage of soil, compost and construction and demolition wastes. Plans are being prepared to improve this area.

The majority of the flanks in the northern and western boundary of the landfill have self-seeded, resulting in the proliferation of a number of dwarf trees (mainly willow), gorse, broom and other flora. Whilst this is not in accordance with the species proposed in the Post Closure Working Plan, they have had the desired effect of stabilising the slopes, especially the near surface restoration soils. No evidence of instability or failure was observed in the walkovers undertaken.

Leachate breakout has previously occurred on the southern bund of the landfill. Measures to collect and treat excess leachate have been implemented by CCC. In the same corner, the capping membrane HDPE is exposed and damaged over an area of approximately 1m². Based on visible vehicle tracks, Geotechnology suspects that trafficking has primarily caused the damage rather than any failure of the soil cover. In the southeastern corner of the landfill, Geotechnology suspects perching of leachate within the waste as the ground surface is soft and fully saturated.

The access road down to the leachate treatment plant is tarmacadam and is in good condition.

3.4 Settlement Survey

The landform at Phase 1 has been surveyed on a number of occasions, the most recent of which was in 2010 by Geotechnology. To ensure that consistent, repeatable settlement surveys of the site is possible, Geotechnology installed 15 fixed position Settlement Monitoring points across the landfill cap in 2010.

4 MONITORING RESULTS

4.1 Leachate

Leachate chemistry has been monitored between 1998 and 2002 and from December 2007 to the present day. The results are graphically illustrated in Appendix 2.

The leachate is moderately mineralised with electrical conductivity of approximately 1500 microS/cm. The dominant contaminants within the leachate are ammonia and potassium. The concentration of these parameters and others is variable but appears to be declining with time. The spot sampling undertaken by Geotechnology during 2014 indicates ammonia and potassium to be typically less than 50 mg/l although 460 mg/l potassium was detected in September. Trace metals within the leachate are at low concentrations and no trace organics were detected during 2014.

The leachate currently has BOD values of <20 mg/l and total organic carbon (TOC) content of <40 mg/l suggesting that the biodegradable component is now low.

4.2 Groundwater

All of the groundwater results are provided in Appendix 4.

To assist with describing the hydrochemistry of groundwater within the vicinity of Phase I, several borehole groupings have been created. The groupings are summarised below and are based on the position of each monitoring position relative to Phase I (see Figure 2).

- BH203 and BH205 – Up-gradient of Phase 1
- BH117 – across gradient from Phase 1 on Eastern side
- BH108 – across gradient from Phase 1 on Western side
- BH101, BH103, BH104 and BH105 – Down-gradient of Phase 1

Recent upgradient groundwater monitoring results for BH203 and BH205 are not available. Results for BH108 and BH117 are only available since 2008, whereas downgradient monitoring records are available since 1998.

The relatively low electrical conductivity indicates that groundwater is of relatively good quality despite the proximity of the monitoring positions to the unlined landfill. Groundwater is less mineralised than leachate but does become locally, slightly more mineralised in the wells along the southern edge of the landfill. The concentration of ammonia did not exceed 0.21 mg/l in any samples collected during 2014 and potassium was less than 40 mg/l.

Trace elements and oxidised species of nitrogen, such as nitrate, are detected in groundwater around the edge of the landfill but at relatively low concentrations (<4 mg/l nitrate) and below Environmental Quality Standards. This data suggests that the landfill is not releasing such potential pollutants.

Hazardous substance cadmium has previously been detected in groundwater upgradient and downgradient of the landfill but at a concentration lower than the freshwater EQS. Cadmium was not detected during the last year of monitoring.

Given the low TOC content of leachate all groundwater samples have previously been found to contain <25 mg/l TOC suggesting that the landfill is not a significant source of organic contaminants. During 2014, trace levels of polyaromatic hydrocarbons were detected at BH101 but below the detection limit at all other locations.

4.3 Surface Water

All of the surface water results are presented in Appendix 4.

Sample points SW1, SW2, SW3 and SW4 monitor the stream that runs west to east along the southern boundary of the landfill. The location of the surface water sample points is shown on Figure 2.

Surface water quality is primarily controlled by input from the CWM treatment lagoons west of the site and the level of leachate treatment achieved at the Phase I treatment plant. Surface water quality observed during 2014 is similar to that observed previously. All waters are moderately mineralised with typically low chloride but variable levels of ammonia. During 2014 ammonia did not exceed 0.25 mg/ at either SW1 or SW4. Chloride was less than 65 mg/l throughout the monitoring period but at times the concentration detected downgradient of the leachate treatment plant (SW1) was higher than detected upgradient (SW4).

4.4 Perimeter Gas

During the quarterly monitoring undertaken since April 2013, all methane concentrations have been below the Permit threshold (1%). Methane was below 0.1% at all monitoring positions during 2014. Carbon dioxide (CO₂) was detected at several position along the eastern boundary (BH114, BH115, BH116 & BH118). During 2014, the concentration of carbon dioxide at these locations reached 2.8%.

5 SUMMARY AND RECOMMENDATIONS

5.1 Environmental Protection

Groundwater and surface water monitoring completed in support of the Permit at Phase I has shown that the landfill is currently having limited impact. The available information shows that the quality of groundwater has not significantly deteriorated since the start of monitoring in 1998.

Upgradient groundwater already contains a series of low level trace elements including List 1 substance cadmium. Passage of this water below the landfill reveals that the landfill is not significantly impacting groundwater as several trace elements remain at the levels observed upgradient. Potassium is a key contaminant within leachate and despite the mobility of this element it is not significantly elevated in downgradient groundwater. The reason that the landfill is not having a significant impact on groundwater is suspected to be because groundwater has a higher piezometric surface than the basal drainage system of the landfill. The basal drainage system therefore intercepts any leachate and groundwater. As a consequence, the landfill is largely considered to be hydraulically isolated. The inward groundwater flow may not, however, prevent some outward diffusive transport, as contaminants move from an area of higher concentration to a lower one i.e. from the leachate to the aquifer. This process does not appear to be having a significant impact.

This model is further confirmed by the surrounding groundwater quality which shows little obvious impact from the landfill.

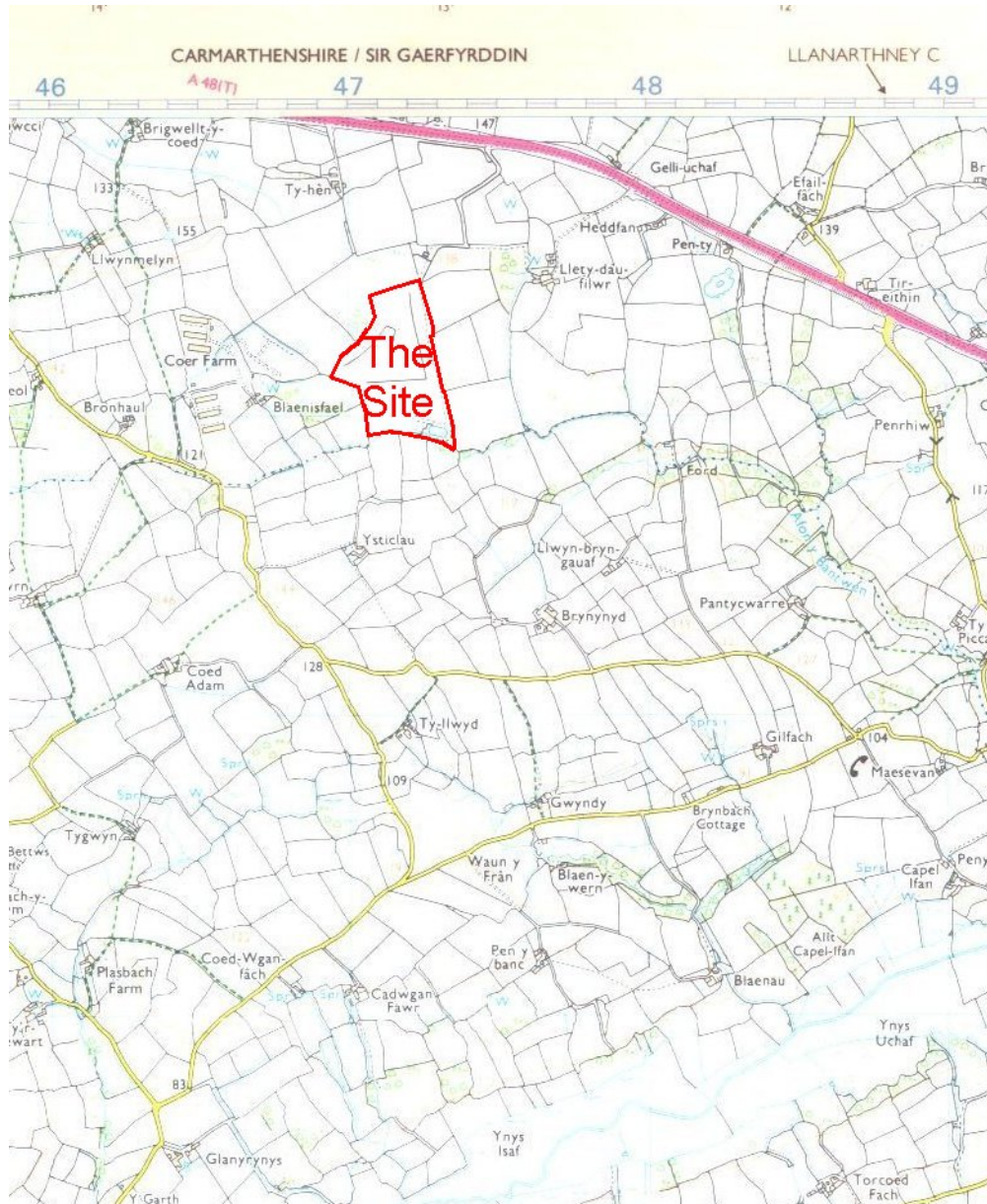
The quality of surface water within the vicinity of the landfill appears to be variable but generally good and is governed by inputs from the CWM surface water treatment lagoons and the discharge from the Phase I leachate treatment plant.

Along the southern flank of the landfill leachate breakout is known to have previously occurred but this situation is now being actively managed and controlled by CCC. Leachate breakout is the visible consequence of elevated leachate levels within the landfill.

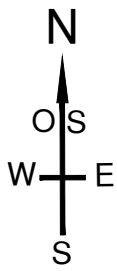
5.2 Monitoring Programme

Now that the site has been formally taken into Aftercare, the monitoring programme agreed in the Aftercare Management Plan will be implemented.

Figure 1 Site Location Plan



Reproduced from the Ordnance Survey Land Ranger Map
with the permission of The Controller of Her Majesty's Stationery Office
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- LEGEND
- BH203 Groundwater Monitoring Location
 - BH204 External Gas Monitoring Location
 - SW1 Surface Water Monitoring Location
 - L1 Leachate Monitoring Location
 - LC-8 Leachate Inspection Chamber
CL - Chamber Level
IL - Invert Level

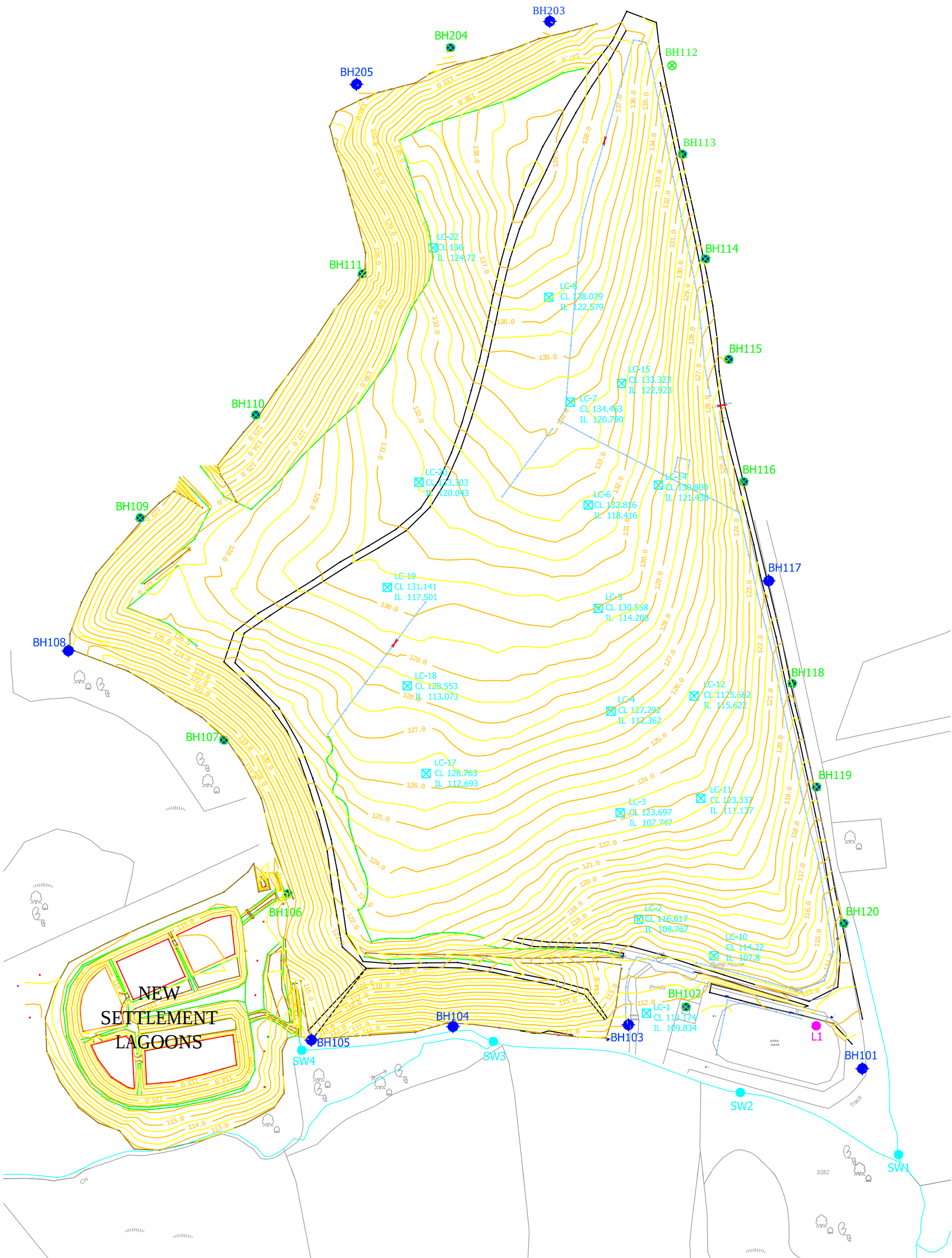


Figure 2 Site Plan and Available Monitoring Network

**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

**ENVIRONMENTAL
PERMIT EA
WML 34183**

**Annual Environmental
Monitoring Report**

**Appendix 1
Laboratory Certificates**
Report Number 1343r1v1d0415

Geotechnology
5 Ty Coed
Cefn Yr Allt
Aberdulais
SA10 8HE

FAO B Rees
24 January 2014

Dear B Rees

Test Report Number **249046**
Your Project Reference **Nant-Y-Caws**

Please find enclosed the results of analysis for the samples received 16 January 2014.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Keith Jones, Technical Manager



2183

Notes to accompany report:

- The sign < means 'less than'
- Tests marked 'U' hold UKAS accreditation
- Tests marked 'M' hold MCertS (and UKAS) accreditation
- Tests marked 'N' do not currently hold UKAS accreditation
- Tests marked 'S' were subcontracted to an approved laboratory
- n/e means 'not evaluated'
- i/s means 'insufficient sample'
- u/s means 'unsuitable sample'
- Comments or interpretations are beyond the scope of UKAS accreditation
- The results relate only to the items tested
- All results are expressed on a dry weight basis
- The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols
- For all other tests the samples were dried at < 37°C prior to analysis
- Uncertainties of measurement for the determinands tested are available upon request
- None of the test results included in this report have been recovery corrected

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 16 January 2014

Report Date
24 January 2014

FAO B Rees

Nant-Y-Caws

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓ Units↓ *

					249046					
					AJ69371	AJ69372	AJ69373	AJ69374	AJ69375	AJ69376
					SW1	SW2	SW3	SW4	BH101	BH103
					14/1/2014	14/1/2014	14/1/2014	14/1/2014	14/1/2014	14/1/2014
									0.28m	0.71m
					WATER	WATER	WATER	WATER	WATER	WATER
1010	pH	PH		U	8.3	8.1	8.0	8.3	8.0	7.9
1020	Electrical Conductivity	EC	µS cm ⁻¹	U	360	330	410	430	450	400
1100	Chemical Oxygen Demand	COD	mg O ₂ l ⁻¹	U	30	16	20	24	<10	<10
1470	Iron (dissolved)	7439896	µg l ⁻¹	N					<20	<20
1220	Alkalinity	ALK	mg CaCO ₃ l ⁻¹	U					220	200
	Chloride	16887006	mg l ⁻¹	U	32	31	35	36	16	14
	Ammoniacal Nitrogen	AMM_NITROG	mg l ⁻¹	U	0.17	0.16	0.19	0.23	0.05	0.04
	Nitrite as N	14797650	mg l ⁻¹	U					<0.010	<0.010
	Nitrate as N	14797558	mg l ⁻¹	U					2.0	1.4
	Total Oxidised Nitrogen		mg l ⁻¹	U					2.0	1.4
1610	Total Organic Carbon	TOC	mg l ⁻¹	N					21	13
1415	Calcium	7440702	mg l ⁻¹	U					84	76
	Potassium	7440097	mg l ⁻¹	U					<0.50	<0.50
	Magnesium	7439954	mg l ⁻¹	U					12	8.1
	Sodium	7440235	mg l ⁻¹	U					14	13
1220	Sulfate	14808798	mg l ⁻¹	U					11	7.9
1450	Cadmium	7440439	µg l ⁻¹	U					<0.080	<0.080
	Chromium	7440473	µg l ⁻¹	U					<1.0	<1.0
	Copper	7440508	µg l ⁻¹	U					1.0	<1.0
	Manganese	7439965	µg l ⁻¹	U					<1.0	<1.0
	Nickel	7440020	µg l ⁻¹	U					<1.0	<1.0
	Lead	7439921	µg l ⁻¹	U					<1.0	<1.0
	Zinc	7440666	µg l ⁻¹	U					8.1	<1.0

Geotechnology
5 Ty Coed
Cefn Yr Allt
Aberdulais
SA10 8HE

FAO B Rees

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 16 January 2014

Nant-Y-Caws



Report Date
24 January 2014

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

249046

AJ69377

AJ69378

AJ69379

AJ69380

BH104

BH105

BH108

BH107

14/1/2014

14/1/2014

14/1/2014

14/1/2014

1.19m

2.18m

1.80m

4.33m

WATER

WATER

WATER

WATER

1010	pH	PH		U	7.6	7.5	7.4	7.5
1020	Electrical Conductivity	EC	$\mu\text{S cm}^{-1}$	U	480	480	300	510
1100	Chemical Oxygen Demand	COD	$\text{mg O}_2 \text{ l}^{-1}$	U	11	<10	<10	10
1470	Iron (dissolved)	7439896	$\mu\text{g l}^{-1}$	N	<20	<20	<20	<20
1220	Alkalinity	ALK	$\text{mg CaCO}_3 \text{ l}^{-1}$	U	240	250	120	240
	Chloride	16887006	mg l^{-1}	U	15	11	16	23
	Ammoniacal Nitrogen	AMM_NITROG	mg l^{-1}	U	0.05	0.05	0.09	0.07
	Nitrite as N	14797650	mg l^{-1}	U	<0.010	<0.010	<0.010	<0.010
	Nitrate as N	14797558	mg l^{-1}	U	0.35	0.97	1.9	0.37
	Total Oxidised Nitrogen		mg l^{-1}	U	0.35	0.97	1.9	0.37
1610	Total Organic Carbon	TOC	mg l^{-1}	N	18	12	12	12
1415	Calcium	7440702	mg l^{-1}	U	110	91	54	140
	Potassium	7440097	mg l^{-1}	U	25	2.7	<0.50	25
	Magnesium	7439954	mg l^{-1}	U	18	11	4.9	22
	Sodium	7440235	mg l^{-1}	U	9.9	12	11	15
1220	Sulfate	14808798	mg l^{-1}	U	19	7.1	14	18
1450	Cadmium	7440439	$\mu\text{g l}^{-1}$	U	<0.080	<0.080	<0.080	<0.080
	Chromium	7440473	$\mu\text{g l}^{-1}$	U	<1.0	<1.0	<1.0	<1.0
	Copper	7440508	$\mu\text{g l}^{-1}$	U	2.1	<1.0	<1.0	<1.0
	Manganese	7439965	$\mu\text{g l}^{-1}$	U	<1.0	<1.0	<1.0	<1.0
	Nickel	7440020	$\mu\text{g l}^{-1}$	U	<1.0	<1.0	<1.0	<1.0
	Lead	7439921	$\mu\text{g l}^{-1}$	U	<1.0	<1.0	<1.0	<1.0
	Zinc	7440666	$\mu\text{g l}^{-1}$	U	1.1	<1.0	1.2	<1.0

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 2

Report page 1 of 1

LIMS sample ID range AJ69371 to AJ69380

Geotechnology
5 Ty Coed
Cefn Yr Allt
Aberdulais
SA10 8HE

FAO B Rees
04 March 2014

Dear B Rees

Test Report Number **252006**
Your Project Reference **1238 NantyCaws Closed Landfill**

Please find enclosed the results of analysis for the samples received 24 February 2014.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Keith Jones, Technical Manager



2183

Notes to accompany report:

- The sign < means 'less than'
- Tests marked 'U' hold UKAS accreditation
- Tests marked 'M' hold MCertS (and UKAS) accreditation
- Tests marked 'N' do not currently hold UKAS accreditation
- Tests marked 'S' were subcontracted to an approved laboratory
- n/e means 'not evaluated'
- i/s means 'insufficient sample'
- u/s means 'unsuitable sample'
- Comments or interpretations are beyond the scope of UKAS accreditation
- The results relate only to the items tested
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- For all other tests the samples were dried at < 37°C prior to analysis
- Uncertainties of measurement for the determinands tested are available upon request
- None of the test results included in this report have been recovery corrected

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 24 February 2014

1238 NantyCaws Closed Landfill

Report Date
04 March 2014

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓	Determinand↓	CAS No↓	Units↓	*	
1010	pH	PH		U	7.2
1020	Electrical Conductivity	EC	µS cm ⁻¹	U	1300
1090	Biochemical Oxygen Demand (ATU)	BOD	mg O ₂ l ⁻¹	N	4.6 ¹
1100	Chemical Oxygen Demand	COD	mg O ₂ l ⁻¹	U	49
1220	Alkalinity	ALK	mg CaCO ₃ l ⁻¹	U	510
	Chloride	16887006	mg l ⁻¹	U	130
	Ammoniacal Nitrogen	AMM_NITROG	mg l ⁻¹	U	37
	Nitrite as N	14797650	mg l ⁻¹	U	0.052
	Nitrate as N	14797558	mg l ⁻¹	U	2.0
	Total Oxidised Nitrogen		mg l ⁻¹	U	2.0
1610	Total Organic Carbon	TOC	mg l ⁻¹	N	21
1415	Calcium	7440702	mg l ⁻¹	U	120
	Potassium	7440097	mg l ⁻¹	U	44
	Magnesium	7439954	mg l ⁻¹	U	15
	Sodium	7440235	mg l ⁻¹	U	70
1220	Sulfate	14808798	mg l ⁻¹	U	31

¹The stability time for this analyte has been exceeded - these results may be compromised. The accreditation for these results remains unaffected.



Final Report

Report Number: 14-10958 Issue-1

Initial Date of Issue: 03-Oct-14

Client: Geotechnology

Client Address: 5 Ty Coed
Cefn Yr Allt
Aberdulais
Glamorgan
SA10 8HE

Contact(s): Ben Rees

Project: Nant-Y-Claws

Quotation No.: Q14-00626

Date Received: 29-Sep-14

Order No.: 1244/1343 OROG2NO

Date Instructed: 29-Sep-14

No. of Samples: 8

Results Due: 02-Oct-14

**Turnaround:
(Weekdays)** 4

Date Approved: 03-Oct-14

Approved By:

Details: Darrell Hall, Laboratory Director

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
pH	U	1010			8.3	8.3	8.1	8.0	7.9	8.2	8.1	7.9
Electrical Conductivity	U	1020	µS/cm	1	580	460	650	580	580	360	720	1500
Suspended Solids At 105C	U	1030	mg/l	5						18	15	
Dissolved Oxygen	N	1150	mg O2/l	0.5	9.0	9.1	7.8	8.8	8.9	9.5	9.1	4.5
Alkalinity (Total)	U	1220	mg CaCO3/l	10	230	210	440	420	410	130	190	590
Chloride	U	1220	mg/l	1	17	15	7.2	11	23	23	65	130
Ammoniacal Nitrogen	U	1220	mg/l	0.01	0.047	0.033	0.016	0.061	0.019	0.037	0.12	49
Phosphate	U	1220	mg/l	0.05	0.063	0.10	0.061	0.10	0.080			< 0.050
Phosphorus (Total)	N	1220	mg/l	0.02	0.021	0.033	0.020	0.033	0.027			< 0.020
Sulphate	U	1220	mg/l	1	10	7.7	23	9.0	13			13
Total Oxidised Nitrogen	U	1220	mg/l	0.2	2.7	1.9	< 0.20	1.1	0.66			0.57
Calcium	U	1415	mg/l	5	64	92	89	87	110			750
Potassium	U	1415	mg/l	0.5	0.60	3.3	0.77	0.55	39	4.6	20	460
Magnesium	U	1415	mg/l	0.5	8.8	15	11	7.4	18			14
Sodium	U	1415	mg/l	0.5	14	25	12	11	79			91
Barium (Dissolved)	U	1450	µg/l	5	86	40	13	35	52			120
Beryllium (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0			< 1.0
Boron (Dissolved)	U	1450	µg/l	20	40	< 20	< 20	< 20	< 20			150
Manganese (Dissolved)	U	1450	µg/l	1	17	< 1.0	36	9.8	1.2			420
Iron (Dissolved)	N	1470	µg/l	20	< 20	< 20	< 20	< 20	< 20			30
Naphthalene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Acenaphthylene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Acenaphthene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Fluorene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Phenanthrene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Anthracene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Fluoranthene	U	1700	µg/l	0.1	12	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Pyrene	U	1700	µg/l	0.1	14	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Chrysene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10			< 0.10
Total Of 16 PAH's	U	1700	µg/l	2	26	< 2.0	< 2.0	< 2.0	< 2.0			< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Chloromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Vinyl Chloride	N	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Bromomethane	U	1760	µg/l	5	C < 5	C < 5	C < 5	C < 5	C < 5			C < 5
Chloroethane	U	1760	µg/l	2	C < 2.0	C < 2.0	C < 2.0	C < 2.0	C < 2.0			C < 2.0
Trichlorofluoromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,1-Dichloroethene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,1-Dichloroethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Bromochloromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Trichloromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Tetrachloromethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,1-Dichloropropene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Benzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2-Dichloroethane	U	1760	µg/l	2	C < 2.0	C < 2.0	C < 2.0	C < 2.0	C < 2.0			C < 2.0
Trichloroethene	N	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2-Dichloropropane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Dibromomethane	U	1760	µg/l	10	C < 10	C < 10	C < 10	C < 10	C < 10			C < 10
Bromodichloromethane	U	1760	µg/l	5	C < 5.0	C < 5.0	C < 5.0	C < 5.0	C < 5.0			C < 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	C < 10	C < 10	C < 10	C < 10	C < 10			C < 10
Toluene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	C < 10	C < 10	C < 10	C < 10	C < 10			C < 10
1,1,2-Trichloroethane	U	1760	µg/l	10	C < 10	C < 10	C < 10	C < 10	C < 10			C < 10
Tetrachloroethene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,3-Dichloropropane	U	1760	µg/l	2	C < 2.0	C < 2.0	C < 2.0	C < 2.0	C < 2.0			C < 2.0
Dibromochloromethane	U	1760	µg/l	10	C < 10	C < 10	C < 10	C < 10	C < 10			C < 10
1,2-Dibromoethane	U	1760	µg/l	5	C < 5.0	C < 5.0	C < 5.0	C < 5.0	C < 5.0			C < 5.0

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
Chlorobenzene	N	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2	C < 2.0	C < 2.0	C < 2.0	C < 2.0	C < 2.0			C < 2.0
Ethylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
m & p-Xylene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
o-Xylene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Styrene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Tribromomethane	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Isopropylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Bromobenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	C < 50	C < 50	C < 50	C < 50	C < 50			C < 50
N-Propylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
2-Chlorotoluene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
4-Chlorotoluene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Tert-Butylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Sec-Butylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
4-Isopropyltoluene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
N-Butylbenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	C < 50	C < 50	C < 50	C < 50	C < 50			C < 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
Hexachlorobutadiene	U	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2	C < 2.0	C < 2.0	C < 2.0	C < 2.0	C < 2.0			C < 2.0
Carbon Disulphide	N	1760	µg/l	2	C < 2	C < 2	C < 2	C < 2	C < 2			C < 2
Methyl Tert-Butyl Ether	N	1760	µg/l	1	C < 1.0	C < 1.0	C < 1.0	C < 1.0	C < 1.0			C < 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Phenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Chlorophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
1,4-Dichlorobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Methylphenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Hexachloroethane	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
4-Methylphenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Nitrobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Isophorone	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Nitrophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Naphthalene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
4-Chloroaniline	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Nitroaniline	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Acenaphthylene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Dimethylphthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Acenaphthene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Dibenzofuran	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Fluorene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Diethyl Phthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
4-Nitroaniline	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Azobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Hexachlorobenzene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Pentachlorophenol	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Phenanthrene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Anthracene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Carbazole	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Fluoranthene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Pyrene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Chrysene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Benzo(g,h,i)perylene	N	1790	µg/l	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50			< 0.50
Demeton-O	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Phorate	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Demeton-S	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Disulphoton	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Fenthion	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Trichloronate	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Prothiophos	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Fensulphothion	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Sulprofos	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Azinphos-Methyl	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20

Results Summary - Water

Project: Nant-Y-Claws

Client: Geotechnology	Chemtest Job No.:				14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958	14-10958
Quotation No.: Q14-00626	Chemtest Sample ID.:				53506	53507	53508	53509	53510	53511	53512	53513
Order No.: 1244/1343 OROG2NO	Client Sample Ref.:											
	Client Sample ID.:				BH101	BH103	BH104	BH105	BH117	SW4	SW1	L1
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:				25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Determinand	Accred.	SOP	Units	LOD								
Coumaphos	N	1820	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Atraton	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Prometon	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Simazine	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Atrazine	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Propazine	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Terbutylazine	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Sebumeton	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Simetryn	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Ametryn	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Prometryn	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Terbutryn	N	1830	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Alpha-Lindane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Gamma-Lindane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Beta-Lindane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Delta-Lindane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Heptachlor	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Aldrin	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Heptachlor Epoxide	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Gamma-Chlordane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Alpha-Chlordane	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endosulphan I	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
4,4-DDE	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Dieldrin	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endrin	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
4,4-DDD	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endosulphan II	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endrin Aldehyde	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
4,4-DDT	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endosulphan Sulphate	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Methoxychlor	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20
Endrin Ketone	N	1840	µg/l	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			< 0.20

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTS accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
53506		BH101	25-Sep-2014	Coloured Winchester 1000ml	C
53506		BH101	25-Sep-2014	Plastic Bottle 1000ml	C
53507		BH103	25-Sep-2014	Coloured Winchester 1000ml	C
53507		BH103	25-Sep-2014	Plastic Bottle 1000ml	C
53508		BH104	25-Sep-2014	Coloured Winchester 1000ml	C
53508		BH104	25-Sep-2014	Plastic Bottle 1000ml	C
53509		BH105	25-Sep-2014	Coloured Winchester 1000ml	C
53509		BH105	25-Sep-2014	Plastic Bottle 1000ml	C
53510		BH117	25-Sep-2014	Coloured Winchester 1000ml	C
53510		BH117	25-Sep-2014	Plastic Bottle 1000ml	C
53513		L1	25-Sep-2014	Coloured Winchester 1000ml	C
53513		L1	25-Sep-2014	Plastic Bottle 1000ml	C

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- I/S Insufficient Sample
- U/S Unsuitable sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk



Final Report

Report Number: 14-14667 Issue-1

Initial Date of Issue: 24-Nov-14

Client: Geotechnology

Client Address: 5 Ty Coed
Cefn Yr Allt
Aberdulais
Glamorgan
SA10 8HE

Contact(s): Ben Rees

Project: Nantycaws

Quotation No.: **Date Received:** 19-Nov-14

Order No.: 1244/1343 **Date Instructed:** 19-Nov-14

No. of Samples: 8 **Results Due:** 24-Nov-14

Turnaround:
(Weekdays) 4

Date Approved: 24-Nov-14

Approved By:

Details: Keith Jones, Technical Manager

Results Summary - Water

Project: Nantycaws

Client: Geotechnology	Chemtest Job No.:					14-14667	14-14667	14-14667	14-14667	14-14667	14-14667
Quotation No.:	Chemtest Sample ID.:					71539	71540	71541	71542	71543	71544
Order No.: 1244/1343	Client Sample Ref.:										
	Client Sample ID.:					L1	BH101	BH103	BH104	BH105	BH117
	Sample Type:					WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):										
	Bottom Depth(m):										
	Date Sampled:					18-Nov-14	17-Nov-14	17-Nov-14	17-Nov-14	17-Nov-14	17-Nov-14
Determinand	Accred.	SOP	Units	LOD							
pH	U	1010			7.6	7.9	7.7	7.5	7.5	7.5	
Electrical Conductivity	U	1020	µS/cm	1	1300	470	430	550	510	540	
Chloride	U	1220	mg/l	1	97	17	15	7.7	11	25	
Ammonia (Free)	U	1220	mg/l	0.01	1.1	0.018	< 0.010	< 0.010	< 0.010	0.013	
Potassium	U	1415	mg/l	0.5	47	1.2	1.2	1.7	1.2	0.79	

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All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk



Final Report

Report Number: 15-06705 Issue-1

Initial Date of Issue: 27-Mar-2015

Client: Geotechnology

Client Address: 5 Ty Coed
Cefn Yr Allt
Aberdulais
Glamorgan
SA10 8HE

Contact(s): Ben Rees

Project: Nanty Caws

Quotation No.: **Date Received:** 24-Mar-2015

Order No.: **Date Instructed:** 24-Mar-2015

No. of Samples: 7

Turnaround: (Wkdays) 4 **Results Due Date:** 27-Mar-2015

Date Approved: 27-Mar-2015

Approved By:

Details: Keith Jones, Technical Manager

Results Summary - Water

Project: Nanty Caws

Client: Geotechnology	Chemtest Job No.:					15-06705	15-06705	15-06705	15-06705	15-06705	15-06705	15-06705
Quotation No.:	Chemtest Sample ID.:					119459	119460	119461	119462	119463	119464	119465
Order No.:	Client Sample Ref.:											
	Client Sample ID.:					BH101	BH103	BH104	BH105	BH117	SW1	SW4
	Sample Type:					WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):											
	Bottom Depth(m):											
	Date Sampled:					19-Mar-15	19-Mar-15	19-Mar-15	19-Mar-15	19-Mar-15	19-Mar-15	19-Mar-15
Determinand	Accred.	SOP	Units	LOD								
pH	U	1010			8.4	8.4	8.4	8.3	8.3	8.2	8.1	
Electrical Conductivity	U	1020	µS/cm	1	460	450	510	510	530	430	460	
Suspended Solids At 105C	U	1030	mg/l	5						< 5.0	16	
Chloride	U	1220	mg/l	1	17	14	13	11	25	35	35	
Ammoniacal Nitrogen	U	1220	mg/l	0.01	0.21	0.086	0.016	< 0.010	< 0.010	0.026	0.040	
Potassium	U	1415	mg/l	0.5	3.3	3.3	3.5	3.4	3.3	3.3	3.3	

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All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

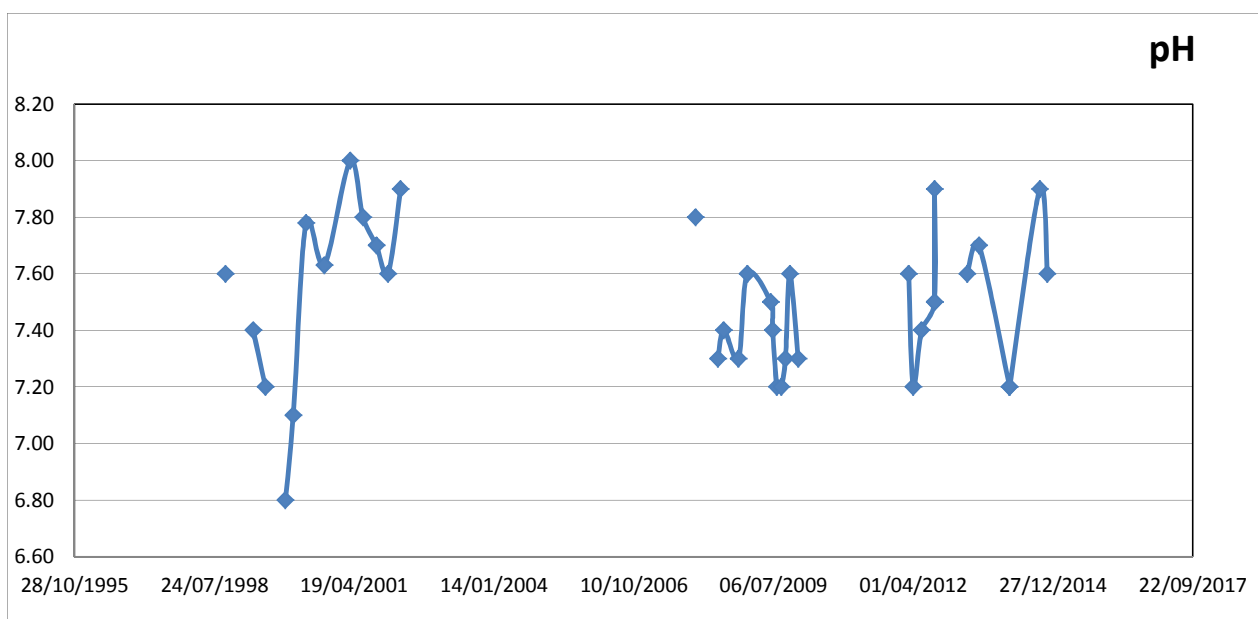
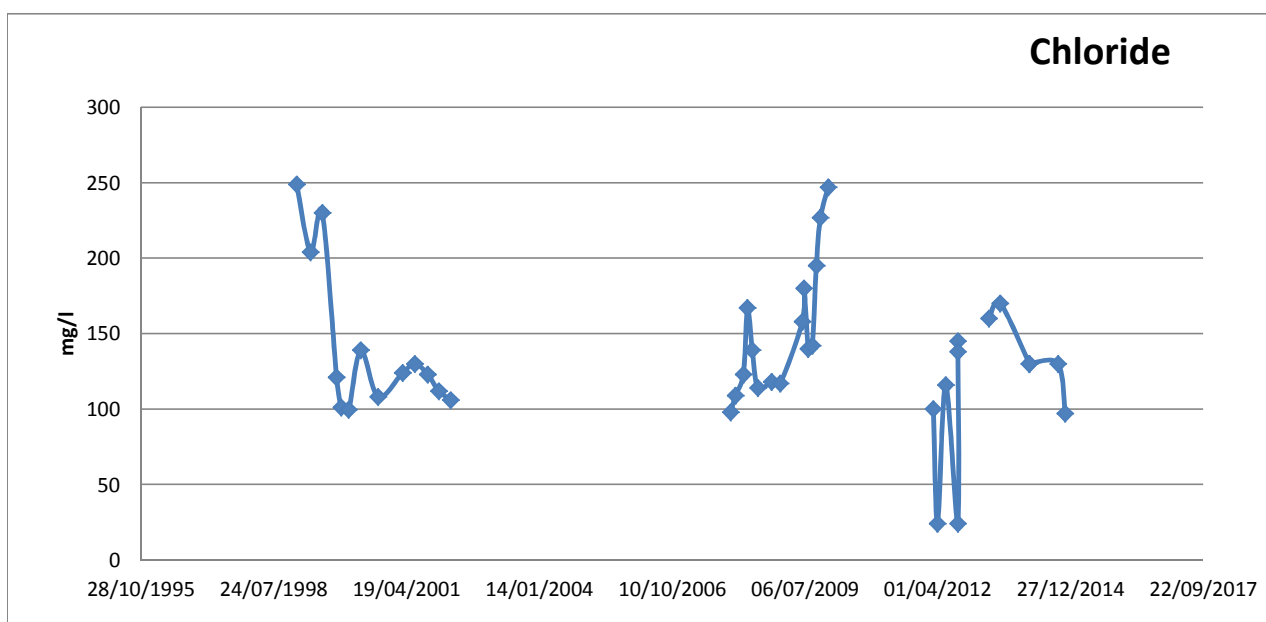
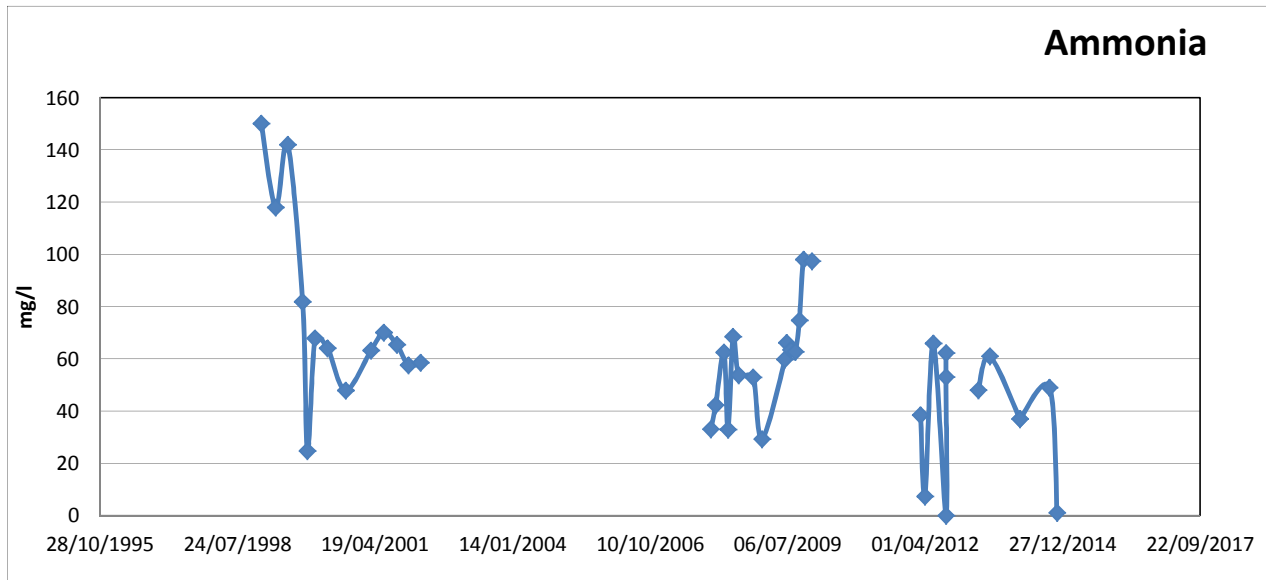
If you require extended retention of samples, please email your requirements to:
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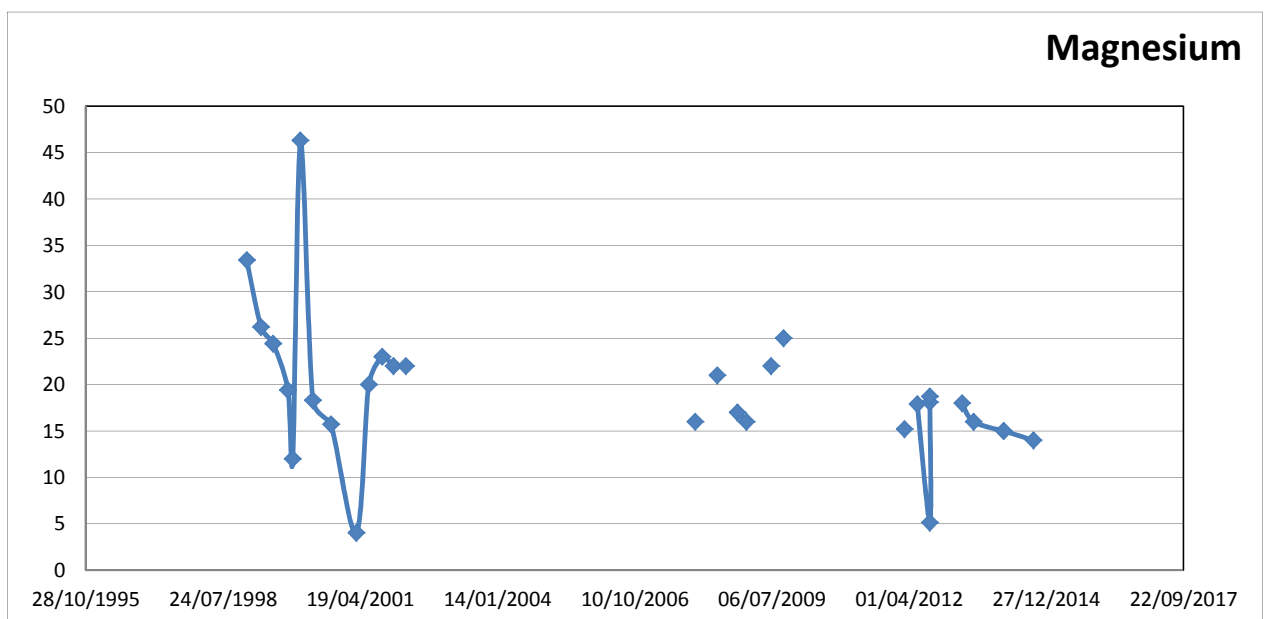
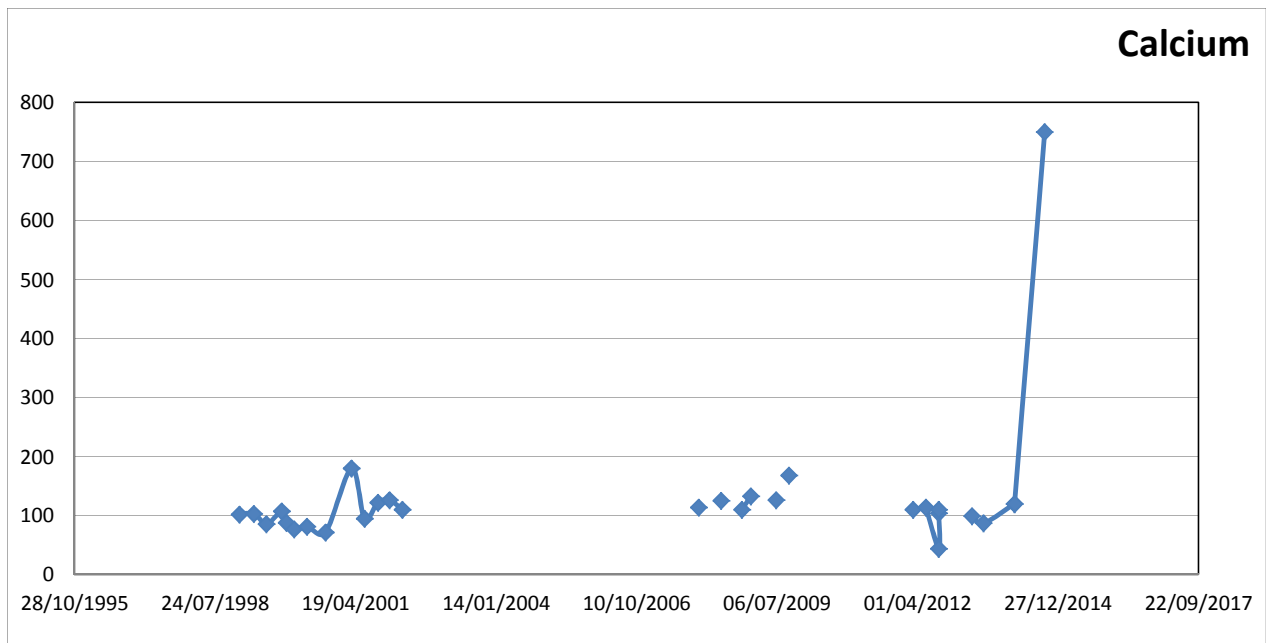
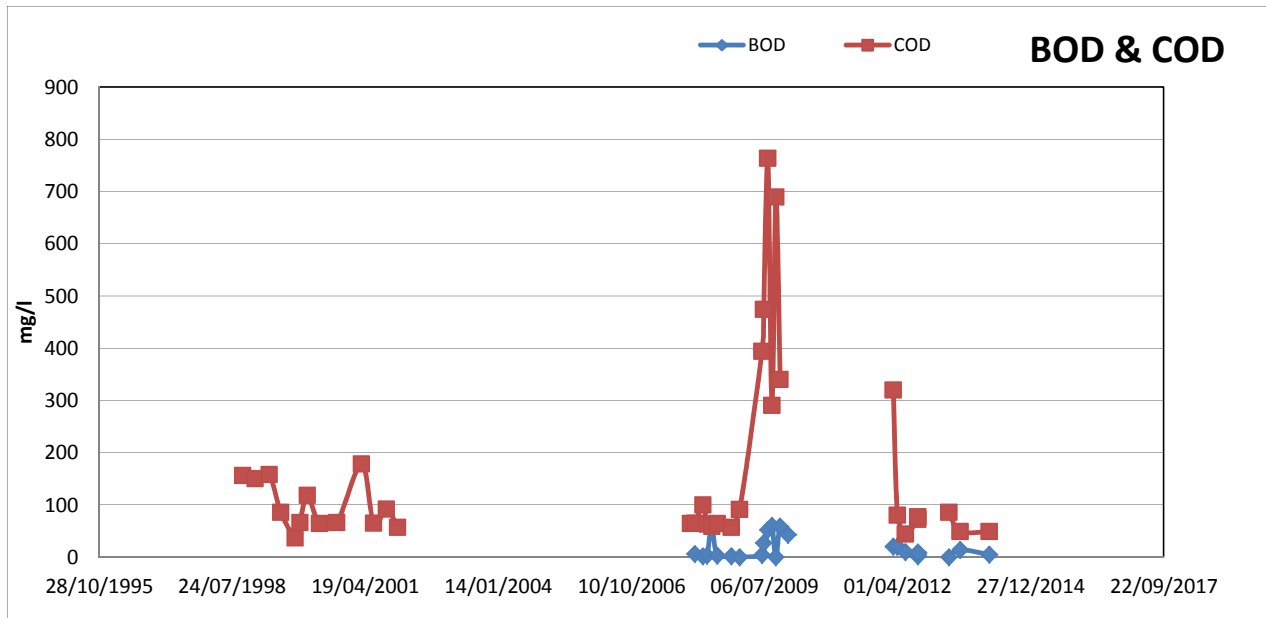
**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

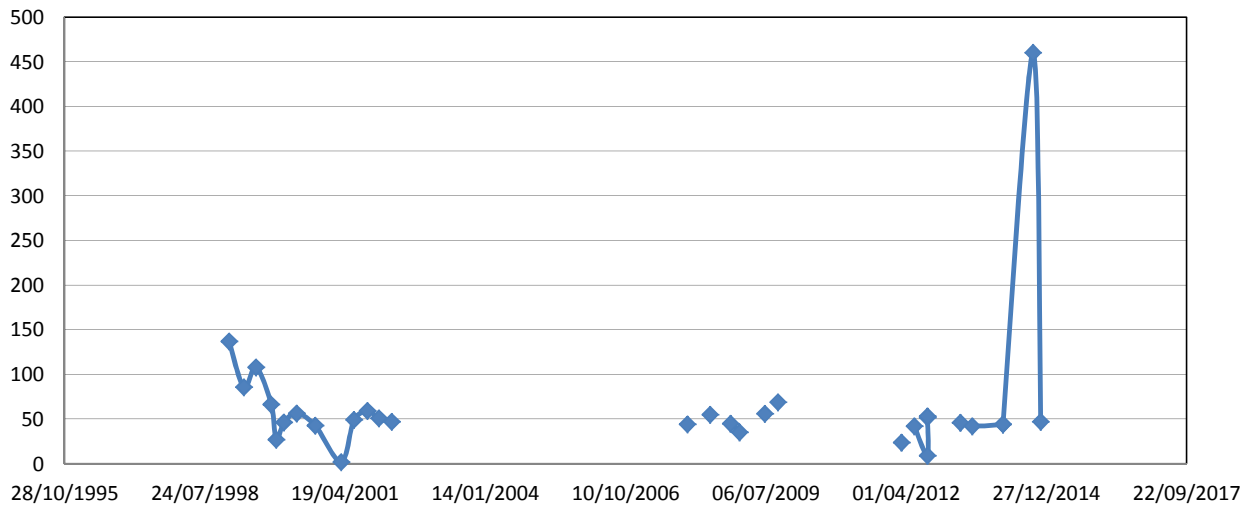
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PERMIT EA
WML 34183**

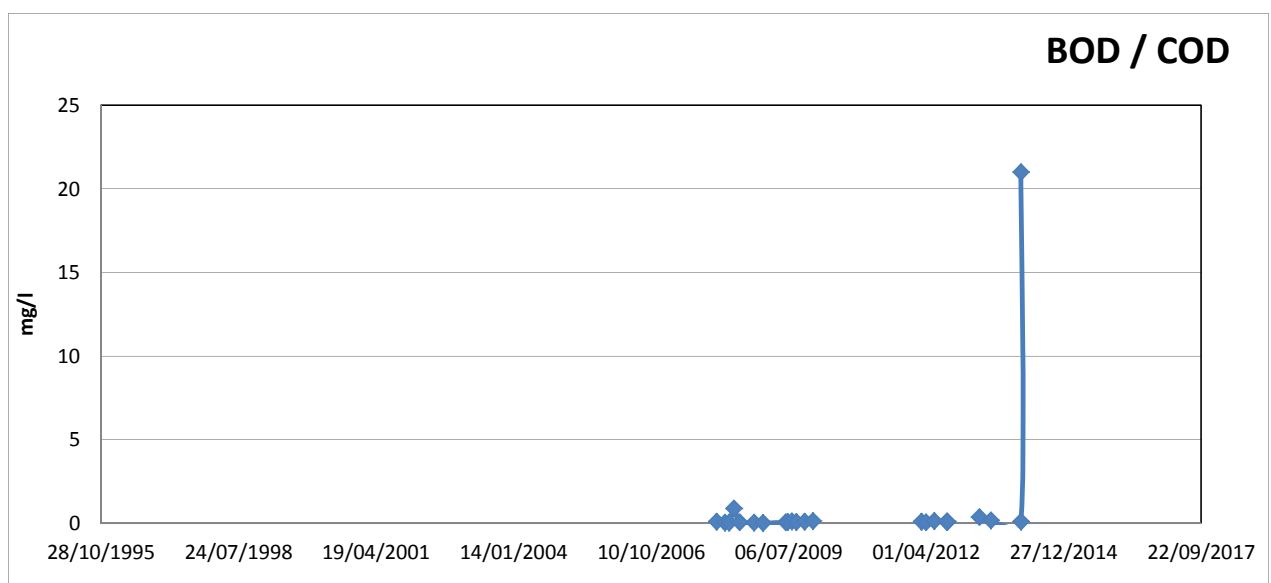
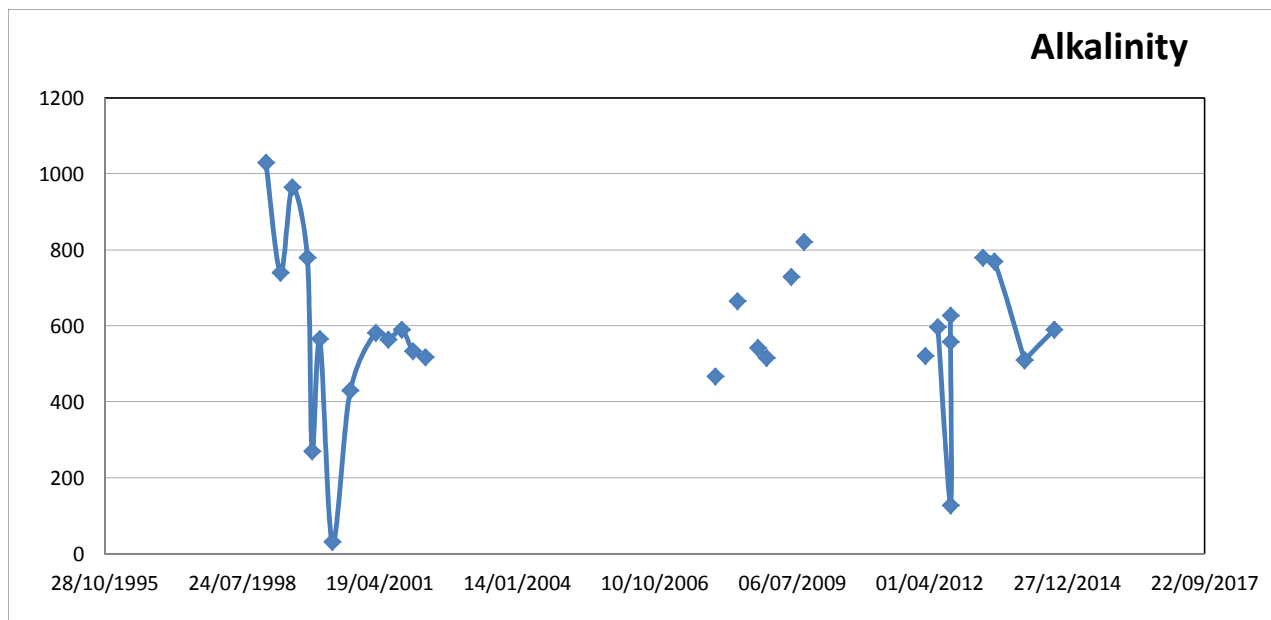
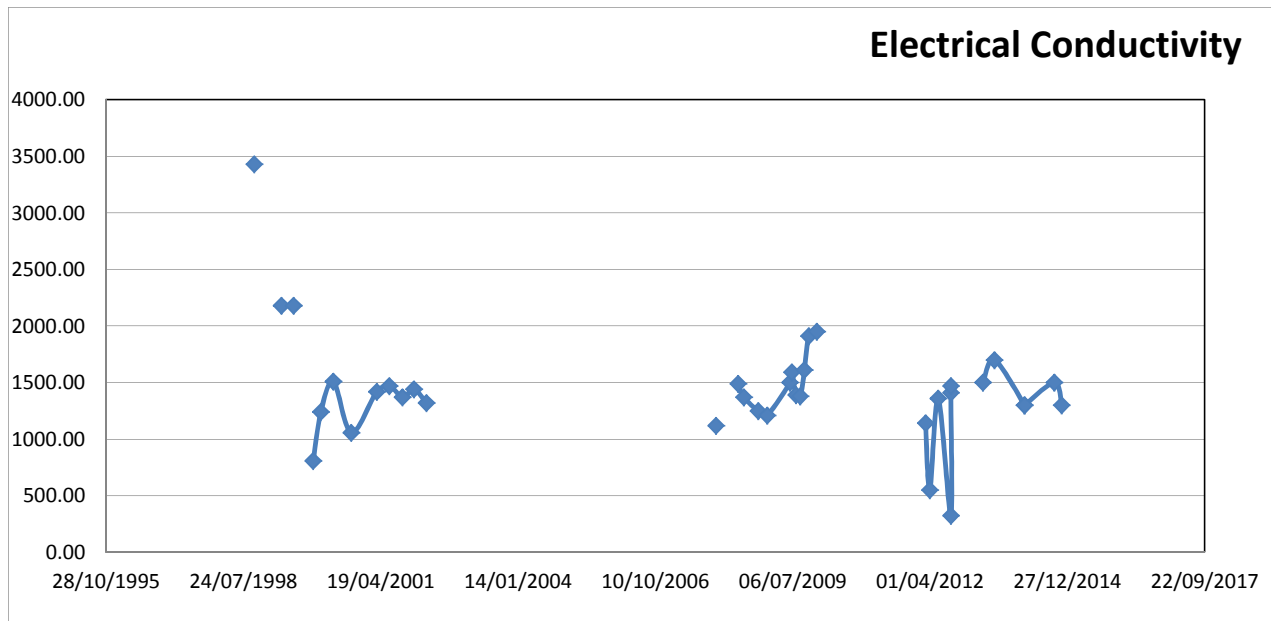
**Annual Environmental
Monitoring Report**

**Appendix 2
Leachate Chemistry**
Report Number 1343r1v1d0415





Potassium

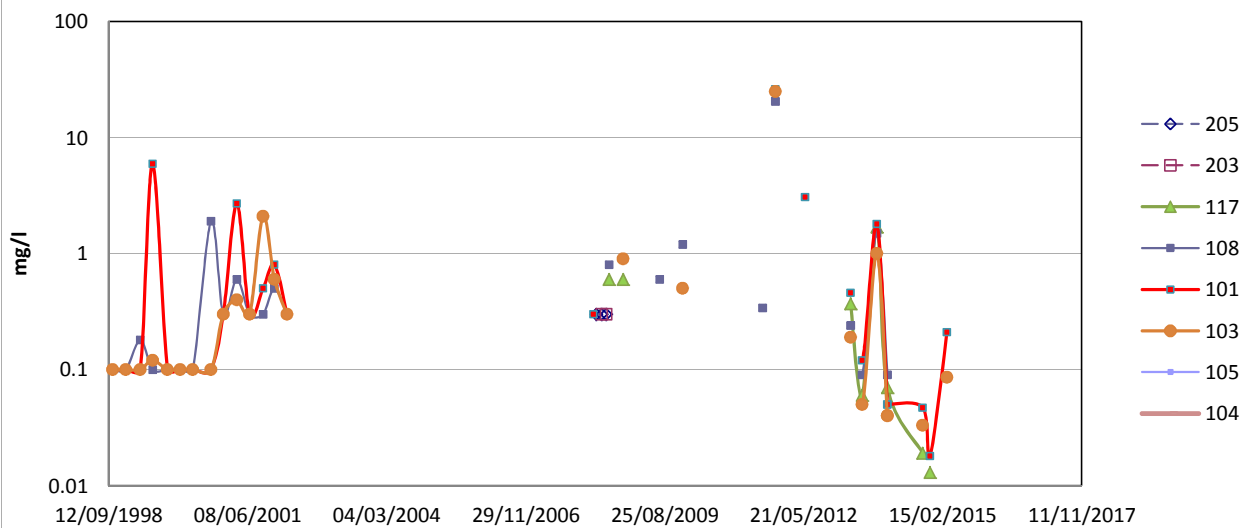
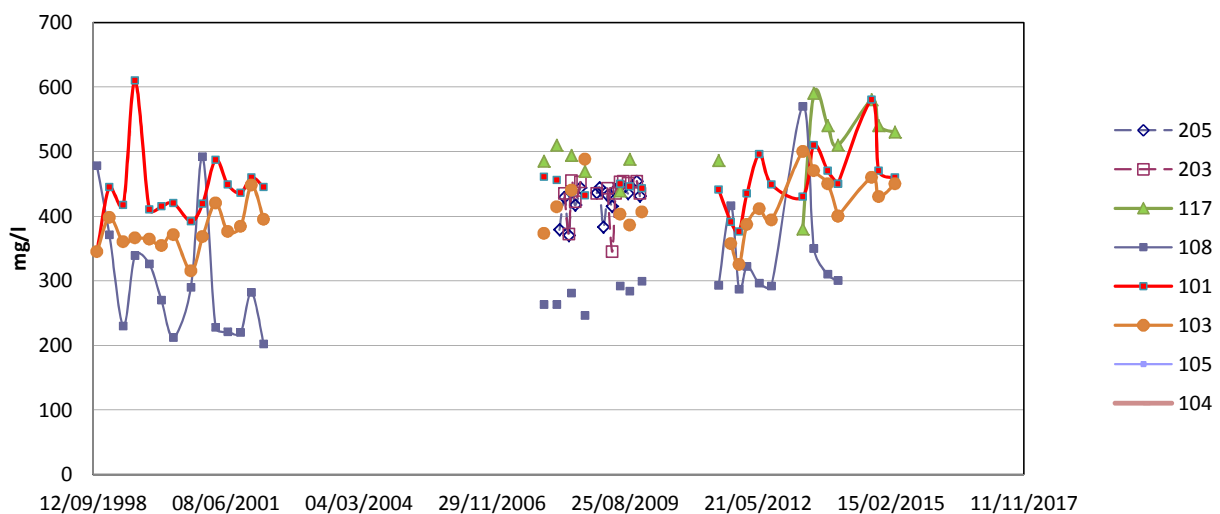


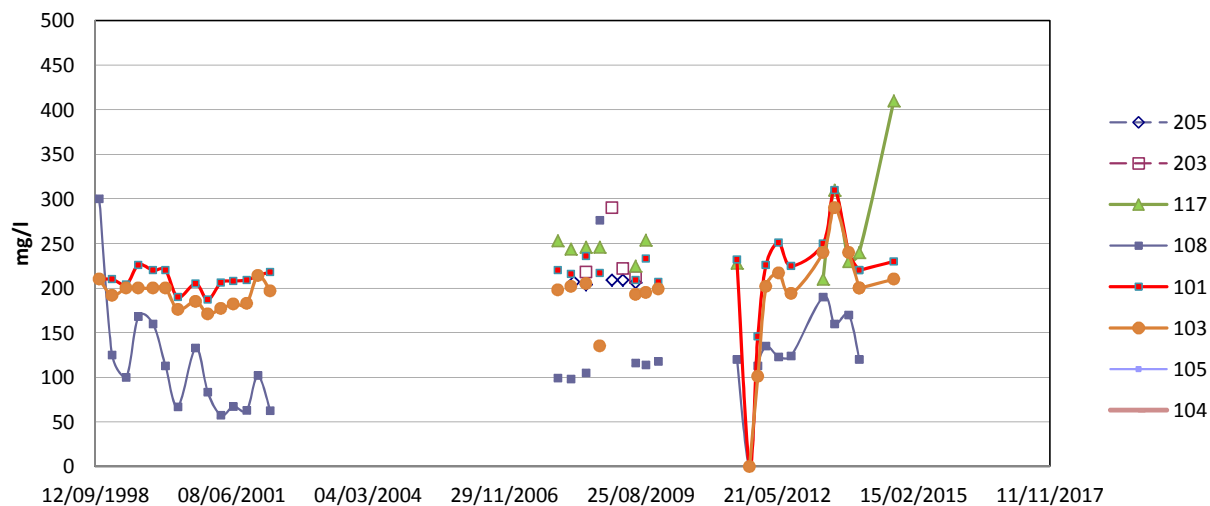
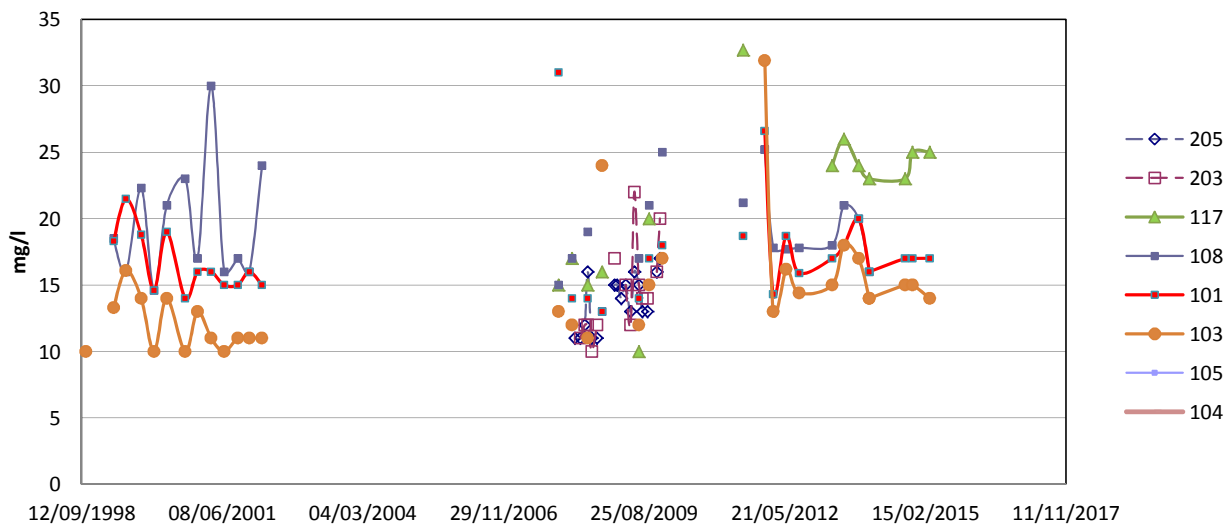
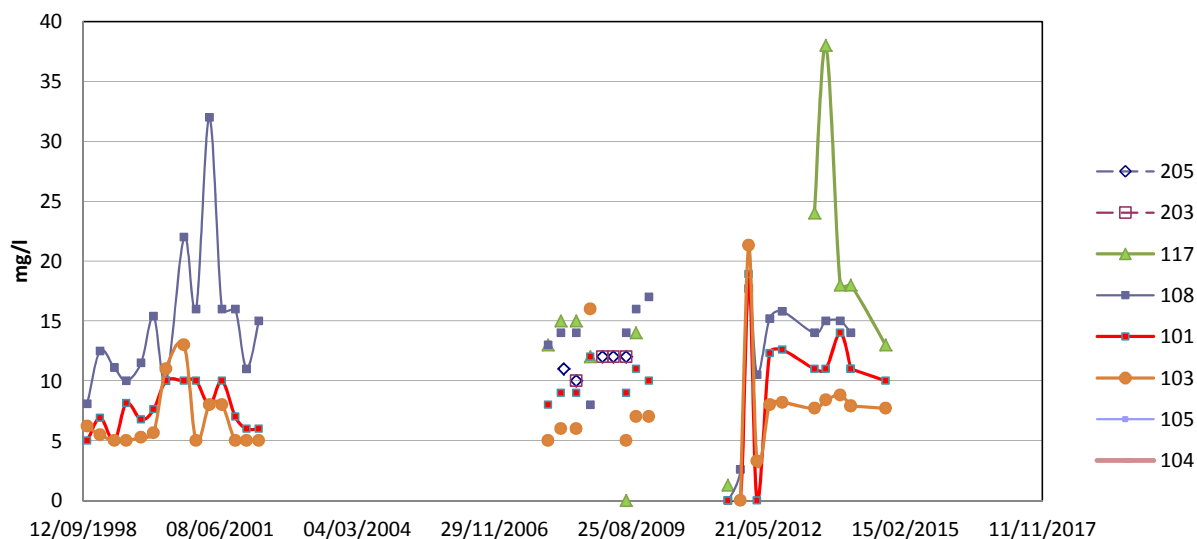
**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

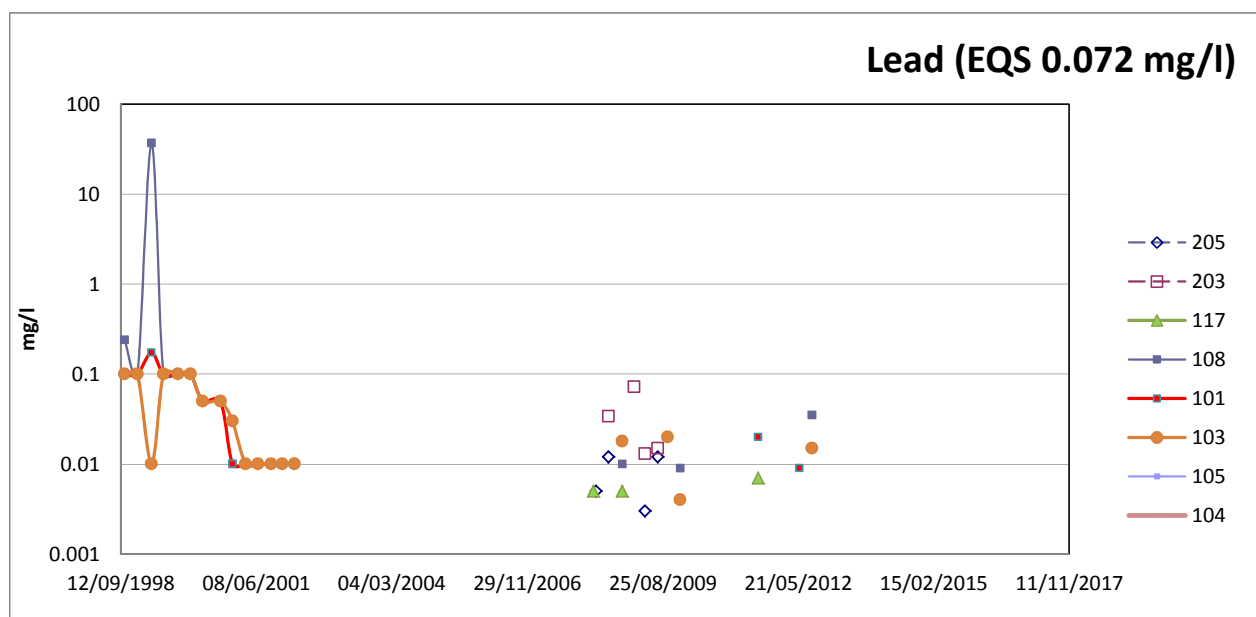
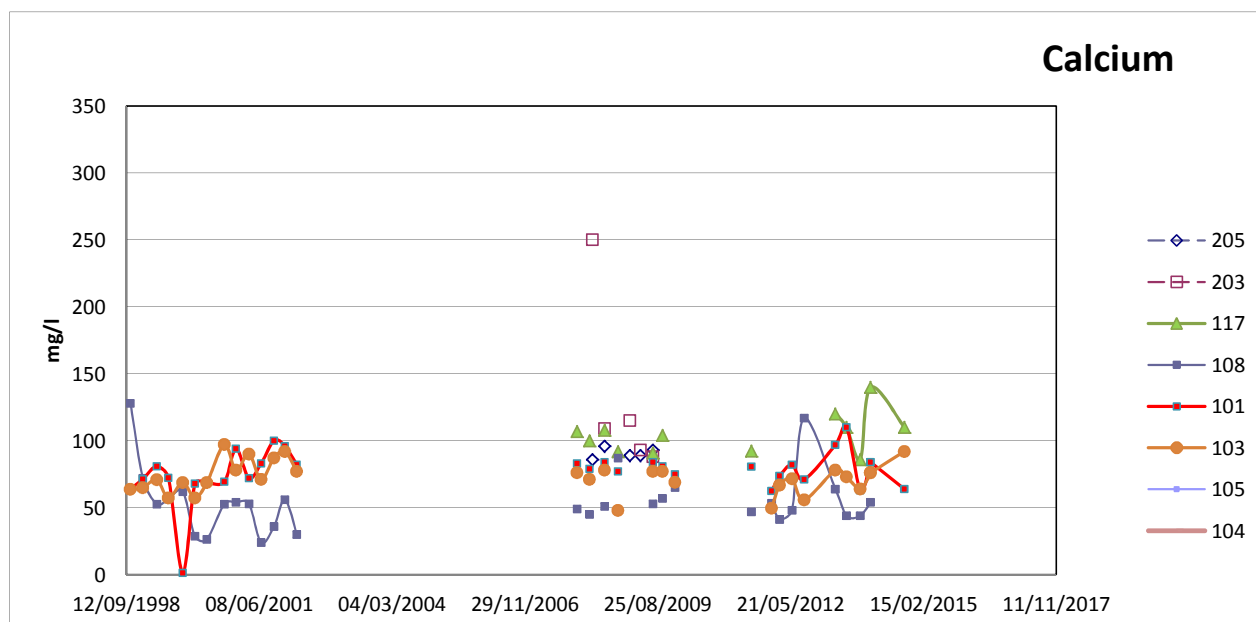
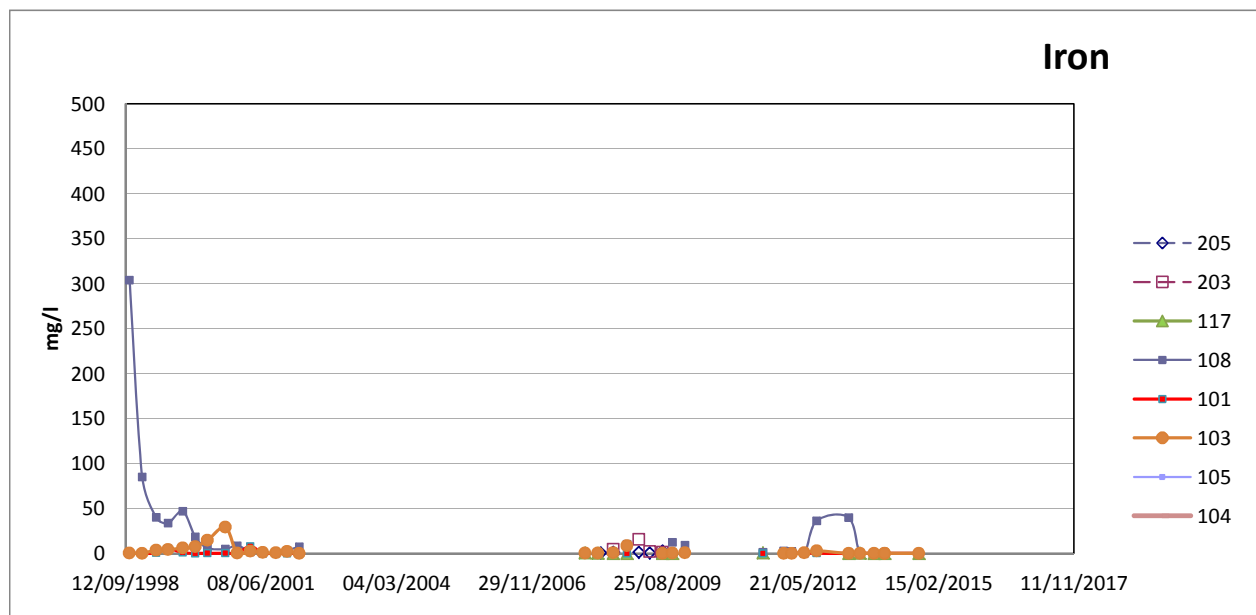
**ENVIRONMENTAL
PERMIT EA
WML 34183**

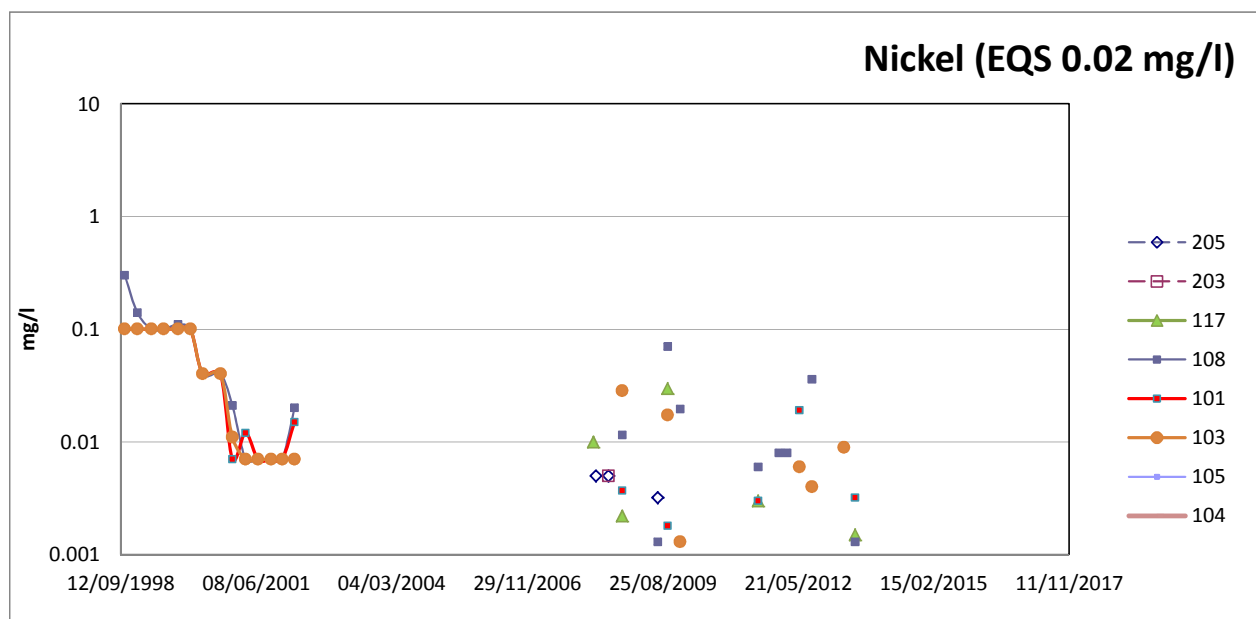
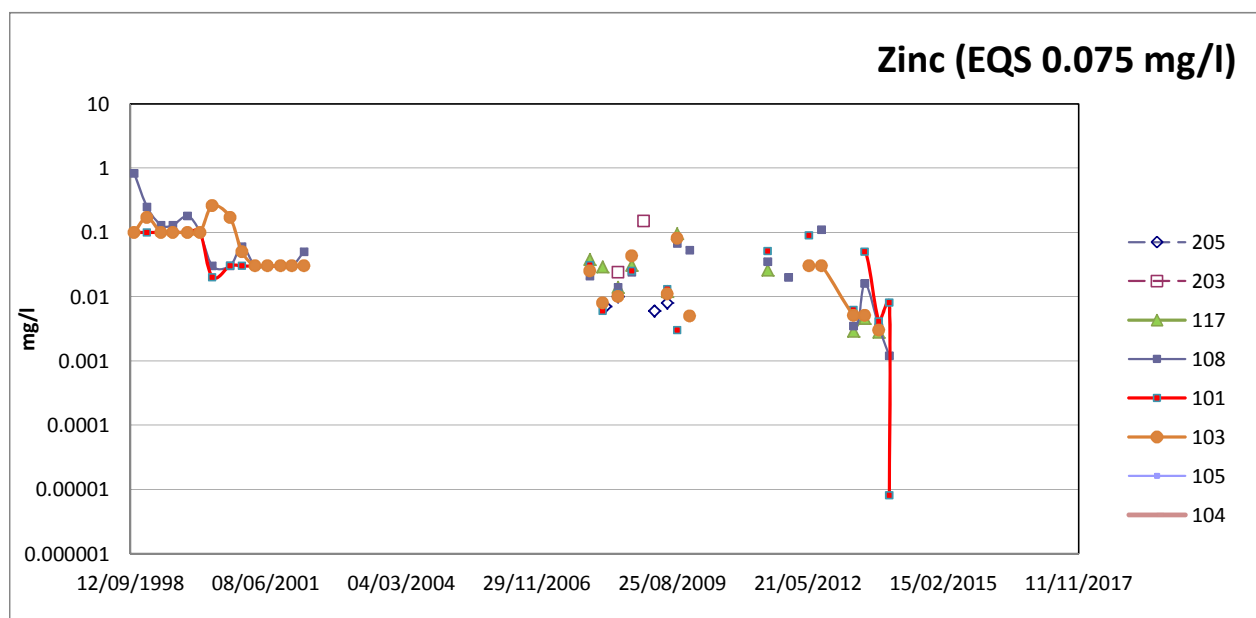
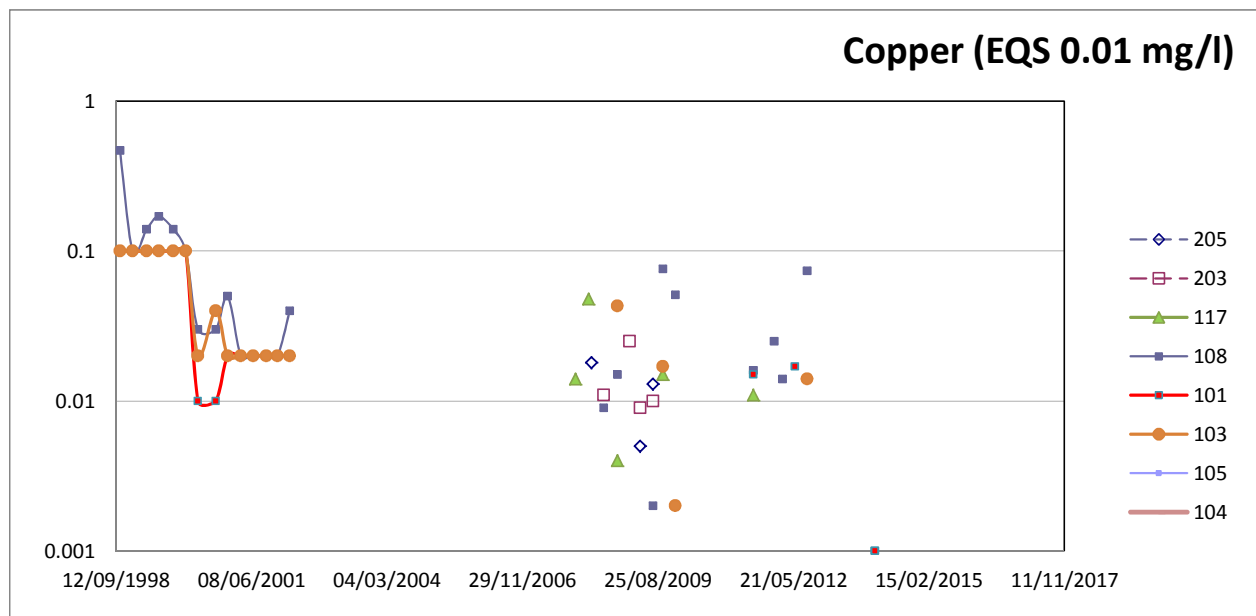
**Annual Environmental
Monitoring Report
Report**

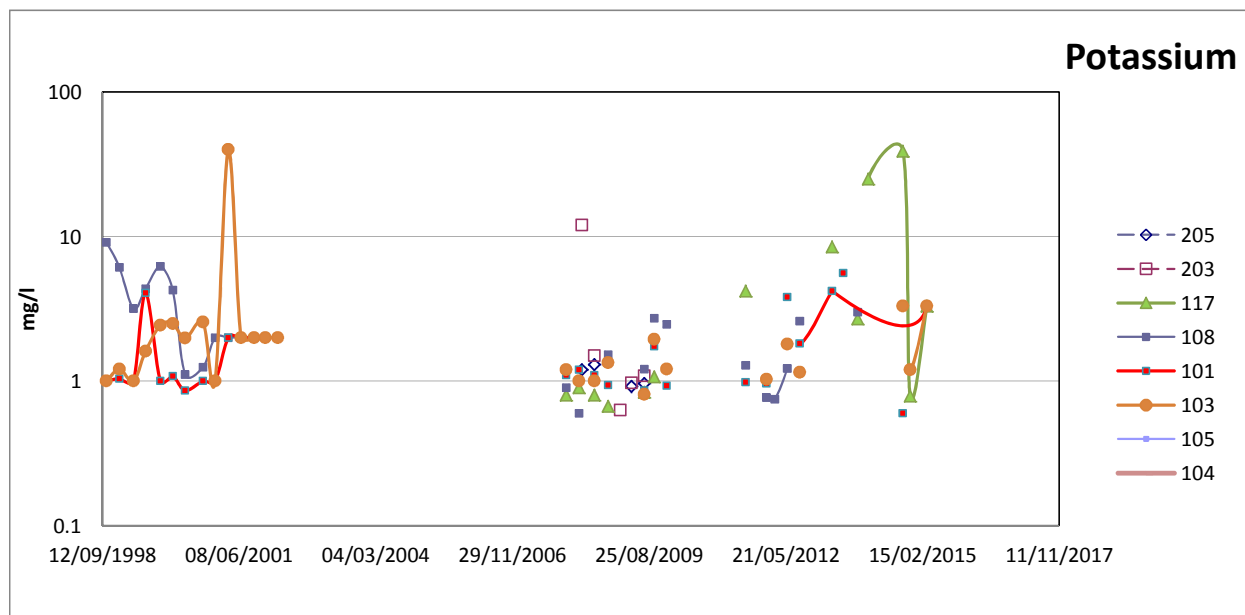
**Appendix 3
Groundwater Chemistry**
Report Number 1343r1v1d0415

pH**Ammonia****Electrical Conductivity**

Alkalinity**Chloride****Sulphate (EQS 400 mg/l)**





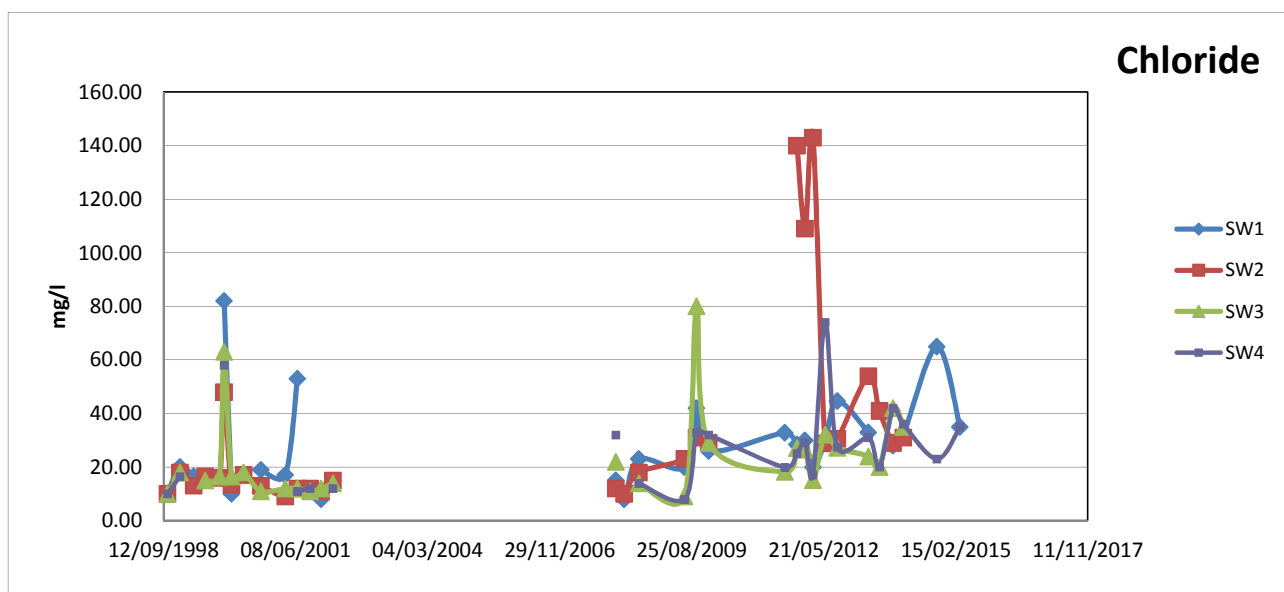
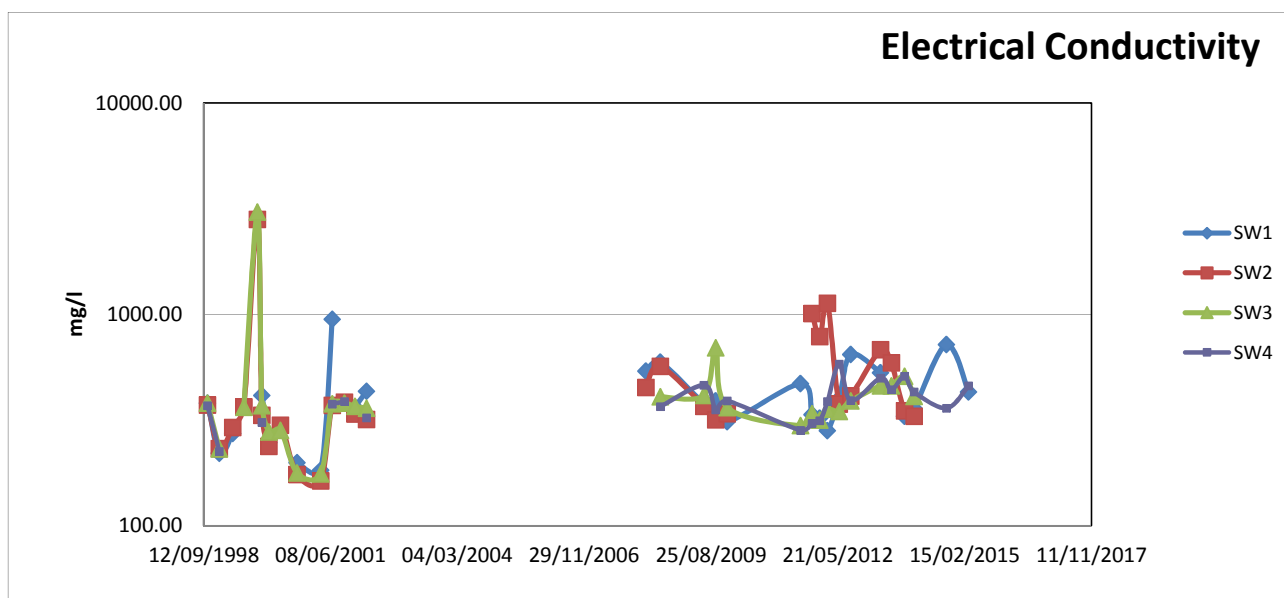
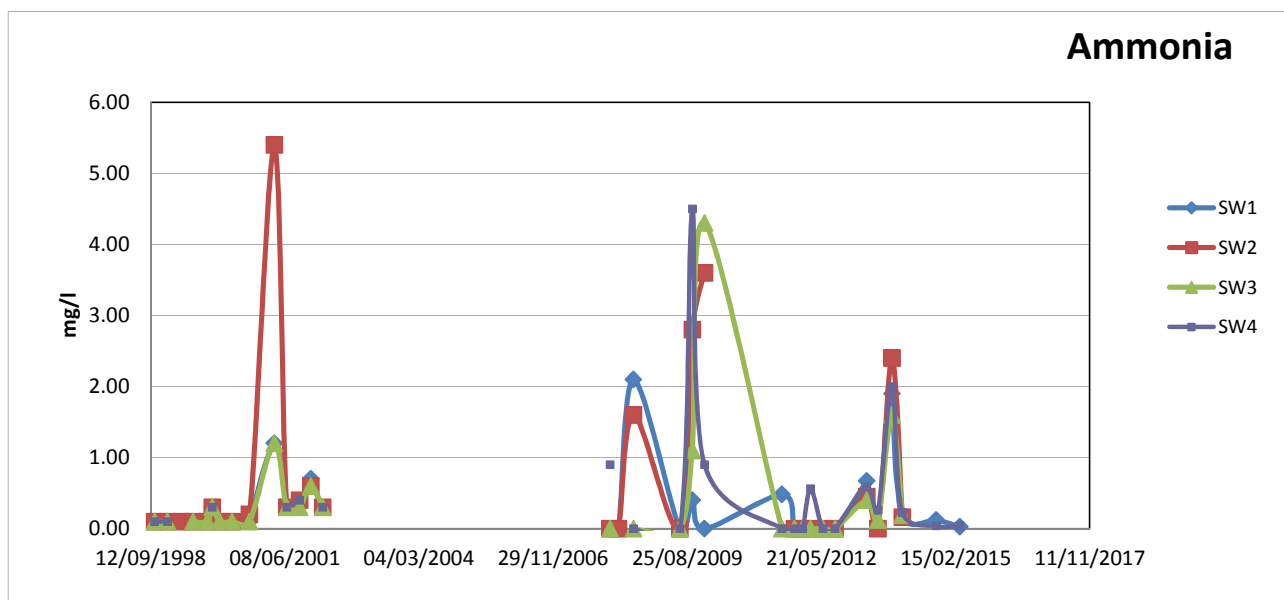


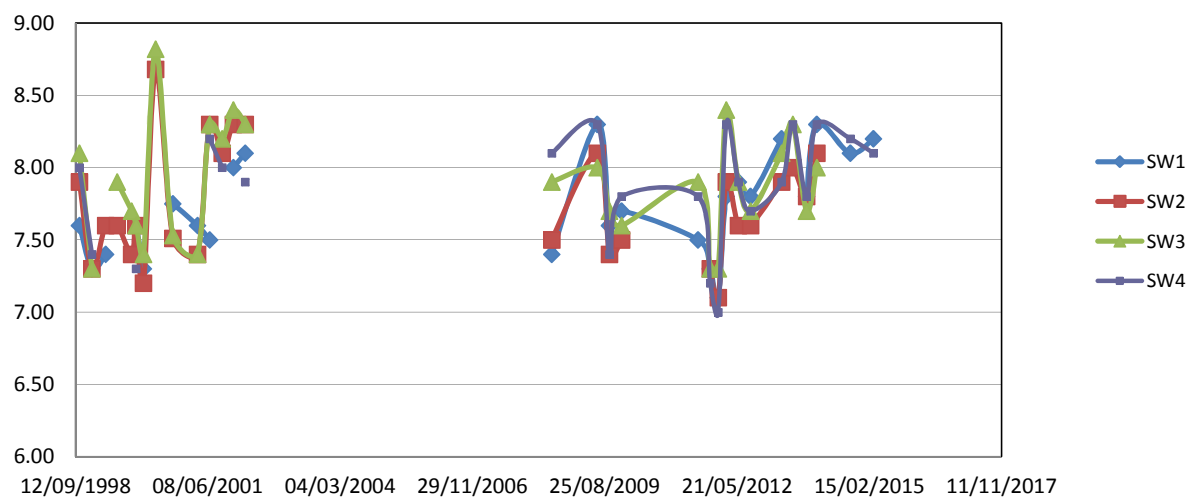
**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

**ENVIRONMENTAL
PERMIT EA
WML 34183**

**Annual Environmental
Monitoring Report
Report**

**Appendix 4
Surface Water Chemistry**
Report Number 1343r1v1d0415



pH**COD**