NANT Y CAWS
PHASE 1
CLOSED LANDFILL

ENVIRONMENTAL PERMIT EA WML 34183

2017 Annual Environmental Monitoring Report

Report Number 1760r1v1d0218

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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 December 2017.

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
2016	Permit Variation issued to operator of leachate treatment system (EPR/PP3338CQ) CWM Environmental placed soils over central part of aimed at restoring surface drainage patterns

Key features of the site are highlighted on Figures 2 and 3. The latter figure is a conceptual site model previously developed for a Hydrogeological Risk Assessment by Geotechnology.

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 is considered to rely 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 with a total of 25 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 with 300mm of inert fill. Subsequent working faces were pushed over each completed layer to form four layers, giving a total landfill thickness of between approximately 8 and 10m. This data was 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 in turn is 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 many 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 the surface 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 intention of the Post Closure Working Plan.

Following the removal of several stockpiles, CWM Environmental placed materials over the central part of the site during 2016. These works were aimed at reinstating the landfill landform and protection of the capping systems. Plates 1 and 2 illustrate the current site conditions.

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 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 drains 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. An application to vary the Permit was prepared by Geotechnology, at the request of CCC in 2015, and this was accepted by NRW in 2016.

3 REGULATORY FRAMEWORK

The Aftercare Management Plan sets out the relevant regulatory framework against which the environmental protection measures should be evaluated. These criteria are summarised in the following sections.

3.1 Leachate Level Limit

The maximum level of leachate that should be observed from a leachate inspection chamber is 0.5m as measured from the base of the chamber.

3.2 Leachate Chemistry Control Levels

Control levels for assessing leachate chemistry are provided in Table 3-1.

Table 3-1 Leachate Control Levels

	Ammoniacal Nitrogen	Chloride	Potassium
	mg l^{-1}	mg l^{-1}	mg l^{-1}
Current Discharge Consent from Effluent Treatment Plant	**4**		
Leachate Quarterly Control Level for L1	70	250	140
Daily Leachate Control Levels	4		

3.3 Groundwater Compliance Levels

Current groundwater trigger and control levels are summarised in Table 3-2.

Table 3-2 Trigger Levels for Emissions to Groundwater

	Ammoniacal Nitrogen	Chloride	Potassium
	mg l^{-1}	mg l^{-1}	mg l^{-1}
Groundwater Trigger Level BH101, 103, 104, 105 and 117	10	250	40
Groundwater Control level BH101, 103, 104, 105 and 117	4	150	30

3.4 Surface Water Control Levels

Current surface water control levels are summarised in Table 3-3.

Table 3-3 Control Levels for Emissions to Surface Water

	Ammoniacal Nitrogen	Chloride	Suspended Solids
Location	mg l^{-1}	mg l^{-1}	mg l^{-1}
SW1	0.6	150	
Cap run-off discharge			50 mg/l
French Drain Discharge	4		

3.5 Perimeter Gas Compliance Levels

Currently applicable emission limits for the perimeter gas wells are summarised in Table 3-4.

Table 3-4 Landfill Gas in External Monitoring Boreholes Emission Limits

Perimeter gas position	Carbon Dioxide Action Level (% v/v)	Methane Compliance Limit (% v/v)
All positions	3	1

Action levels are for internal use by CCC while methane compliance limits are a Permit requirement.

4 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 currently undertaken by Geotechnology under contract. Upgradient groundwater wells are sampled by the current operators of the adjacent operational landfill, CWM Environmental. The available monitoring infrastructure is shown on Figure 2.

A summary of the current monitoring programme is provided in Table 4-1.

Table 4-1 Current Monitoring Programme

Item	Monitoring Point	Type of Monitoring	Monitoring Frequency	Relevant Working Plan	Party Responsible
A	Landfill leachate level	Level and Conditional Observations	Monthly for 12 months starting 2014 and then quarterly	See WP10	WEBS*
B	Landfill leachate – L1	Composition	Six monthly	See WP10	Geo
C	Leachate Breakout - Phase 1 flanks (including toe drain)	Visual	Quarterly	See WP10	Geo
D	Upgradient Groundwater – BH203, BH205	Composition		Data provided by CWM Environmental	CCC/CWM
E	Downgradient Groundwater – BH101, 103, 104, 105, 117	Level	Quarterly	See WP11	Geo
F	Downgradient Surface Water – SW1, SW4	Composition	Quarterly	See WP12	Geo
G	Internal landfill gas	Composition	Monthly	See WP13	Infinis
H	French Drain	On-site measurement of composition	When observed to be flowing during inspections by WEBS	See WP12	WEBS*
I	Run-off Discharge	Composition	Quarterly	See WP12	Geo
J	Leachate Discharge	Composition	Monthly	See WP10	WEBS*
K	Contingency Surface Water Sample Points	Composition		See WP12	Geo
L	Perimeter landfill gas - BH102, 106, 107, 109, 110, 111, 113, 114, 115, 118, 119, 120	Composition	Quarterly	See WP14	Geo
M	Monitoring infrastructure integrity	Observational	Inspect each point when sampling	See WP10 – WP14	Geo
N	Topographic Survey and Settlement Assessment	Topographic Survey	Every 5 years starting 2015	See WP15	Geo
Note: * Geotechnology understand that WEBS is no longer the contractor appointed to manage the leachate treatment system. It is unknown if the new contractor has been requested to undertake the monitoring identified					

4.1 Monitoring Network

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

Other minor repairs have been undertaken as required to headworks of several wells. Several headworks require improvement.

4.2 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 as follows:

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

In previous years, the operators of the leachate treatment plant undertook more frequent monitoring of the leachate prior to and following treatment. They also monitored the quality of a French drain along the southern perimeter of the site that was previously installed to collected leachate outbreaks. It is unclear if this data is still being gathered.

4.3 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 most 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 have recently been reprofiled by CWM Environmental. Most of the flanks in the northern and western boundary of the landfill have self-seeded, resulting in the proliferation of many 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, failure or leachate breakout was observed in the walkovers undertaken in 2016 or 2017.

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 $1m^2$. 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.

4.4 Topographic Survey

The landform at Phase 1 has been surveyed on many occasions. The most recent of which was in 2015 by Geotechnology. Since this time CWM Environmental has undertaken remedial reprofiling works. The next topographic survey is scheduled for 2020.

5 LEACHATE

5.1 Leachate Quality

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 data presented includes data gathered by Geotechnology and more frequent monitoring undertaken by WEBS who previously operated the leachate treatment plant.

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 since 2015 indicates ammonia and potassium to be typically less than 50 mg/l. Trace metals within the leachate are at low concentrations. Low level trace organics have also been detected in recent years. In 2017, these included speciated polyaromatic hydrocarbons (<0.001 mg/l total PAH) and 0.0012 mg/l mecoprop.

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.

Given the potentially declining source concentrations, Geotechnology suggest that CCC maintain scrutiny of the leachate treatment requirements to ensure resource are being effectively used. The treatment goals and operation of the leachate treatment plant and the potential for cost savings using alternate techniques should be regularly considered and at least every 5 years.

5.2 Assessment against Control Levels

The spot samples collected by Geotechnology indicate that leachate quality falls below the control levels (see Table 5-1). The more detailed routine monitoring undertaken by the leachate treatment operator should also be scrutinised.

Table 5-1 Evaluation of Leachate Chemistry

	Ammoniacal Nitrogen	**Chloride**	**Potassium**
	mg l^{-1}	**mg l^{-1}**	**mg l^{-1}**
Leachate Quarterly Control Level for L1	**70**	**250**	**140**
2016 Maximum value from spot sampling at L1	31.9	79.4	37.6
2017 Maximum value from spot sampling at L1	24.8	75.8	31.1

6 GROUNDWATER

6.1 Groundwater Quality

All the groundwater results are provided in Appendix 3.

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

Results for BH108 and BH117 are only available since 2008, whereas downgradient monitoring records are available since 1998.

The relatively low electrical conductivity of downgradient groundwater 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 0.4 mg/l in any samples collected during 2017 and potassium was less than 1.3 mg/l on all occasions. At BH103, where groundwater is artesian, the low levels of ammonia appear to be increasing

Trace elements and oxidised species of nitrogen, such as nitrate, have been detected in groundwater around the edge of the landfill but at relatively low concentrations. The data suggests that either the landfill is not releasing such potential pollutants or that natural attenuation is occurring. Increased COD at BH117 and BH104 noted previously has not persisted, although levels have increased at BH103.

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. Mercury was detected at 0.00006 mg/l at BH105 in November 2016 but not above the analytical detection limit in 2017. On all other occasions it was below the analytical level of detection.

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 2016, trace levels of polyaromatic hydrocarbons (PAHs) were only detected at BH104 (0.3 microg/l total PAH). In 2017, similar hydrocarbons were found at BH117 (<0.007 microg/l total PAHs) and BH104 (0.168 microg/l total PAHs).

6.2 Assessment against Compliance Levels

The groundwater chemistry observed in 2017 was like that observed previously and no breaches of the control and trigger levels occurred, as shown by the summary in Table 6-1.

Table 6-1 Comparison of Groundwater Chemistry with Compliance Levels

		Potassium	Ammoniacal Nitrogen	Chloride
		mg/l	**mg/l**	**mg/l**
	Trigger Levels (BH101, 103, 104, 105 and 117)	40	10	250
	Control Levels (BH101, 103, 104, 105 and 117)	30	4	150
	Maximum Value in Groundwater (2016)	4.39	0.631	26.8
	Maximum Value in Groundwater (2017)	1.21	0.39	25.6

7 SURFACE WATER

All the surface water results are presented in Appendix 4.

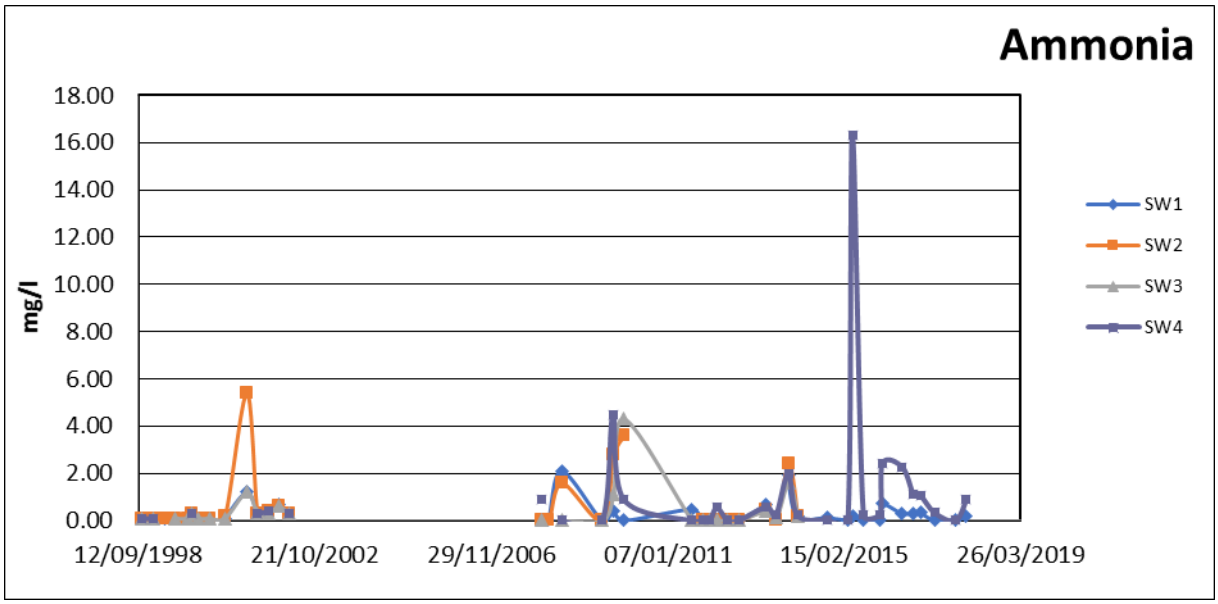
7.1 Contributions

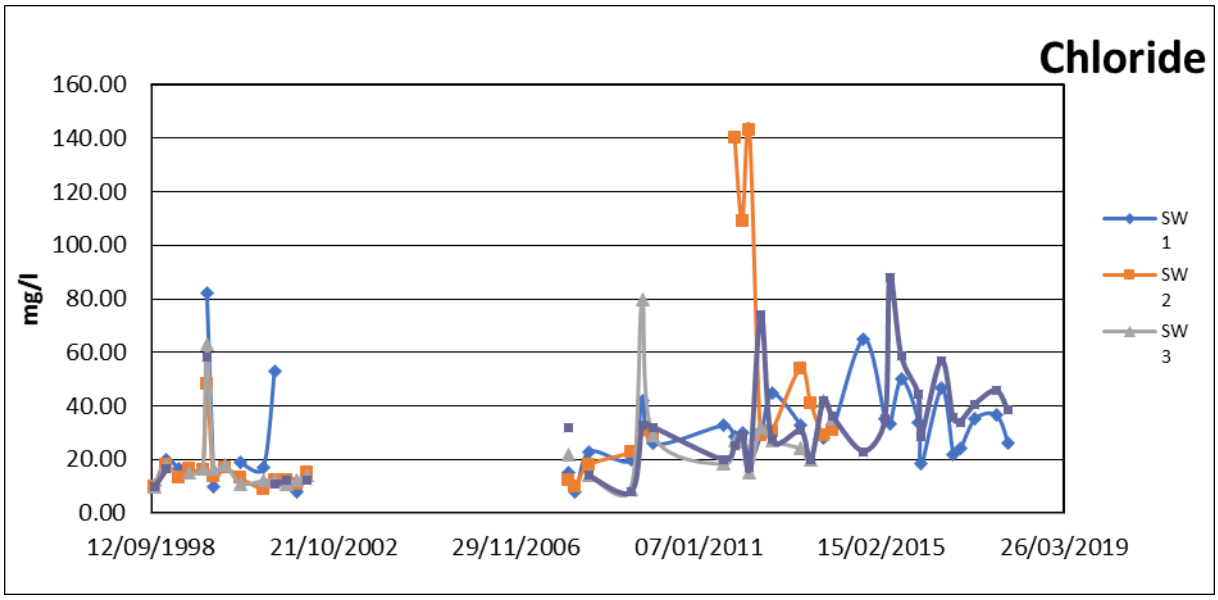
Sample points SW1, SW2, SW3 and SW4 monitor the stream that runs west to east along the southern boundary of the landfill. The location of the surface water sample points is shown on Figure 2.

Surface water quality is primarily influenced by input from the CWM treatment lagoons west of the site and the level of leachate treatment achieved at the Phase I treatment plant.

7.2 Quality

Surface water quality observed during 2017 is like that observed previously. The quality of surface water leaving the site at SW1 (the furthest point monitored downgradient of the site) is better than the quality issuing into the stream just upstream of SW4 from the settlement lagoons to the west. As highlighted by the graphs reproduced below and further graphs in Appendix 4, this is best observed by comparing the higher concentration of several parameters observed at SW4 with the lower concentrations at SW1. This evaluation also demonstrates that water quality at SW1 is influenced by water quality at SW4 which in-turn is directly downgradient of the CWM settlement lagoons and not related to the landfill.





7.3 Assessment against Control Levels

All surface water quality was below the emission limits in 2017, as summarised in Table 7-1.

Table 7-1 Comparison of Surface Water Data with Emission Levels

	Ammoniacal Nitrogen as N	Chloride	Suspended solids
	mg/l	mg/l	mg/l
	Ammoniacal Nitrogen	Chloride	Suspended Solids
Location	**mg l^{-1}**	**mg l^{-1}**	**mg l^{-1}**
Control Levels			
SW1	0.6	150	
Cap run-off discharge			50 mg/l
Max values in 2017			
SW1	0.2	26.1	
Max value in cap runoff			5.95

8 PERIMETER GROUND GAS

During the quarterly monitoring undertaken since April 2013, all methane concentrations have been below the Permit threshold. Methane has been below 0.3% at all monitoring positions since 2014.

Carbon dioxide (CO_2) has been detected at several positions along the eastern boundary (BH114, BH115, BH116 & BH118). Throughout 2014 and 2015, the concentration of carbon dioxide rarely exceeded 1%. In 2016, 3.3% was detected at BH115 in January and 6.8% at BH116 in June. At all other times less than 2.1% was detected at either position. In 2017, the carbon dioxide value detected was 4.1% at BH116. Less than 0.5% was detected at other positions.

9 SUMMARY AND RECOMMENDATIONS

9.1 Environmental Protection

The current data reveals a declining leachate source term. Consequently, the risk to the environment is reducing. Within this in mind, CCC should regularly review the operation of the leachate treatment plant to ensure it is an efficient use of resources.

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 hazardous substances. 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. Consequently, 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 surface water treatment lagoons to the west.

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.

9.2 Monitoring Programme

Now that the site has been formally taken into Aftercare, the monitoring programme agreed in the Aftercare Management Plan has started to be implemented. As part of this Plan, an increased range of chemical parameters were analysed in leachate and groundwater samples as these media had not previously been assessed for the presence of hazardous substances and trace organics. Based on the data gathered during the last 24 months, where most of these substances were not found above detection limits, Geotechnology suggests that the monitoring programme should continue to be implemented as summarised in Table 4-1 but that the analytical suites should be reduced to those summarised in Table 9-1. The reduction reflects the declining leachate source term and is aimed at ensuring efficient use of resources.

Table 9-1 Analytical Testing Schedule

Media	Groundwater		Surface Water	Leachate	Runoff Discharge	Perimeter Gas	Leachate Discharge	French Drain
Suite ID	NYC1	NYC2	NYC3	NYC4	NYC5			
Time of Year	Q1, Q3	Q2, Q4	Q1, Q2, Q3, Q4	Q2, Q4	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Monthly	When flowing
Sampling locations	BH101, 103, 104, 105, 117		SW1 and SW4	L1	End of pipe discharge point	BH102, 106, 107, 109, 110, 111, 113, 114, 115, 117, 118, 119, 120	End of pipe discharge point	
No. of samples/ year	15	5	8	2	4	-	12	
ON-SITE TESTING								
Carbon dioxide, methane, hydrogen sulphide, carbon monoxide, differential pressure, air temperature, atmospheric pressure, balance gas			✓			✓		
Ammonia, pH, temperature (at treatment plant by operator)							✓	✓
LAB TESTING								
pH	✓	✓	✓	✓	✓			
Electrical Conductivity	✓	✓	✓	✓	✓			
Dissolved Oxygen	✓	✓	✓	✓				
Alkalinity	✓	✓	✓	✓				
Hardness		✓		✓				
Calcium		✓		✓				
Magnesium		✓		✓				
Chloride	✓	✓	✓	✓				
Potassium	✓	✓	✓	✓				
Sodium	✓	✓		✓				
Sulphate		✓		✓				
Phosphate		✓		✓				
Phosphorous		✓		✓				
Ammoniacal Nitrogen	✓	✓	✓	✓				
Arsenic		✓		✓				
Barium		✓		✓				
Beryllium		✓		✓				
Boron		✓		✓				
Cadmium		✓		✓				
Chromium		✓		✓				
Copper		✓		✓				
Iron		✓		✓				
Lead		✓		✓				
Manganese		✓		✓				
Mercury		✓		✓				
Nickel		✓		✓				
Zinc		✓		✓				
Mecoprop		✓		✓				
Total PAH		✓		✓	✓			
Suspended Solids			✓		✓			

9.3 Decommissioning and Surrender

Ahead of the development of the site for the disposal of waste, CCC leased the land from a Mr D Davies as part of a 50-year lease starting in 1983. Since this time, CWM has purchased the land and is now the landlord. Geotechnology understands that the long-term plan of CCC is to start the process of handing the land lease back to CWM once the materials being stored on the surface have been removed and any remedial works completed. Now that this work has been undertaken Geotechnology suggests that this next stage should be initiated.

During the next phase of site management, Geotechnology understand that CCC will continue to monitor the site and treat leachate and that CWM will continue to be responsible for landfill gas collection and management. Monitoring will continue to be coordinated by CCC until there is no risk to the environment. At that point, a Permit Surrender application will be submitted to NRW bringing together the lines of evidence that demonstrate the site no longer poses a risk to the environment and the infrastructure can be decommissioned. During this period, regular consideration should be given to the performance and suitability of the leachate treatment plant.

Figure 1 Site Location Plan

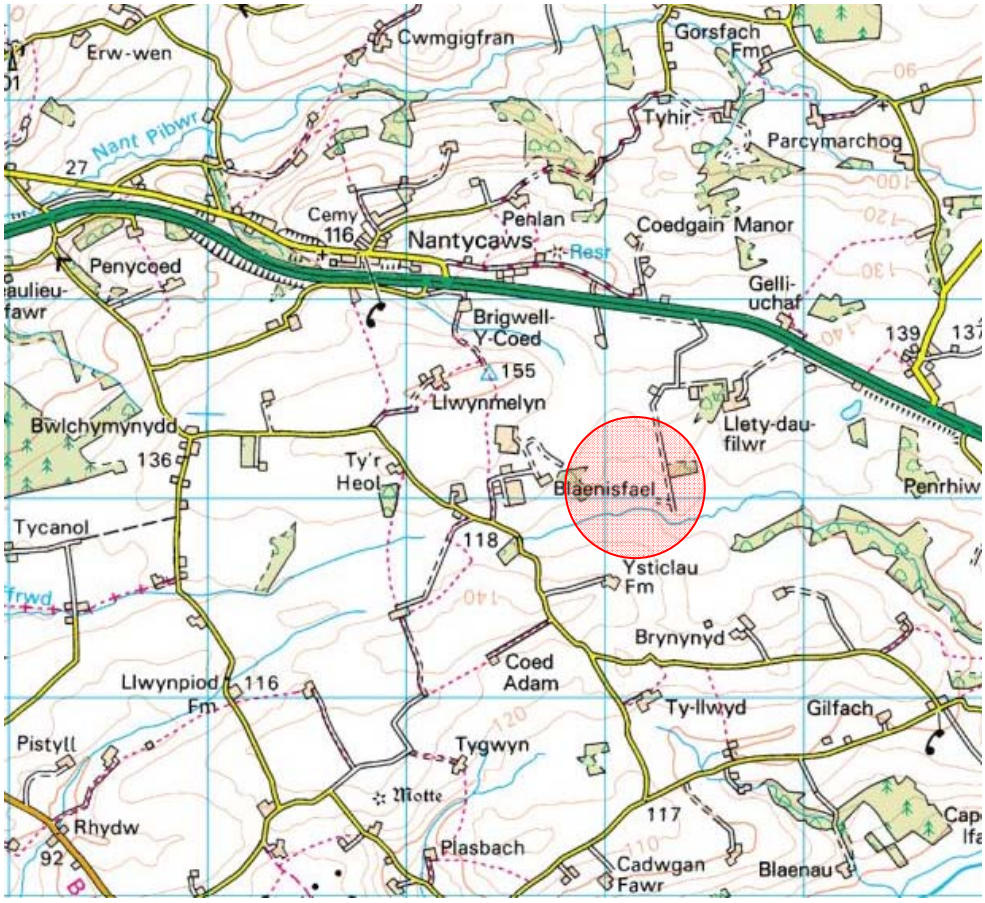


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Figure 2 Available Monitoring Network

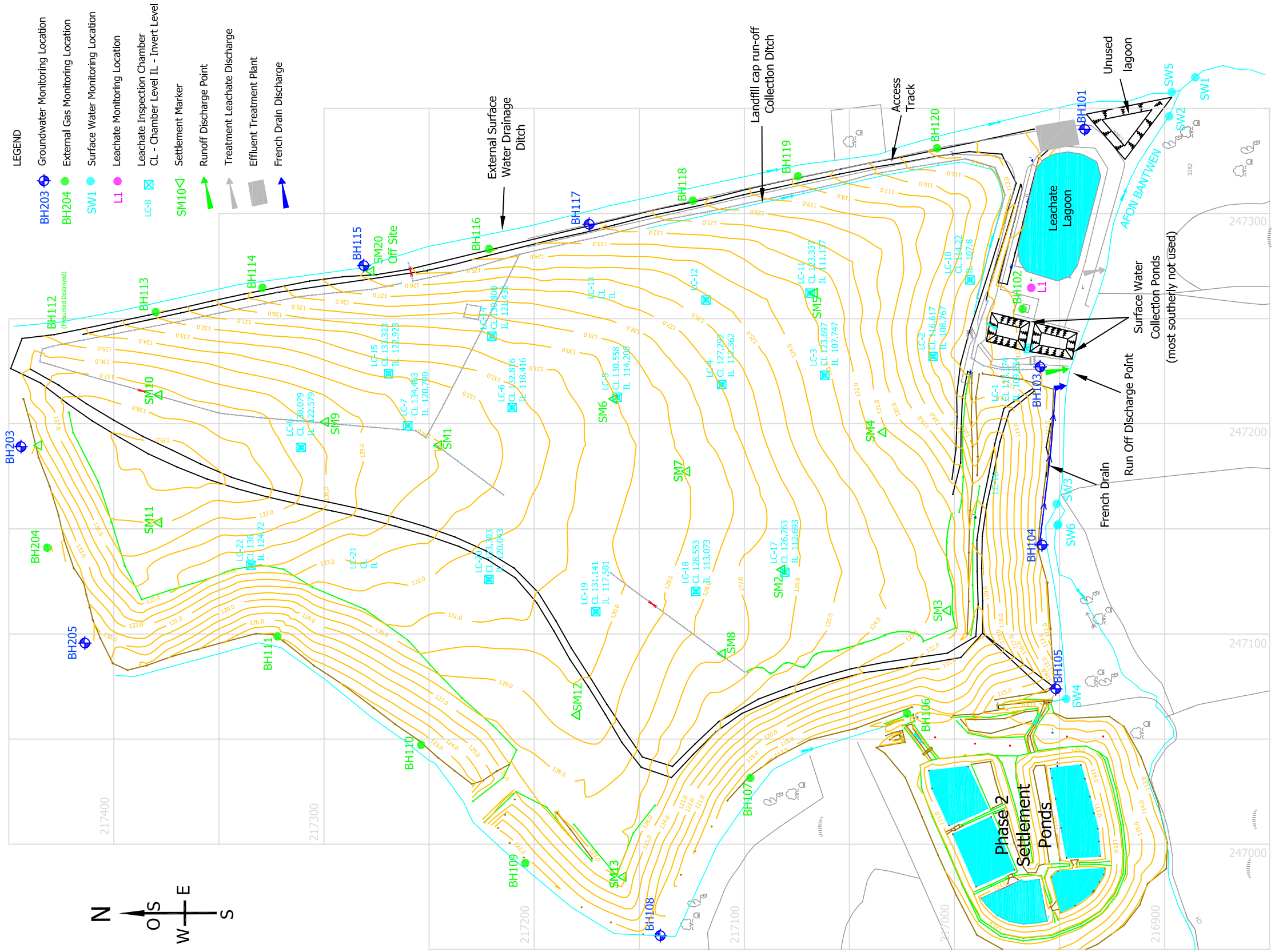
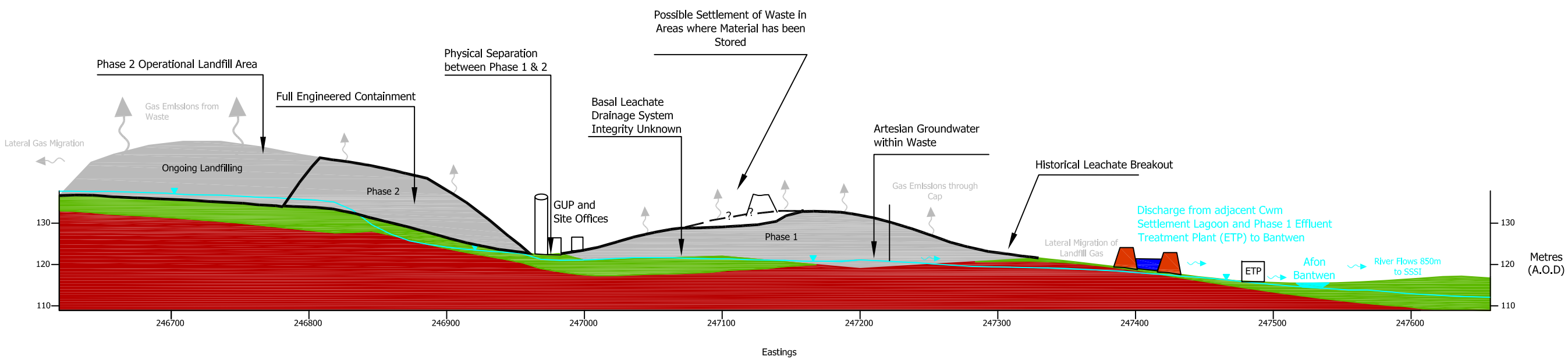


Figure 3 Conceptual Site Model



Legend

- Waste
- Glacial Drift
- Devonian Bedrock
- Potential Landfill Gas Emission
- Potential Seepage to Controlled Water

GUP Gas Utilisation Plant
ETP Effluent Treatment Plant

Note:
Landfill gas can give rise to odour and migrate laterally

NANT Y CAWS
PHASE 1
CLOSED LANDFILL

ENVIRONMENTAL
PERMIT EA WML 34183

2017 Annual
Environmental
Monitoring Report

Appendix 1
Laboratory Certificates

Report Number 1760r1v1d0218

Unit 7-8 Hawarden Business Park
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Website: www.alsenvironmental.co.uk

Geotechnology
5 Cefn-yr-Allt
Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	31 March 2017
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	170324-96
Your Reference:	
Location:	Carmarthen
Report No:	403565

We received 3 samples on Friday March 24, 2017 and 3 of these samples were scheduled for analysis which was completed on Friday March 31, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170324-96	**Client Reference:**		**Report Number:**	403565
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15232824	WERN BH10			23/03/2017
15232823	WERN SW2			23/03/2017
15232822	WERN SW4			23/03/2017

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170324-96	**Client Reference:**		**Report Number:**	403565
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			15232824	15232823	15232822	
Customer Sample Reference			WERN BH10	WERN SW2	WERN SW4	
AGS Reference						
Depth (m)						
Container			100ml Unfilt. (ALE502)	H2SO4 (ALE244)	100ml Unfilt. (ALE502)	100ml Unfilt. (ALE502)
Sample Type			GW	GW	SW	SW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1		X		
		NDPs: 0 Tests: 2			X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X			
		NDPs: 0 Tests: 2			X	X
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1	X			
		NDPs: 0 Tests: 2			X	X
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1	X			
		NDPs: 0 Tests: 2			X	X
pH Value	All	NDPs: 0 Tests: 1	X			
		NDPs: 0 Tests: 2			X	X

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170324-96	**Client Reference:**		**Report Number:**	403565
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			WERN BH10	WERN SW2	WERN SW4			
Depth (m)			.	.	.			
Sample Type			Ground Water (GW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled			23/03/2017	23/03/2017	23/03/2017			
Sample Time			.	.	.			
Date Received			24/03/2017	24/03/2017	24/03/2017			
SDG Ref			170324-96	170324-96	170324-96			
Lab Sample No.(s)			15232824	15232823	15232822			
AGS Reference								
Component	**LOD/Units**	**Method**						
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	180 #	<0.2 #	<0.2 #			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	3.31 #	0.583 #	0.177 #			
Chloride	<2 mg/l	TM184	280 #	14.9 #	9.3 #			
Potassium (diss.filt)	<1 mg/l	TM228	92.7	5.72 #	1.18 #			
pH	<1 pH Units	TM256	7.23 #	8.19 #	7.86 #			

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Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	170324-96	**Client Reference:**		**Report Number:**	403565
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15232824	15232823	15232822
Customer Sample Ref.	WERN BH10	WERN SW2	WERN SW4
AGS Ref.			
Depth			
Type	Ground Water	Surface Water	Surface Water
Ammoniacal Nitrogen	31-Mar-2017	31-Mar-2017	31-Mar-2017
Anions by Kone (w)	31-Mar-2017	31-Mar-2017	31-Mar-2017
Conductivity (at 20 deg.C)	30-Mar-2017	29-Mar-2017	29-Mar-2017
Metals by iCap-OES Dissolved (W)	30-Mar-2017	30-Mar-2017	30-Mar-2017
pH Value	30-Mar-2017	30-Mar-2017	30-Mar-2017

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Website: www.alsenvironmental.co.uk

Geotechnology
5 Cefn-yr-Allt
Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	04 April 2017
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	170329-63
Your Reference:	
Location:	Carmarthen
Report No:	403924

We received 8 samples on Wednesday March 29, 2017 and 8 of these samples were scheduled for analysis which was completed on Tuesday April 04, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15252592	BH101			28/03/2017
15252593	BH103			28/03/2017
15252595	BH104			28/03/2017
15252596	BH105			28/03/2017
15252597	BH117			28/03/2017
15252600	RUNOFF			28/03/2017
15252599	SW2			28/03/2017
15252598	SW4			28/03/2017

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170329-63	**Client Reference:**		**Report Number:**	403924
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			15252592	15252593	15252595	15252596	15252597	15252600	15252599	15252598
Customer Sample Reference			BH101	BH103	BH104	BH105	BH117	RUNOFF	SW2	SW4
AGS Reference										
Depth (m)										
Container			0.5l glass bottle (ALE227)	H2SO4 (ALE244)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	H2SO4 (ALE244)	1lplastic (ALE221)	H2SO4 (ALE244)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2								
		NDPs: 0 Tests: 5	X		X		X		X	
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2								
		NDPs: 0 Tests: 5		X		X		X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 2								
		NDPs: 0 Tests: 5	X		X		X		X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 3								
		NDPs: 0 Tests: 5	X		X		X		X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2								
		NDPs: 0 Tests: 5	X		X		X		X	
pH Value	All	NDPs: 0 Tests: 3								
		NDPs: 0 Tests: 5	X		X		X		X	
Suspended Solids	All	NDPs: 0 Tests: 3								

Lab Sample No(s)			15252597	15252600	15252599	15252598
Customer Sample Reference			BH117	RUNOFF	SW2	SW4
AGS Reference						
Depth (m)						
Container			H2SO4 (ALE244)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	1lplastic (ALE221)	H2SO4 (ALE244)
Sample Type			GW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2			X		X	
		NDPs: 0 Tests: 5						
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2				X		X
		NDPs: 0 Tests: 5	X					
Anions by Kone (w)	All	NDPs: 0 Tests: 2			X		X	
		NDPs: 0 Tests: 5						
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 3		X	X		X	
		NDPs: 0 Tests: 5						
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2			X		X	
		NDPs: 0 Tests: 5						
pH Value	All	NDPs: 0 Tests: 3		X	X		X	
		NDPs: 0 Tests: 5						
Suspended Solids	All	NDPs: 0 Tests: 3		X	X		X	

17:40:34 04/04/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170329-63	**Client Reference:**		**Report Number:**	403924
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	RUNOFF
Depth (m)			.	.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			28/03/2017	28/03/2017	28/03/2017	28/03/2017	28/03/2017	28/03/2017
Sample Time			.	.	.	.	.	.
Date Received			29/03/2017	29/03/2017	29/03/2017	29/03/2017	29/03/2017	29/03/2017
SDG Ref			170329-63	170329-63	170329-63	170329-63	170329-63	170329-63
Lab Sample No.(s)			15252592	15252593	15252595	15252596	15252597	15252600
AGS Reference								
Component	**LOD/Units**	**Method**						
Suspended solids, Total	<2 mg/l	TM022						<6 #
Alkalinity, Total as CaCO3	<2 mg/l	TM043	220 #	220 #	310 #	270 #	270 #	
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	<0.2 #	<0.2 #	0.272 #	<0.2 #	
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.431 #	0.383 #	0.535 #	0.479 #	0.521 #	0.479 #
Chloride	<2 mg/l	TM184	15.3 #	14.5 #	8.4 #	11 #	24.6 #	
Potassium (diss.filt)	<1 mg/l	TM228	1.14	1.21	<1	1.11	<1	
pH	<1 pH Units	TM256	7.82 #	7.78 #	7.57 #	7.56 #	7.61 #	8.23 #

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170329-63	**Client Reference:**		**Report Number:**	403924
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			SW2	SW4				
Depth (m)			.	.				
Sample Type			Surface Water (SW)	Surface Water (SW)				
Date Sampled			28/03/2017	28/03/2017				
Sample Time			.	.				
Date Received			29/03/2017	29/03/2017				
SDG Ref			170329-63	170329-63				
Lab Sample No.(s)			15252599	15252598				
AGS Reference								
Component	**LOD/Units**	**Method**						
Suspended solids, Total	<2 mg/l	TM022	5 #	10.5 #				
Alkalinity, Total as CaCO3	<2 mg/l	TM043	180 #	190 #				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	0.327 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.473 #	0.511 #				
Chloride	<2 mg/l	TM184	35.4 #	40.7 #				
Potassium (diss.filt)	<1 mg/l	TM228	17.6 #	22.1 #				
pH	<1 pH Units	TM256	8.1 #	8.1 #				

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Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	170329-63	**Client Reference:**		**Report Number:**	403924
Location:	Carmarthen	**Order Number:**	1284/1551	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15252592	15252593	15252595	15252596	15252597	15252600	15252599	15252598
Customer Sample Ref.	BH101	BH103	BH104	BH105	BH117	RUNOFF	SW2	SW4
AGS Ref.								
Depth								
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water
Alkalinity as CaCO3	31-Mar-2017	31-Mar-2017	31-Mar-2017	31-Mar-2017	31-Mar-2017		31-Mar-2017	31-Mar-2017
Ammoniacal Nitrogen	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017		03-Apr-2017	03-Apr-2017
Anions by Kone (w)	01-Apr-2017	01-Apr-2017	01-Apr-2017	01-Apr-2017	01-Apr-2017		01-Apr-2017	01-Apr-2017
Conductivity (at 20 deg.C)	30-Mar-2017	31-Mar-2017	30-Mar-2017	30-Mar-2017	30-Mar-2017	31-Mar-2017	30-Mar-2017	30-Mar-2017
Metals by iCap-OES Dissolved (W)	31-Mar-2017	03-Apr-2017	31-Mar-2017	31-Mar-2017	31-Mar-2017		31-Mar-2017	31-Mar-2017
pH Value	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017	03-Apr-2017
Suspended Solids						04-Apr-2017	04-Apr-2017	04-Apr-2017

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Geotechnology
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Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	02 October 2017
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	170921-20
Your Reference:	
Location:	Carmarthen
Report No:	426516

We received 12 samples on Thursday September 21, 2017 and 10 of these samples were scheduled for analysis which was completed on Monday October 02, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16220724	BH10	ES		19/09/2017
16220728	BH101	ES		19/09/2017
16220727	BH103	ES		19/09/2017
16220726	BH104	ES		19/09/2017
16220725	BH105	ES		19/09/2017
16220731	LAGOON IN			19/09/2017
16220730	LAGOON OUT			19/09/2017
16220729	RUNOFF			19/09/2017
16220722	SW2 NYC	ES		19/09/2017
16220723	SW4 NYC	ES		19/09/2017
16220720	SW2 WERN	ES		19/09/2017
16220721	SW4 WERN	ES		19/09/2017

Maximum Sample/Coolbox Temperature (°C) : **15.4**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16220724	16220728	16220727	16220726	16220725	16220729	16220722	16220723	16220720
Customer Sample Reference			BH10	BH101	BH103	BH104	BH105	RUNOFF	SW2 NYC	SW4 NYC	SW2 WERN
AGS Reference			ES	ES	ES	ES	ES		ES	ES	ES
Depth (m)											
Container			500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	1lplastic (ALE221)	H2SO4 (ALE244)	1lplastic (ALE221)	H2SO4 (ALE244)	1lplastic (ALE221)	H2SO4 (ALE244)
Sample Type			UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL
Acid Herbicides (W)	All	NDPs: 0 Tests: 2									
Alkalinity as CaCO3	All	NDPs: 0 Tests: 6				X		X		X	
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 9		X			X		X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 9	X			X		X		X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 10	X			X		X		X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2									
Mercury Dissolved	All	NDPs: 0 Tests: 2									
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 9			X	X		X		X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2									
pH Value	All	NDPs: 0 Tests: 10	X			X		X		X	
Suspended Solids	All	NDPs: 0 Tests: 3									
VOC MS (W)	All	NDPs: 0 Tests: 2									

Lab Sample No(s)	16220722	16220723	16220720
Customer Sample Reference	SW2 NYC	SW4 NYC	SW2 WERN
AGS Reference	ES	ES	ES
Depth (m)			
Container	1lplastic (ALE221)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	1lplastic (ALE221)	H2SO4 (ALE244)
Sample Type	UNL	UNL	UNL	UNL	UNL
Acid Herbicides (W)				X	
Alkalinity as CaCO3	X	X			
Ammoniacal Nitrogen		X			X
Anions by Kone (w)	X	X		X	
Conductivity (at 20 deg.C)	X	X		X	
Dissolved Metals by ICP-MS					
Mercury Dissolved					
Metals by iCap-OES Dissolved (W)	X		X		
PAH Spec MS - Aqueous (W)				X	
pH Value	X	X		X	
Suspended Solids	X	X			
VOC MS (W)				X	

16220721	SW4 WERN	ES		HNO3 Filtered (ALE204)	UNL												X		X		X								
				H2SO4 (ALE244)	UNL						X																		
				500ml Plastic (ALE208)	UNL		X						X		X								X		X				X
16220720	SW2 WERN	ES		HNO3 Filtered (ALE204)	UNL												X		X		X								

Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH10	BH101	BH103	BH104	BH105	RUNOFF
Depth (m)			.	.	.	.	.	.
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)
Date Sampled			19/09/2017	19/09/2017	19/09/2017	19/09/2017	19/09/2017	19/09/2017
Sample Time			.	.	.	.	.	.
Date Received			21/09/2017	21/09/2017	21/09/2017	21/09/2017	21/09/2017	21/09/2017
SDG Ref			170921-20	170921-20	170921-20	170921-20	170921-20	170921-20
Lab Sample No.(s)			16220724	16220728	16220727	16220726	16220725	16220729
AGS Reference			ES	ES	ES	ES	ES	
Component	**LOD/Units**	**Method**						
Suspended solids, Total	<2 mg/l	TM022						5.95
Alkalinity, Total as CaCO3	<2 mg/l	TM043		220	210	345	280	
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	247	<0.2	0.299	<0.2	0.219	
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	3.45	0.398	0.384	0.519	0.466	0.572
Chloride	<2 mg/l	TM184	290	15.6	14.5	6.6	10.3	
Potassium (diss.filt)	<1 mg/l	TM228	131	<1	1	<1	1.12	
pH	<1 pH Units	TM256	7.27	7.84	7.77	7.42	7.39	8.03

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			SW2 NYC	SW4 NYC	SW2 WERN	SW4 WERN		
Depth (m)			.	.	.	.		
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)		
Date Sampled			19/09/2017	19/09/2017	19/09/2017	19/09/2017		
Sample Time			.	.	.	.		
Date Received			21/09/2017	21/09/2017	21/09/2017	21/09/2017		
SDG Ref			170921-20	170921-20	170921-20	170921-20		
Lab Sample No.(s)			16220722	16220723	16220720	16220721		
AGS Reference			ES	ES	ES	ES		
Component	**LOD/Units**	**Method**						
Suspended solids, Total	<2 mg/l	TM022	8.15	11.5				
Alkalinity, Total as CaCO3	<2 mg/l	TM043	185	205				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2	<0.2	<0.2	<0.2		
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.471	0.543	0.534	0.26		
Arsenic (diss.filt)	<0.5 µg/l	TM152			1.58	1.03		
Barium (diss.filt)	<0.2 µg/l	TM152			276	58.1		
Beryllium (diss.filt)	<0.1 µg/l	TM152			<0.1	<0.1		
Boron (diss.filt)	<5 µg/l	TM152			111	26.9		
Cadmium (diss.filt)	<0.08 µg/l	TM152			<0.08	<0.08		
Chromium (diss.filt)	<1 µg/l	TM152			<1	<1		
Copper (diss.filt)	<0.3 µg/l	TM152			<0.3	1.33		
Lead (diss.filt)	<0.2 µg/l	TM152			<0.2	0.221		
Manganese (diss.filt)	<1 µg/l	TM152			39.7	32.5		
Nickel (diss.filt)	<0.4 µg/l	TM152			0.516	1.25		
Zinc (diss.filt)	<1 µg/l	TM152			1.15	12.3		
Mercury (diss.filt)	<0.01 µg/l	TM183			<0.01	<0.01		
Sulphate	<2 mg/l	TM184			<2	6.6		
Chloride	<2 mg/l	TM184	36.5	45.8	11.2	9.3		
Phosphate (ortho) as PO4	<0.05 mg/l	TM184			<0.05	<0.05		
Calcium (diss.filt)	<0.012 mg/l	TM228			109	59		
Sodium (diss.filt)	<0.076 mg/l	TM228			9.39	6.31		
Magnesium (diss.filt)	<0.036 mg/l	TM228			9.91	2.61		
Potassium (diss.filt)	<1 mg/l	TM228	22.2	28.8	7.81	1.5		
Iron (diss.filt)	<0.019 mg/l	TM228			0.0379	0.233		
pH	<1 pH Units	TM256	8.09	8.08	8.16	8.11		

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Acid Herbicides (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			SW2 WERN	SW4 WERN				
Depth (m)			.	.				
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)				
Date Sampled			19/09/2017	19/09/2017				
Sample Time			.	.				
Date Received			21/09/2017	21/09/2017				
SDG Ref			170921-20	170921-20				
Lab Sample No.(s)			16220720	16220721				
AGS Reference			ES	ES				
Component	**LOD/Units**	**Method**						
2,3,6-Trichlorobenzoic acid	<0.04 µg/l	TM186	<0.04	<0.04				
Benazolin	<0.04 µg/l	TM186	<0.04	<0.04				
Bentazone	<0.04 µg/l	TM186	<0.04	<0.04				
Bromoxynil	<0.04 µg/l	TM186	<0.04	<0.04				
Clopyralid	<0.04 µg/l	TM186	<0.04	<0.04				
Dicamba	<0.04 µg/l	TM186	<0.05	<0.04				
Dinitro-o-cresol	<0.04 µg/l	TM186	<0.04	<0.04				
Ioxynil	<0.04 µg/l	TM186	<0.04	<0.04				
MCPB	<0.04 µg/l	TM186	<0.04	<0.04				
Mecoprop (MCPP)	<0.04 µg/l	TM186	<0.04	<0.04				
Pentachlorophenol	<0.04 µg/l	TM186	<0.04	<0.04				

17:06:30 02/10/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			SW2 WERN	SW4 WERN				
Depth (m)			.	.				
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)				
Date Sampled			19/09/2017	19/09/2017				
Sample Time			.	.				
Date Received			21/09/2017	21/09/2017				
SDG Ref			170921-20	170921-20				
Lab Sample No.(s)			16220720	16220721				
AGS Reference			ES	ES				
Component	**LOD/Units**	**Method**						
Naphthalene (aq)	<0.01 µg/l	TM178	0.0188	0.0211				
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.005	0.0132				
Fluorene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Chrysene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Pyrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002	<0.002				
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005				
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082	<0.082				

17:06:30 02/10/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			SW2 WERN	SW4 WERN				
Depth (m)			.	.				
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)				
Date Sampled			19/09/2017	19/09/2017				
Sample Time			.	.				
Date Received			21/09/2017	21/09/2017				
SDG Ref			170921-20	170921-20				
Lab Sample No.(s)			16220720	16220721				
AGS Reference			ES	ES				
Component	**LOD/Units**	**Method**						
Benzene	<1 µg/l	TM208	<1 1	<1 1				
Toluene	<1 µg/l	TM208	<1 1	1.06 1				
Ethylbenzene	<1 µg/l	TM208	<1 1	<1 1				
m,p-Xylene	<1 µg/l	TM208	<1 1	<1 1				
o-Xylene	<1 µg/l	TM208	<1 1	<1 1				
Sum of detected Xylenes	<2 µg/l	TM208	<2 1	<2 1				

17:06:30 02/10/2017

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM186	Determination of Acidic Herbicides in Groundwater and Potable Water by LC/MSD Using Selective Ion Monitoring. Agilent Technologies Inc. Application Note 5988-5882EN.	The Determination of Acid Herbicides in Environmental Water Samples and Leachates by LC/MS QQQ.		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	170921-20	**Client Reference:**		**Report Number:**	426516
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16220724	16220728	16220727	16220726	16220725	16220729	16220722	16220723	16220720	16220721
Customer Sample Ref.	BH10	BH101	BH103	BH104	BH105	RUNOFF	SW2 NYC	SW4 NYC	SW2 WERN	SW4 WERN
AGS Ref.	ES	ES	ES	ES	ES		ES	ES	ES	ES
Depth										
Type	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq	Unspecified Liq
Acid Herbicides (W)									27-Sep-2017	27-Sep-2017
Alkalinity as CaCO3		27-Sep-2017	27-Sep-2017	27-Sep-2017	27-Sep-2017		27-Sep-2017	27-Sep-2017		
Ammoniacal Nitrogen	26-Sep-2017	27-Sep-2017	26-Sep-2017	26-Sep-2017	26-Sep-2017		26-Sep-2017	27-Sep-2017	26-Sep-2017	27-Sep-2017
Anions by Kone (w)	02-Oct-2017	02-Oct-2017	02-Oct-2017	02-Oct-2017	02-Oct-2017		02-Oct-2017	02-Oct-2017	02-Oct-2017	02-Oct-2017
Conductivity (at 20 deg.C)	28-Sep-2017	28-Sep-2017	28-Sep-2017	28-Sep-2017	28-Sep-2017	28-Sep-2017	28-Sep-2017	27-Sep-2017	28-Sep-2017	28-Sep-2017
Dissolved Metals by ICP-MS									02-Oct-2017	02-Oct-2017
Mercury Dissolved									26-Sep-2017	26-Sep-2017
Metals by iCap-OES Dissolved (W)	30-Sep-2017	30-Sep-2017	30-Sep-2017	30-Sep-2017	30-Sep-2017		30-Sep-2017	30-Sep-2017	30-Sep-2017	30-Sep-2017
PAH Spec MS - Aqueous (W)									28-Sep-2017	28-Sep-2017
pH Value	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017	25-Sep-2017
Suspended Solids						01-Oct-2017	01-Oct-2017	01-Oct-2017		
VOC MS (W)									28-Sep-2017	27-Sep-2017

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Unit 7-8 Hawarden Business Park
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Website: www.alsenvironmental.co.uk

Geotechnology
5 Cefn-yr-Allt
Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	13 October 2017
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	170930-66
Your Reference:	
Location:	Carmarthen
Report No:	428202

We received 2 samples on Saturday September 30, 2017 and 2 of these samples were scheduled for analysis which was completed on Friday October 13, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16281622	BH117			29/09/2017
16281621	L1			29/09/2017

Maximum Sample/Coolbox Temperature (°C) : **12.4**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)					16281622					16281621
Customer Sample Reference					BH117					L1
AGS Reference										
Depth (m)										
Container					500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)
Sample Type					GW	GW	GW	LE	LE	LE	LE	LE
Acid Herbicides (W)	All	NDPs: 0 Tests: 1						X				
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1			X				X			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1				X				X		
Anions by Kone (w)	All	NDPs: 0 Tests: 1			X				X			
BOD True Total	All	NDPs: 0 Tests: 1							X			
COD Unfiltered	All	NDPs: 0 Tests: 1							X			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1			X				X			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1						X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1									X	
Mercury Dissolved	All	NDPs: 0 Tests: 1									X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1					X				X	
Metals by iCap-OES Unfiltered (W)	All	NDPs: 0 Tests: 1							X			
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 1						X				
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 1						X				
Organochlorine Pesticides (Aq)	All	NDPs: 0 Tests: 1						X				

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16281622				16281621			
Customer Sample Reference			BH117				L1			
AGS Reference										
Depth (m)										
Container			500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	1000ml glass bottle (ALE220)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)
Sample Type			GW	GW	GW	LE	LE	LE	LE	LE
Organophosphorus Pesticides (Aq)	All	NDPs: 0 Tests: 1				X				
Organotins in Aqueous Samples	All	NDPs: 0 Tests: 1				X				
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 1				X				
pH Value	All	NDPs: 0 Tests: 1	X				X			
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 1				X				
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 1				X				
VOC MS (W)	All	NDPs: 0 Tests: 1								X

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH117	L1				
Depth (m)			.	.				
Sample Type			Ground Water (GW)	Land Leachate (LE)				
Date Sampled			29/09/2017	29/09/2017				
Sample Time			.	.				
Date Received			30/09/2017	30/09/2017				
SDG Ref			170930-66	170930-66				
Lab Sample No.(s)			16281622	16281621				
AGS Reference								
Component	**LOD/Units**	**Method**						
Alkalinity, Total as CaCO3	<2 mg/l	TM043	270 #	450 #				
BOD, unfiltered	<1 mg/l	TM045		2.43 #				
Organic Carbon, Total	<3 mg/l	TM090		13.2				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	24.8				
COD, unfiltered	<7 mg/l	TM107		41.3 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.494 #	0.94 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		0.776				
Barium (diss.filt)	<0.2 µg/l	TM152		94.6				
Beryllium (diss.filt)	<0.1 µg/l	TM152		<0.1				
Boron (diss.filt)	<5 µg/l	TM152		104				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08				
Chromium (diss.filt)	<1 µg/l	TM152		<1				
Copper (diss.filt)	<0.3 µg/l	TM152		0.905				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2				
Manganese (diss.filt)	<1 µg/l	TM152		357				
Nickel (diss.filt)	<0.4 µg/l	TM152		2.72				
Phosphorus (diss.filt)	<10 µg/l	TM152		50				
Zinc (diss.filt)	<1 µg/l	TM152		6.35				
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172		<100				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #				
Sulphate	<2 mg/l	TM184		19.6				
Chloride	<2 mg/l	TM184	25.6 #	75.8				
Phosphate (ortho) as PO4	<0.05 mg/l	TM184		<0.05				
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184		1.12				
Cyanide, Total	<0.05 mg/l	TM227		<0.05 #				
Cyanide, Free	<0.05 mg/l	TM227		<0.05 #				
Calcium (diss.filt)	<0.012 mg/l	TM228		114				
Sodium (diss.filt)	<0.076 mg/l	TM228		44.7				
Magnesium (diss.filt)	<0.036 mg/l	TM228		12.4				
Potassium (diss.filt)	<1 mg/l	TM228	<1	31.1				
Iron (diss.filt)	<0.019 mg/l	TM228		0.825				
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM228		336				
pH	<1 pH Units	TM256	7.72 #	7.65 #				

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH117	L1				
Depth (m)			.	.				
Sample Type			Ground Water (GW)	Land Leachate (LE)				
Date Sampled			29/09/2017	29/09/2017				
Sample Time			.	.				
Date Received			30/09/2017	30/09/2017				
SDG Ref			170930-66	170930-66				
Lab Sample No.(s)			16281622	16281621				
AGS Reference								
Component	**LOD/Units**	**Method**						
Etridiazole	<0.01 µg/l	TM314		<0.01				
Propachlor	<0.01 µg/l	TM314		<0.01				
Trifluralin	<0.01 µg/l	TM314		<0.01				
Simazine	<0.01 µg/l	TM315		<0.01				
Atrazine	<0.01 µg/l	TM315		<0.01				
Propazine	<0.01 µg/l	TM315		<0.01				
Alachlor	<0.01 µg/l	TM315		<0.01				
Chlorpyriphos-Ethyl	<0.01 µg/l	TM315		<0.01				
Terbutryn	<0.01 µg/l	TM315		<0.01				
Prometryn	<0.01 µg/l	TM315		<0.01				
Dibutyl tin	<5 ng/l	TM328		<5				
Tributyl tin	<1 ng/l	TM328		<1				
Tetrabutyl tin	<2 ng/l	TM328		<2				
Triphenyl tin	<1 ng/l	TM328		<1				
Surrogate	%	TM328		103				

12:26:23 13/10/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Acid Herbicides (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.					
			L1					
			Depth (m)	.				
			Sample Type	Land Leachate (LE)				
			Date Sampled	29/09/2017				
			Sample Time	.				
			Date Received	30/09/2017				
			SDG Ref	170930-66				
			Lab Sample No.(s)	16281621				
			AGS Reference					
2,3,6-Trichlorobenzoic acid	<0.04 µg/l	TM186	<0.15					
Benazolin	<0.04 µg/l	TM186	<0.08					
Bentazone	<0.04 µg/l	TM186	0.097					
Bromoxynil	<0.04 µg/l	TM186	<0.08					
Clopyralid	<0.04 µg/l	TM186	<0.08					
Dicamba	<0.04 µg/l	TM186	<0.2					
Dinitro-o-cresol	<0.04 µg/l	TM186	<0.08					
Ioxynil	<0.04 µg/l	TM186	<0.08					
MCPB	<0.04 µg/l	TM186	<0.08					
Mecoprop (MCPP)	<0.04 µg/l	TM186	1.24					
Pentachlorophenol	<0.04 µg/l	TM186	<0.08					

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

OC, OP Pesticides and Triazine Herb

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			L1
Depth (m)			.
Sample Type			Land Leachate (LE)
Date Sampled			29/09/2017
Sample Time			.
Date Received			30/09/2017
SDG Ref			170930-66
Lab Sample No.(s)			16281621
AGS Reference			
Component	**LOD/Units**	**Method**	
Dichlorvos	<0.01 µg/l	TM231	<0.01
Mevinphos	<0.01 µg/l	TM231	<0.01
Tecnazene	<0.01 µg/l	TM231	<0.01
Hexachlorobenzene	<0.01 µg/l	TM231	<0.01
Trifluralin	<0.01 µg/l	TM231	<0.01
alpha-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01
Quintozene (PCNB)	<0.01 µg/l	TM231	<0.01
Diazinon	<0.01 µg/l	TM231	<0.01
Triallate	<0.01 µg/l	TM231	<0.01
Etrimphos	<0.01 µg/l	TM231	<0.01
gamma-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01
Disulfoton	<0.01 µg/l	TM231	<0.01
Propetamphos	<0.01 µg/l	TM231	<0.01
Heptachlor	<0.01 µg/l	TM231	<0.01
Chlorpyriphos methyl	<0.01 µg/l	TM231	<0.01
Dimethoate	<0.01 µg/l	TM231	<0.01
Aldrin	<0.01 µg/l	TM231	<0.01
Chlorothalonil	<0.01 µg/l	TM231	<0.02
Pirimiphos-methyl	<0.01 µg/l	TM231	<0.01
beta-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01
Chlorpyriphos	<0.01 µg/l	TM231	<0.01
Telodrin	<0.01 µg/l	TM231	<0.01
Methyl parathion	<0.01 µg/l	TM231	<0.01
Isodrin	<0.01 µg/l	TM231	<0.01
Malathion	<0.01 µg/l	TM231	<0.01
Fenthion	<0.01 µg/l	TM231	<0.01
Fenitrothion	<0.01 µg/l	TM231	<0.01
Heptachlor epoxide	<0.01 µg/l	TM231	<0.01
Triadimefon	<0.01 µg/l	TM231	<0.01
Pendimethalin	<0.01 µg/l	TM231	<0.01
Parathion	<0.01 µg/l	TM231	<0.01
o,p-DDE	<0.01 µg/l	TM231	<0.01
Chlorfenvinphos	<0.01 µg/l	TM231	<0.01

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

OC, OP Pesticides and Triazine Herb

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			L1					
Depth (m)			.					
Sample Type			Land Leachate (LE)					
Date Sampled			29/09/2017					
Sample Time			.					
Date Received			30/09/2017					
SDG Ref			170930-66					
Lab Sample No.(s)			16281621					
AGS Reference								
Component	**LOD/Units**	**Method**						
Endosulphan I	<0.01 µg/l	TM231	<0.01					
Trans-chlordane	<0.01 µg/l	TM231	<0.01					
cis-Chlordane	<0.01 µg/l	TM231	<0.01					
p,p-DDE	<0.01 µg/l	TM231	<0.01					
Dieldrin	<0.01 µg/l	TM231	<0.01					
o,p-TDE (DDD)	<0.01 µg/l	TM231	<0.01					
Endrin	<0.01 µg/l	TM231	<0.01					
o,p-DDT	<0.01 µg/l	TM231	<0.01					
p,p-TDE (DDD)	<0.01 µg/l	TM231	<0.01					
Ethion	<0.01 µg/l	TM231	<0.01					
Endosulphan II	<0.01 µg/l	TM231	<0.01					
p,p-DDT	<0.01 µg/l	TM231	<0.01					
Carbophenothion	<0.01 µg/l	TM231	<0.01					
o,p-Methoxychlor	<0.01 µg/l	TM231	<0.01					
Triazophos	<0.01 µg/l	TM231	<0.01					
p,p-Methoxychlor	<0.01 µg/l	TM231	<0.01					
Endosulphan sulphate	<0.01 µg/l	TM231	<0.01					
Permethrin I	<0.01 µg/l	TM231	<0.01					
Phosalone	<0.01 µg/l	TM231	<0.01					
Permethrin II	<0.01 µg/l	TM231	<0.01					
Azinphos-methyl	<0.01 µg/l	TM231	<0.01					
Azinphos-ethyl	<0.01 µg/l	TM231	<0.01					

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			L1					
Depth (m)			.					
Sample Type			Land Leachate (LE)					
Date Sampled			29/09/2017					
Sample Time			.					
Date Received			30/09/2017					
SDG Ref			170930-66					
Lab Sample No.(s)			16281621					
AGS Reference								
Component	**LOD/Units**	**Method**						
Naphthalene (aq)	<0.01 µg/l	TM178	0.0332					
Acenaphthene (aq)	<0.005 µg/l	TM178	0.0173					
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005					
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.005					
Anthracene (aq)	<0.005 µg/l	TM178	<0.005					
Phenanthrene (aq)	<0.005 µg/l	TM178	0.00521					
Fluorene (aq)	<0.005 µg/l	TM178	<0.005					
Chrysene (aq)	<0.005 µg/l	TM178	<0.005					
Pyrene (aq)	<0.005 µg/l	TM178	<0.005					
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	0.00539					
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	0.008					
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005					
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	0.00232					
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005					
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	0.00515					
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005					
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082					

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CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			L1					
Depth (m)			.					
Sample Type			Land Leachate (LE)					
Date Sampled			29/09/2017					
Sample Time			.					
Date Received			30/09/2017					
SDG Ref			170930-66					
Lab Sample No.(s)			16281621					
AGS Reference								
Component	**LOD/Units**	**Method**						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1					
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1					
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1					
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1					
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1					
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1					
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1					
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1					
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1					
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1					
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1					
2-Chlorophenol (aq)	<1 µg/l	TM176	<1					
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1					
2-Methylphenol (aq)	<1 µg/l	TM176	<1					
2-Nitroaniline (aq)	<1 µg/l	TM176	<1					
2-Nitrophenol (aq)	<1 µg/l	TM176	<1					
3-Nitroaniline (aq)	<1 µg/l	TM176	<1					
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1					
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1					
4-Chloroaniline (aq)	<1 µg/l	TM176	<1					
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1					
4-Methylphenol (aq)	<1 µg/l	TM176	<1					
4-Nitroaniline (aq)	<1 µg/l	TM176	<1					
4-Nitrophenol (aq)	<1 µg/l	TM176	<1					
Azobenzene (aq)	<1 µg/l	TM176	<1					
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1					
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1					
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2					
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1					
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<1					
Carbazole (aq)	<1 µg/l	TM176	<1					
Dibenzofuran (aq)	<1 µg/l	TM176	<1					
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<1					

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			L1
Depth (m)			.
Sample Type			Land Leachate (LE)
Date Sampled			29/09/2017
Sample Time			.
Date Received			30/09/2017
SDG Ref			170930-66
Lab Sample No.(s)			16281621
AGS Reference			
Component	**LOD/Units**	**Method**	
Diethyl phthalate (aq)	<1 µg/l	TM176	<1
Dimethyl phthalate (aq)	<1 µg/l	TM176	<1
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<5
Hexachlorobenzene (aq)	<1 µg/l	TM176	<1
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<1
Pentachlorophenol (aq)	<1 µg/l	TM176	<1
Phenol (aq)	<1 µg/l	TM176	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<1
Hexachloroethane (aq)	<1 µg/l	TM176	<1
Nitrobenzene (aq)	<1 µg/l	TM176	<1
Isophorone (aq)	<1 µg/l	TM176	<1
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<1
SVOC TIC (aq)	-	TM176	Not Detected
SVOC Derivatised (aq)	-	TM176	Not Detected
Total SVOC TIC	<10 µg/l	TM176	<10

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	L1
Depth (m)	.
Sample Type	Land Leachate (LE)
Date Sampled	29/09/2017
Sample Time	.
Date Received	30/09/2017
SDG Ref	170930-66
Lab Sample No.(s)	16281621
AGS Reference	

Component	LOD/Units	Method	L1
Dibromofluoromethane**	%	TM208	117
Toluene-d8**	%	TM208	96.9
4-Bromofluorobenzene**	%	TM208	96.7
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #
Chloromethane	<1 µg/l	TM208	<1 #
Vinyl chloride	<1 µg/l	TM208	<1 #
Bromomethane	<1 µg/l	TM208	<1 #
Chloroethane	<1 µg/l	TM208	<1 #
Trichlorofluoromethane	<1 µg/l	TM208	<1 #
1,1-Dichloroethene	<1 µg/l	TM208	<1 #
Carbon disulphide	<1 µg/l	TM208	<1 #
Dichloromethane	<3 µg/l	TM208	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #
1,1-Dichloroethane	<1 µg/l	TM208	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #
2,2-Dichloropropane	<1 µg/l	TM208	<1
Bromochloromethane	<1 µg/l	TM208	<1 #
Chloroform	<1 µg/l	TM208	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #
1,1-Dichloropropene	<1 µg/l	TM208	<1 #
Carbontetrachloride	<1 µg/l	TM208	<1 #
1,2-Dichloroethane	<1 µg/l	TM208	<1 #
Benzene	<1 µg/l	TM208	<1 #
Trichloroethene	<1 µg/l	TM208	<1 #
1,2-Dichloropropane	<1 µg/l	TM208	<1 #
Dibromomethane	<1 µg/l	TM208	<1 #
Bromodichloromethane	<1 µg/l	TM208	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #
Toluene	<1 µg/l	TM208	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #
1,3-Dichloropropane	<1 µg/l	TM208	<1 #

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Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	L1
Depth (m)	.
Sample Type	Land Leachate (LE)
Date Sampled	29/09/2017
Sample Time	.
Date Received	30/09/2017
SDG Ref	170930-66
Lab Sample No.(s)	16281621
AGS Reference	

Component	LOD/Units	Method	L1
Tetrachloroethene	<1 µg/l	TM208	<1 #
Dibromochloromethane	<1 µg/l	TM208	<1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 #
Chlorobenzene	<1 µg/l	TM208	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #
o-Xylene	<1 µg/l	TM208	<1 #
Styrene	<1 µg/l	TM208	<1 #
Bromoform	<1 µg/l	TM208	<1 #
Isopropylbenzene	<1 µg/l	TM208	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #
Bromobenzene	<1 µg/l	TM208	<1 #
Propylbenzene	<1 µg/l	TM208	<1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #
n-Butylbenzene	<1 µg/l	TM208	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #
Naphthalene	<1 µg/l	TM208	<1 #
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	L1
Depth (m)	.
Sample Type	Land Leachate (LE)
Date Sampled	29/09/2017
Sample Time	.
Date Received	30/09/2017
SDG Ref	170930-66
Lab Sample No.(s)	16281621
AGS Reference	

Component	LOD/Units	Method	
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1

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Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters		
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM186	Determination of Acidic Herbicides in Groundwater and Potable Water by LC/MSD Using Selective Ion Monitoring. Agilent Technologies Inc. Application Note 5988-5882EN.	The Determination of Acid Herbicides in Environmental Water Samples and Leachates by LC/MS QQQ.		
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM231	Agilent 6890 Gas Chromatograph system using an Agilent 5973 Mass Selective Detector (MSD)	Determination of Organochlorine and Organophosphorus Pesticides and Triazine Herbicides by GCMS		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		
TM314		Analysis of Organochlorine Pesticides in Aqueous sample by GCMS		
TM315		Analysis of Organophosphorus Pesticides in Aqueous samples by GCMS		
TM328				

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	170930-66	**Client Reference:**		**Report Number:**	428202
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16281622	16281621
Customer Sample Ref.	BH117	L1
AGS Ref.		
Depth		
Type	Ground Water	Land Leachate
Acid Herbicides (W)		13-Oct-2017
Alkalinity as CaCO3	09-Oct-2017	06-Oct-2017
Ammoniacal Nitrogen	04-Oct-2017	04-Oct-2017
Anions by Kone (w)	10-Oct-2017	11-Oct-2017
BOD True Total		06-Oct-2017
COD Unfiltered		03-Oct-2017
Conductivity (at 20 deg.C)	04-Oct-2017	04-Oct-2017
Cyanide Comp/Free/Total/Thiocyanate		06-Oct-2017
Dissolved Metals by ICP-MS		10-Oct-2017
Mercury Dissolved		09-Oct-2017
Metals by iCap-OES Dissolved (W)	09-Oct-2017	09-Oct-2017
Metals by iCap-OES Unfiltered (W)		09-Oct-2017
Mineral Oil C10-40 Aqueous (W)		05-Oct-2017
OC, OP Pesticides and Triazine Herb		05-Oct-2017
Organochlorine Pesticides (Aq)		10-Oct-2017
Organophosphorus Pesticides (Aq)		10-Oct-2017
Organotins in Aqueous Samples		05-Oct-2017
PAH Spec MS - Aqueous (W)		06-Oct-2017
pH Value	04-Oct-2017	04-Oct-2017
SVOC MS (W) - Aqueous		05-Oct-2017
Total Organic and Inorganic Carbon		04-Oct-2017
VOC MS (W)		08-Oct-2017

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	27 December 2017
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	171214-100
Your Reference:	
Location:	Carmarthen
Report No:	438189

We received 2 samples on Thursday December 14, 2017 and 2 of these samples were scheduled for analysis which was completed on Wednesday December 27, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	171214-100	**Client Reference:**		**Report Number:**	438189
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16760142	WERN SW2		0.00 - 0.10	12/12/2017
16760143	WERN SW4		0.00 - 0.10	12/12/2017

Maximum Sample/Coolbox Temperature (°C) : **4.8**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	171214-100	**Client Reference:**		**Report Number:**	438189
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16760142		16760143	
Customer Sample Reference			WERN SW2		WERN SW4	
AGS Reference						
Depth (m)			0.00 - 0.10		0.00 - 0.10	
Container			500ml Plastic (ALE208)	H2SO4 (ALE244)	500ml Plastic (ALE208)	H2SO4 (ALE244)
Sample Type			SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2	X		X	
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2		X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X		X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2	X		X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2	X		X	
pH Value	All	NDPs: 0 Tests: 2	X		X	

Validated

CERTIFICATE OF ANALYSIS

SDG:	171214-100	**Client Reference:**		**Report Number:**	438189
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	WERN SW2	WERN SW4				
Customer Sample Ref.			WERN SW2	WERN SW4				
Depth (m)			0.00 - 0.10	0.00 - 0.10				
Sample Type			Surface Water (SW)	Surface Water (SW)				
Date Sampled			12/12/2017	12/12/2017				
Sample Time			.	.				
Date Received			14/12/2017	14/12/2017				
SDG Ref			171214-100	171214-100				
Lab Sample No.(s)			16760142	16760143				
AGS Reference								
Alkalinity, Total as CaCO3	<2 mg/l	TM043	360 #	145 #				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.364 #	1.75 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.622 #	0.297 #				
Chloride	<2 mg/l	TM184	13.7 #	18.1 #				
Potassium (diss.filt)	<1 mg/l	TM228	6.38 #	3.42 #				
pH	<1 pH Units	TM256	8.09 #	7.89 #				

15:29:39 27/12/2017

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	171214-100	**Client Reference:**		**Report Number:**	438189
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16760142	16760143
Customer Sample Ref.	WERN SW2	WERN SW4
AGS Ref.		
Depth	0.00 - 0.10	0.00 - 0.10
Type	Surface Water	Surface Water
Alkalinity as CaCO3	20-Dec-2017	21-Dec-2017
Ammoniacal Nitrogen	20-Dec-2017	20-Dec-2017
Anions by Kone (w)	27-Dec-2017	27-Dec-2017
Conductivity (at 20 deg.C)	20-Dec-2017	20-Dec-2017
Metals by iCap-OES Dissolved (W)	22-Dec-2017	22-Dec-2017
pH Value	21-Dec-2017	21-Dec-2017

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date:	26 January 2018
Customer:	H_GETCNO_NAH
Sample Delivery Group (SDG):	171223-28
Your Reference:	
Location:	Carmarthen
Report No:	441803

We received 10 samples on Saturday December 23, 2017 and 8 of these samples were scheduled for analysis which was completed on Friday January 26, 2018. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16815519	BH101			21/12/2017
16815520	BH103			21/12/2017
16815521	BH104			21/12/2017
16815522	BH105			21/12/2017
16815525	BH117			21/12/2017
16815528	L1			21/12/2017
16815518	NO ID			
16815523	NYCSW2			21/12/2017
16815524	NYCSW4			21/12/2017
16815527	RUNOFF			21/12/2017

Maximum Sample/Coolbox Temperature (°C) : **12.4**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16815519					16815520						16815521						16815522	
Customer Sample Reference			BH101					BH103						BH104						BH105	
AGS Reference																					
Depth (m)																					
Container			1000ml glass bottle (ALE220)	1lplastic (ALE221)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1lplastic (ALE221)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Acid Herbicides (Suite 3) (W)*	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 2	X					X													
Acid Herbicides (W)	All	NDPs: 0 Tests: 2												X						X	
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3																			
		NDPs: 0 Tests: 4		X					X						X						X
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3																			
		NDPs: 0 Tests: 4			X						X						X				
Anions by Kone (w)	All	NDPs: 0 Tests: 3																			
		NDPs: 0 Tests: 4		X					X						X						X
BOD True Total	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4		X						X						X					
COD Unfiltered	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4		X						X						X					
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 4		X					X						X						X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1																			

16815527	RUNOFF			1lplastic (ALE221)	SW																											X			
16815524	NYCSW4			HNO3 Filtered (ALE204)	SW																														
				H2SO4 (ALE244)	SW												X																		
				1lplastic (ALE221)	SW								X								X											X			
16815523	NYCSW2			HNO3 Filtered (ALE204)	SW																														
				H2SO4 (ALE244)	SW												X																		
				500ml Plastic (ALE208)	SW								X								X											X			
16815525	BH117			Vial (ALE297)	SW																														
				HNO3 Unfiltered (ALE204)	SW																														
				H2SO4 (ALE244)	SW												X																		
				500ml Plastic (ALE208)	SW								X								X				X				X			X			
				1000ml glass bottle (ALE220)	SW		X																												X
16815522	BH105			Vial (ALE297)	GW																														
				HNO3 Filtered (ALE204)	GW																														
				H2SO4 (ALE244)	GW														X																
				250ml BOD (ALE212)	GW																						X				X				

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16815519					16815520						16815521						16815522	
Customer Sample Reference			BH101					BH103						BH104						BH105	
AGS Reference																					
Depth (m)																					
Container			1000ml glass bottle (ALE220)	1plastic (ALE221)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4	X					X						X						X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4				X			X									X			
Mercury Dissolved	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4				X		X										X			
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 3																			
		NDPs: 0 Tests: 4				X			X									X			
Metals by iCap-OES Unfiltered (W)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4		X								X			X						X
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
Organochlorine Pesticides (Aq)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	

16815527	RUNOFF			1plastic (ALE221)	SW																		
16815524	NYCSW4			HNO3 Filtered (ALE204)	SW																		
				H2SO4 (ALE244)	SW																		
				1plastic (ALE221)	SW																		
16815523	NYCSW2			HNO3 Filtered (ALE204)	SW																		
				H2SO4 (ALE244)	SW																		
				500ml Plastic (ALE208)	SW																		
16815525	BH117			Vial (ALE297)	SW																		
				HNO3 Unfiltered (ALE204)	SW																		
				H2SO4 (ALE244)	SW																		
				500ml Plastic (ALE208)	SW																		
				1000ml glass bottle (ALE220)	SW																		
16815522	BH105			Vial (ALE297)	GW																		
				HNO3 Filtered (ALE204)	GW																		
				H2SO4 (ALE244)	GW																		
				250ml BOD (ALE212)	GW																		

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

- X Test
- N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
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DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16815519					16815520						16815521						16815522	
Customer Sample Reference			BH101					BH103						BH104						BH105	
AGS Reference																					
Depth (m)																					
Container			1000ml glass bottle (ALE220)	1plastic (ALE221)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Organophosphorus Pesticides (Aq)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
Organotins in Aqueous Samples	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
pH Value	All	NDPs: 0 Tests: 4		X					X						X						X
Phosphate by Kone (w)	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4		X					X						X						X
Suspended Solids	All	NDPs: 0 Tests: 3																			
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 1																			
		NDPs: 0 Tests: 4	X					X						X						X	
VOC MS (W)	All	NDPs: 0 Tests: 1																			

16815527	RUNOFF			1lplastic (ALE221)	SW														X						X										
16815524	NYCSW4			HNO3 Filtered (ALE204)	SW																														
				H2SO4 (ALE244)	SW																														
				1lplastic (ALE221)	SW														X						X										
16815523	NYCSW2			HNO3 Filtered (ALE204)	SW																														
				H2SO4 (ALE244)	SW																														
				500ml Plastic (ALE208)	SW														X						X										
16815525	BH117			Vial (ALE297)	SW																														X
				HNO3 Unfiltered (ALE204)	SW																														
				H2SO4 (ALE244)	SW																														
				500ml Plastic (ALE208)	SW														X		X														
				1000ml glass bottle (ALE220)	SW		X				X				X												X				X				
16815522	BH105			Vial (ALE297)	GW																														
				HNO3 Filtered (ALE204)	GW																														
				H2SO4 (ALE244)	GW																														
				250ml BOD (ALE212)	GW																														

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)					16815519						16815520						16815521						16815522	
Customer Sample Reference					BH101						BH103						BH104						BH105	
AGS Reference																								
Depth (m)																								
Container					1000ml glass bottle (ALE220)	1plastic (ALE221)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	1000ml glass bottle (ALE220)	1plastic (ALE221)
Sample Type					GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
VOC MS (W)	All	NDPs: 0 Tests: 4							X						X						X			

16815527	RUNOFF			1lplastic (ALE221)	SW		
16815524	NYCSW4			HNO3 Filtered (ALE204)	SW		
				H2SO4 (ALE244)	SW		
				1lplastic (ALE221)	SW		
16815523	NYCSW2			HNO3 Filtered (ALE204)	SW		
				H2SO4 (ALE244)	SW		
				500ml Plastic (ALE208)	SW		
16815525	BH117			Vial (ALE297)	SW		
				HNO3 Unfiltered (ALE204)	SW		
				H2SO4 (ALE244)	SW		
				500ml Plastic (ALE208)	SW		
				1000ml glass bottle (ALE220)	SW		
16815522	BH105			Vial (ALE297)	GW		X
				HNO3 Filtered (ALE204)	GW		
				H2SO4 (ALE244)	GW		
				250ml BOD (ALE212)	GW		

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	NYCSW2
Depth (m)			.	.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525	16815523
AGS Reference								
Component	**LOD/Units**	**Method**						
2,3,6-TBA (2,3,6-trichlorobenzoic acid)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
2,4,5-T (2,4,5-trichlorophenoxy acetic acid)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
2,4,5-TP (fenoprop)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
2,4-D (2,4-dichlorophenoxyacetic acid)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
2,4-DB (4-(2,4-dichlorophenoxy)butyric	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
2,4-DP (dichlorprop)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Bentazone*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Benazolin*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Bromoxynil*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Dicamba*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Fluroxypyr*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Ioxynil*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
MCPA*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
MCPB*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
MCPP (mecoprop)*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Pentachlorophenol (PCP)*	<0.02 µg/l	SUB	<0.05	<0.05			<0.05	
Triclopyr*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Clopyralid*	<0.02 µg/l	SUB	<0.02	<0.02			<0.02	
Suspended solids, Total	<2 mg/l	TM022						14.5 #
Alkalinity, Total as CaCO3	<2 mg/l	TM043	220 #	215 #	315 #	270 #	275 #	155 #
BOD, unfiltered	<1 mg/l	TM045	<1 #	3.28 #	<1 #	<1 #	<1 #	
Organic Carbon, Total	<3 mg/l	TM090	<3 #	<3 #	4.47 #	<3 #	<3 #	
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	0.39 #	<0.2 #	<0.2 #	<0.2 #	0.206 #
COD, unfiltered	<7 mg/l	TM107	<7 #	244 #	134 #	91.8 #	331 #	
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.427 #	0.413 #	0.529 #	0.478 #	0.511 #	0.389 #
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5 #	0.554 #	<0.5 #	<0.5 #	<0.5	
Barium (diss.filt)	<0.2 µg/l	TM152	116 #	53 #	16.3 #	59.8 #	86.8	
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1	
Boron (diss.filt)	<5 µg/l	TM152	16.4 #	6.54 #	6.02 #	8.14 #	<5	
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08	
Chromium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<1	
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3 #	<0.3 #	1.52 #	<0.3 #	<0.3	
Lead (diss.filt)	<0.2 µg/l	TM152	0.268 #	<0.2 #	0.431 #	<0.2 #	<0.2	

15:12:16 26/01/2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	NYCSW2
Depth (m)			.	.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525	16815523
AGS Reference								
Component	**LOD/Units**	**Method**						
Manganese (diss.filt)	<1 µg/l	TM152	3.91 #	<1 #	14.3 #	8.04 #	13.2	
Nickel (diss.filt)	<0.4 µg/l	TM152	<0.4 #	<0.4 #	0.567 #	<0.4 #	<0.4	
Phosphorus (diss.filt)	<10 µg/l	TM152	15.2 #	18.1 #	14.7 #	17.5 #	15.9	
Zinc (diss.filt)	<1 µg/l	TM152	5.79 #	<1 #	5.99 #	5.27 #	<1	
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	<100	<100	<100	<100	102	
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 ♦ #	<0.01 ♦ #	<0.01 ♦ #	<0.01 ♦ #	<0.01 ♦	
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05 #	0.065 #	<0.05 #	<0.05 #	<0.05 #	
Sulphate	<2 mg/l	TM184	9.5 #	8.9 #	16.3 #	6.5 #	12.9 #	
Chloride	<2 mg/l	TM184	14.2 #	13.3 #	8.6 #	10.1 #	23 #	26.1 #
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	2.61 #	1.92 #	0.38 #	1.21 #	0.575 #	
Cyanide, Total	<0.05 mg/l	TM227	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05	
Cyanide, Free	<0.05 mg/l	TM227	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05	
Calcium (diss.filt)	<0.012 mg/l	TM228	71.6	72.5	106	90.9	103 #	
Sodium (diss.filt)	<0.076 mg/l	TM228	15.6	14.1	9.31	11.8	12.8 #	
Magnesium (diss.filt)	<0.036 mg/l	TM228	12.2	8.35	10.5	9.43	7.31 #	
Potassium (diss.filt)	<1 mg/l	TM228	1.02	<1	<1	1.07	<1 #	13.1 #
Iron (diss.filt)	<0.019 mg/l	TM228	0.0213	<0.019	0.0271	<0.019	<0.019 #	
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM228	284	218	368	272	637 #	
pH	<1 pH Units	TM256	7.77 #	7.74 #	7.62 #	7.56 #	7.37 #	7.97 #
Etridiazole	<0.01 µg/l	TM314	<0.02	<0.02	<0.02	<0.02	<0.02	
Propachlor	<0.01 µg/l	TM314	<0.01	<0.01	<0.01	<0.01	<0.01	
Trifluralin	<0.01 µg/l	TM314	<0.01	<0.01	<0.01	<0.01	<0.01	
Simazine	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Atrazine	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Propazine	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Alachlor	<0.01 µg/l	TM315	<0.02	<0.02	<0.02	<0.02	<0.02	
Chlorpyriphos-Ethyl	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Terbutryn	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Prometryn	<0.01 µg/l	TM315	<0.01	<0.01	<0.01	<0.01	<0.01	
Dibutyl tin	<5 ng/l	TM328	<5	<5	<5	<5	<5	
Tributyl tin	<1 ng/l	TM328	<1	<1	<1	<1	<1	
Tetrabutyl tin	<2 ng/l	TM328	<2	<2	<2	<2	<2	

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	NYCSW2
Depth (m)			.	.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525	16815523
AGS Reference								
Component	**LOD/Units**	**Method**						
Triphenyl tin	<1 ng/l	TM328	<1	<1	<1	<1	<1	
Surrogate	%	TM328	95.5	105	85.4	88.3	79.7	

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Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			NYCSW4	RUNOFF				
Depth (m)			.	.				
Sample Type			Surface Water (SW)	Surface Water (SW)				
Date Sampled			21/12/2017	21/12/2017				
Sample Time			.	.				
Date Received			23/12/2017	23/12/2017				
SDG Ref			171223-28	171223-28				
Lab Sample No.(s)			16815524	16815527				
AGS Reference								
Component	**LOD/Units**	**Method**						
Suspended solids, Total	<2 mg/l	TM022	11 #	<2 #				
Alkalinity, Total as CaCO3	<2 mg/l	TM043	185 #					
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.907 #					
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.517 #	0.68 #				
Chloride	<2 mg/l	TM184	38.4 #					
Potassium (diss.filt)	<1 mg/l	TM228	25 #					
pH	<1 pH Units	TM256	7.95 #	8.12 #				

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Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Acid Herbicides (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH104	BH105				
Customer Sample Ref.			BH104	BH105				
Depth (m)			.	.				
Sample Type			Ground Water (GW)	Ground Water (GW)				
Date Sampled			21/12/2017	21/12/2017				
Sample Time			.	.				
Date Received			23/12/2017	23/12/2017				
SDG Ref			171223-28	171223-28				
Lab Sample No.(s)			16815521	16815522				
AGS Reference								
2,3,6-Trichlorobenzoic acid	<0.02 µg/l	SUB	<0.04	<0.06				
Benazolin	<0.02 µg/l	SUB	<0.04	<0.04				
Bentazone	<0.02 µg/l	SUB	<0.04	<0.04				
Bromoxynil	<0.02 µg/l	SUB	<0.04	<0.04				
Clopyralid	<0.02 µg/l	SUB	<0.04	<0.04				
Dicamba	<0.02 µg/l	SUB	<0.04	<0.04				
Dinitro-o-cresol	<0.02 µg/l	SUB	<0.04	<0.04				
Ioxynil	<0.02 µg/l	SUB	<0.04	<0.04				
MCPB	<0.02 µg/l	SUB	<0.08	<0.08				
Mecoprop (MCPP)	<0.02 µg/l	SUB	<0.04	<0.04				
Pentachlorophenol	<0.02 µg/l	SUB	<0.04	<0.04				

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

OC, OP Pesticides and Triazine Herb

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
Dichlorvos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Tecnazene	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Trifluralin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Quintozene (PCNB)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Triallate	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Etrimphos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Propetamphos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos methyl	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Dimethoate	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorothalonil	<0.01 µg/l	TM231	<0.02	<0.02	<0.02	<0.02	<0.02
Pirimiphos-methyl	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
beta-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Telodrin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl parathion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Isodrin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Fenthion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Triadimefon	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Pendimethalin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Parathion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
o,p-DDE	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorfenvinphos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

OC, OP Pesticides and Triazine Herb

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	
Depth (m)			.	.	.	.	.	
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	
Sample Time			.	.	.	.	.	
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017	
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28	
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525	
AGS Reference								
Component	**LOD/Units**	**Method**						
Endosulphan I	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Trans-chlordane	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
cis-Chlordane	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
p,p-DDE	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Dieldrin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
o,p-TDE (DDD)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Endrin	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
o,p-DDT	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
p,p-TDE (DDD)	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Ethion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan II	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
p,p-DDT	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Carbophenothion	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
o,p-Methoxychlor	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Triazophos	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
p,p-Methoxychlor	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan sulphate	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Permethrin I	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Phosalone	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Permethrin II	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Azinphos-methyl	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	
Azinphos-ethyl	<0.01 µg/l	TM231	<0.01	<0.01	<0.01	<0.01	<0.01	

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117	
Depth (m)			.	.	.	.	.	
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)	
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	
Sample Time			.	.	.	.	.	
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017	
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28	
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525	
AGS Reference								
Component	**LOD/Units**	**Method**						
Naphthalene (aq)	<0.01 µg/l	TM178	<0.01	<0.01	<0.01	<0.01	<0.01	
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0109	<0.005	<0.005	
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0287	<0.005	0.00669	
Anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.00843	<0.005	<0.005	
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0133	<0.005	<0.005	
Fluorene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	
Chrysene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0235	<0.005	<0.005	
Pyrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0234	<0.005	0.00616	
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0257	<0.005	<0.005	
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.0166	<0.005	<0.005	
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	0.00901	<0.005	<0.005	
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002	<0.002	0.0083	<0.002	0.00357	
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005	<0.005	<0.005	<0.005	<0.005	
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082	<0.082	0.168	<0.082	<0.082	

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Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Chlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
2-Nitrophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
3-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Chloroaniline (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
4-Nitrophenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
Azobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2 ♦ #	<2 ♦ #	<2 ♦ #	<2 ♦ #	<2 ♦ #
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Carbazole (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Dibenzofuran (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #

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CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
Diethyl phthalate (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Dimethyl phthalate (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<5 ♦ #	<5 ♦ #	<5 ♦ #	<5 ♦ #	<5 ♦ #
Hexachlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Pentachlorophenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
Phenol (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Hexachloroethane (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Nitrobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Isophorone (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1
SVOC TIC (aq)		TM176	Not Detected ♦	Not Detected ♦	Not Detected ♦	Not Detected ♦	Not Detected ♦
SVOC Derivatised (aq)		TM176	Not Detected ♦	Not Detected ♦	Not Detected ♦	Not Detected ♦	Not Detected ♦
Total SVOC TIC	<10 µg/l	TM176	<10	<10	<10	<10	<10

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
Dibromofluoromethane**	%	TM208	103	104	103	104	101
Toluene-d8**	%	TM208	98.6	98.5	97.4	98.5	98.8
4-Bromofluorobenzene**	%	TM208	99.7	99.5	98.1	96.3	94.7
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Chloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Bromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #	<3 #	<3 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroform	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #

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CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Styrene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Bromoform	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.			BH101	BH103	BH104	BH105	BH117
Depth (m)			.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
Date Sampled			21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Sample Time			.	.	.	.	.
Date Received			23/12/2017	23/12/2017	23/12/2017	23/12/2017	23/12/2017
SDG Ref			171223-28	171223-28	171223-28	171223-28	171223-28
Lab Sample No.(s)			16815519	16815520	16815521	16815522	16815525
AGS Reference							
Component	**LOD/Units**	**Method**					
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	<1	<1

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Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM231	Agilent 6890 Gas Chromatograph system using an Agilent 5973 Mass Selective Detector (MSD)	Determination of Organochlorine and Organophosphorus Pesticides and Triazine Herbicides by GCMS
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM314		Analysis of Organochlorine Pesticides in Aqueous sample by GCMS
TM315		Analysis of Organophosphorus Pesticides in Aqueous samples by GCMS
TM328		

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	171223-28	**Client Reference:**		**Report Number:**	441803
Location:	Carmarthen	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16815519	16815520	16815521	16815522	16815525	16815523	16815524	16815527
Customer Sample Ref.	BH101	BH103	BH104	BH105	BH117	NYCSW2	NYCSW4	RUNOFF
AGS Ref.								
Depth								
Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water
Acid Herbicides (Suite 3) (W)*	26-Jan-2018	26-Jan-2018			26-Jan-2018			
Acid Herbicides*			10-Jan-2018	10-Jan-2018				
Alkalinity as CaCO3	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	
Ammoniacal Nitrogen	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	
Anions by Kone (w)	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	
BOD True Total	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017			
COD Unfiltered	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017			
Conductivity (at 20 deg.C)	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	28-Dec-2017	27-Dec-2017	27-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate	03-Jan-2018	29-Dec-2017	03-Jan-2018	29-Dec-2017	03-Jan-2018			
Dissolved Metals by ICP-MS	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018			
Mercury Dissolved	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018			
Metals by iCap-OES Dissolved (W)	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	
Metals by iCap-OES Unfiltered (W)	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018			
Mineral Oil C10-40 Aqueous (W)	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018			
OC, OP Pesticides and Triazine Herb	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018			
Organochlorine Pesticides (Aq)	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018			
Organophosphorus Pesticides (Aq)	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018			
Organotins in Aqueous Samples	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018			
PAH Spec MS - Aqueous (W)	02-Jan-2018	02-Jan-2018	02-Jan-2018	04-Jan-2018	02-Jan-2018			
pH Value	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018
Phosphate by Kone (w)	02-Jan-2018	30-Dec-2017	30-Dec-2017	30-Dec-2017	02-Jan-2018			
Suspended Solids						29-Dec-2017	29-Dec-2017	29-Dec-2017
SVOC MS (W) - Aqueous	11-Jan-2018	11-Jan-2018	11-Jan-2018	11-Jan-2018	11-Jan-2018			
Total Organic and Inorganic Carbon	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017			
VOC MS (W)	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018			

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Certificate of Analysis

Report No.: 18-68352-1

Issue No.: 1
Date of Issue 26/01/2018

Customer Details:	ALS Life Sciences Limited, Unit7-8, Hawarden Business Park, Manor Road, Hawarden, Deeside, Flintshire, CH5 3US
Customer Contact:	Carrie Foster (2)
Customer Order No.:	P59813
Customer Reference:	171223-28
Quotation Reference:	180111/11
Description:	3 water samples
Date Received:	15/01/2018
Date Started:	17/01/2018
Date Completed:	26/01/2018
Test Methods:	Details available on request (refer to SOP code against relevant result/s)
Notes:	None

Approved By: **Matthew Hickson, Laboratory Manager**

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service.
Observations and interpretations are outside of the scope of UKAS accreditation.
Results reported herein relate only to the items supplied to the laboratory for testing.

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Results Summary

Report No.: 18-68352-1

Customer Reference: 171223-28

Customer Order No: P59813

					Customer Sample No	**16857584**	**16857581**	**16857587**
					Customer Sample ID	BH101	BH103	BH117
					RPS Sample No	351407	351408	351409
					Sample Type	**WATER**	**WATER**	**WATER**
					Sampling Date	21/12/2017	21/12/2017	21/12/2017
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**			
2,3,6-TBA	50-31-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
2,4,5-TP (fenoprop, silvex)	93-72-1	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
2,4-DB	94-82-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
dichlorprop (2,4-DP)	120-36-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
2,4-D (2,4-dichlorophenoxyacetic acid)	94-75-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
benazolin	3813-05-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
bentazone	25057-89-0	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
bromoxynil	1689-84-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
clopyralid	1702-17-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
dicamba	1918-00-9	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
fluroxypyr	69377-81-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
ioxynil	1689-83-4	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
MCPA (4-chloro-o-tolyloxyacetic acid)	94-74-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
MCPB	94-81-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
mecoprop (MCPP)	93-65-2	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02
pentachlorophenol (PCP)	87-86-5	N	303	ug/l	0.02	< 0.05	< 0.05	< 0.05
triclopyr	55335-06-3	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02

2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, **F** +44 (0)1462 480 403, **E** rpsmh@rpsgroup.com, **W** rpsgroup.com

Report No.: 18-68352-1
Customer Reference: 171223-28
Customer Order No: P59813

Comments

Job	Description	Job Comments
18-68352	3 water samples	Due to matrix interference resulting in low spike recovery, the reporting limit for PCP has been raised to 0.05ug/l.

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Deviating Samples

Report No.: 18-68352-1
Customer Reference: 171223-28
Customer Order No: P59813

Our policy on Deviating Samples and reference list of Holding Times applied can be supplied on request. These have been implemented in accordance with UKAS Policy on Deviating Samples (TPS63).
RPS is not responsible for the integrity of samples as received, unless RPS personnel performed the sampling, and it is possible that samples submitted may be declared to be deviating.
Where applicable the analysis method remains UKAS accredited, however results reported for a deviating sample may be invalid. The reason for a sample being declared to be deviating is indicated below.
Where no sampling date was supplied, samples have been declared to be deviating. However, if a date of sampling can be supplied, the results may be reissued with the deviating sample status removed.
Where the sample container used was unsuitable, the appropriate Holding Time was exceeded, or the sample is flagged as deviating for some other reason, re-sampling/re-submisson may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating Sample	Reason for Sample Deviation
351407	16857584		21/12/2017	500ml green glass bottle	**Yes**	Holding time has been exceeded
351408	16857581		21/12/2017	500ml green glass bottle	**Yes**	Holding time has been exceeded
351409	16857587		21/12/2017	500ml green glass bottle	**Yes**	Holding time has been exceeded

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Report Information

Key to Report Codes

U	UKAS Accredited
M	MCERTS Accredited
N	Not accredited
S	Subcontracted to approved laboratory
US	Subcontracted to approved laboratory UKAS Accredited for the test
MS	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
SI	Subcontracted to internal RPS Group laboratory
USI	Subcontracted to internal RPS Group laboratory UKAS Accredited for the test
MSI	Subcontracted to internal RPS Group laboratory MCERTS/UKAS Accredited for the test
I/S (in results)	Insufficient Sample
U/S (in results)	Unsuitable Sample
S/C (in results)	See Comments
ND (in results)	Not Detected
DW (in units)	Results are expressed on a dry weight basis

Sample Retention and Disposal

Samples will generally* be retained for the following times prior to disposal:

Perishables, e.g. foodstuffs	1 month (if frozen) from the issue date of this report
Waters	2 weeks from the issue date of this report
Other Liquids	1 month from the issue date of this report
Solids (including Soils)	1 month from the issue date of this report

*Sample retention may be subject to agreement with the customer for particular projects

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

NANT Y CAWS
PHASE 1
CLOSED LANDFILL

ENVIRONMENTAL
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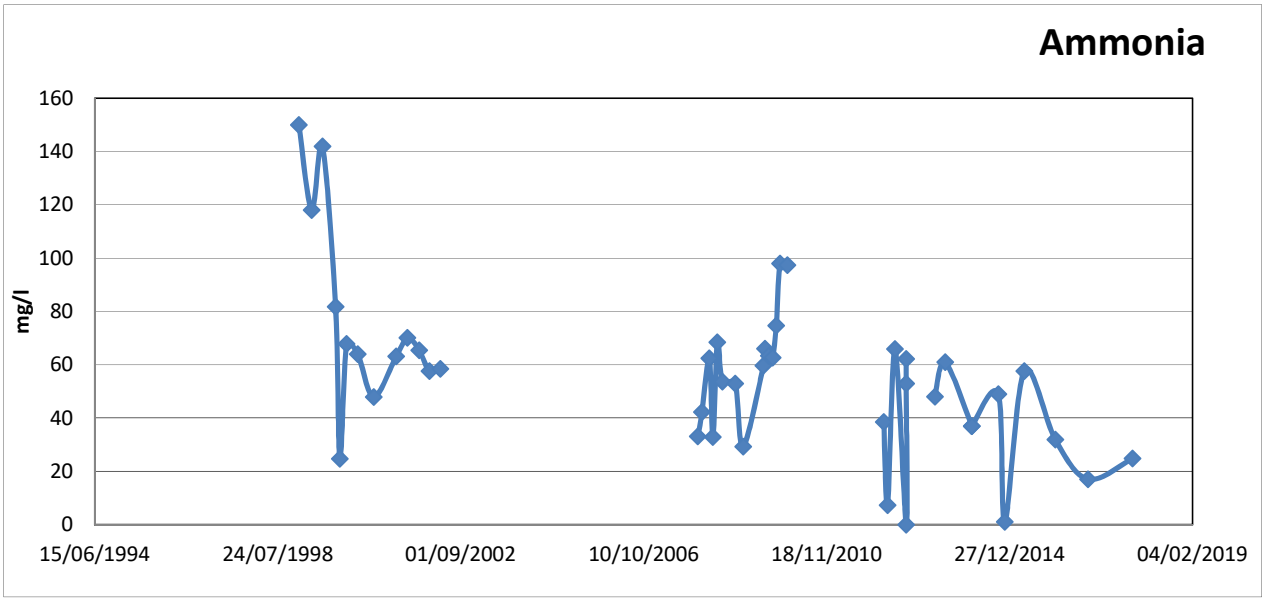
Environmental
Monitoring Report

Appendix 2
Leachate Chemistry

Report Number 1760r1v1d0218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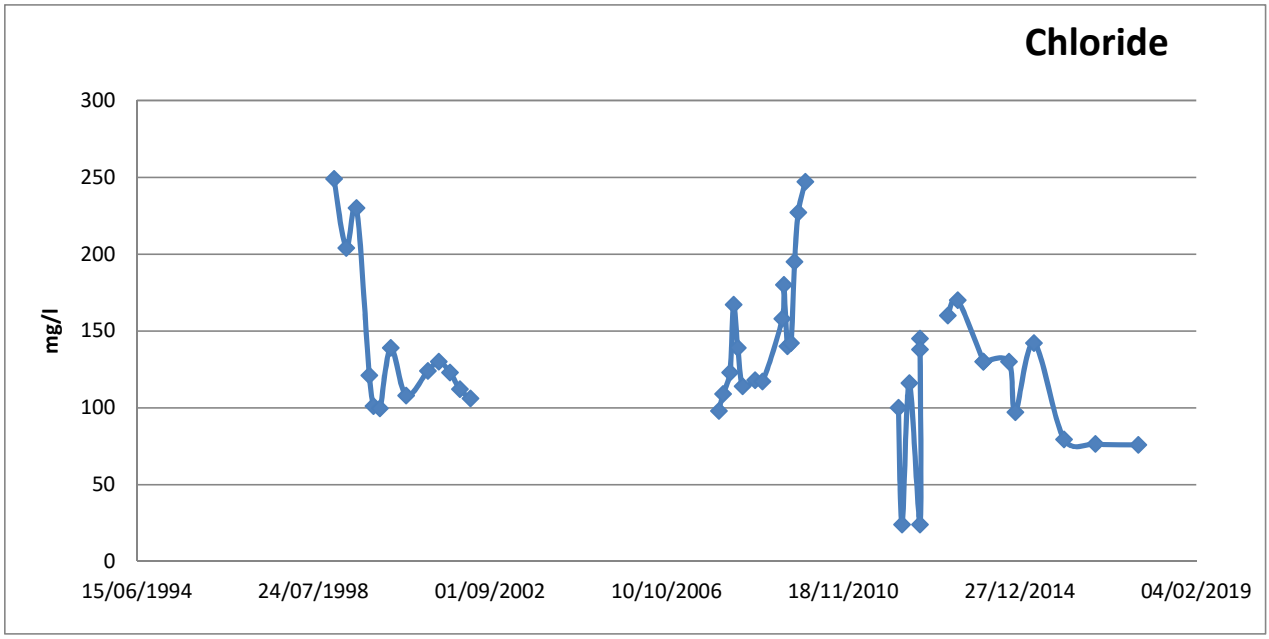
01/09/2002
10/10/2006
18/11/2010
27/12/2014
04/02/2019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mg/l
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250
200
150
100
50
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24/07/1998
01/09/2002
10/10/2006
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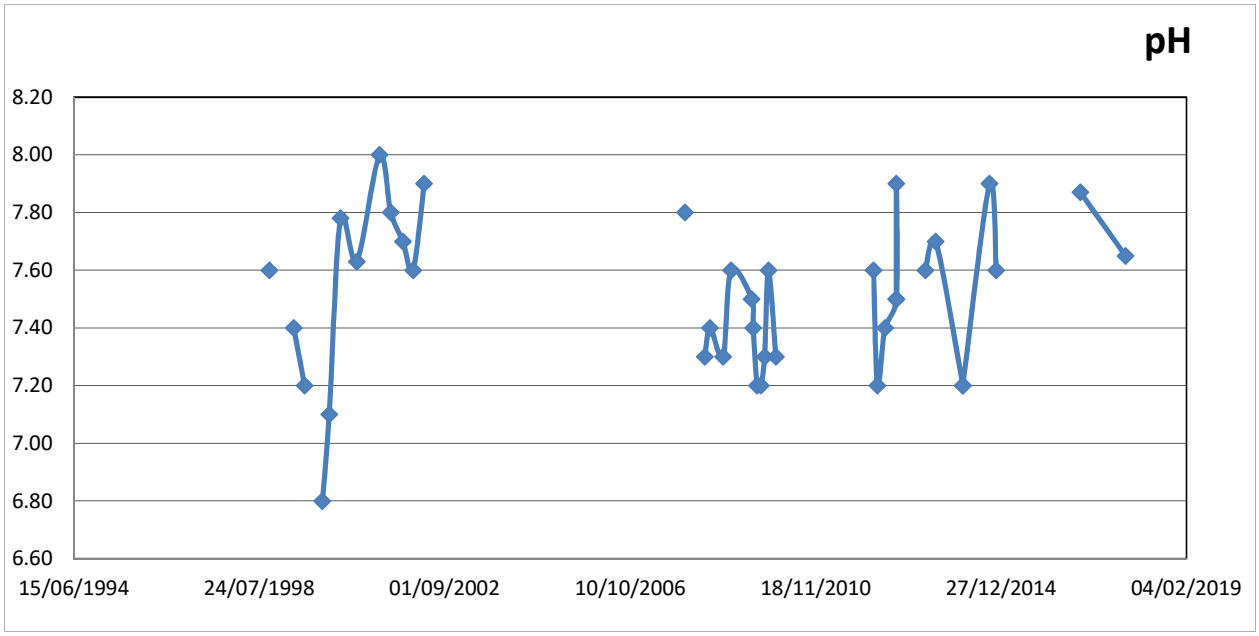
04/02/2019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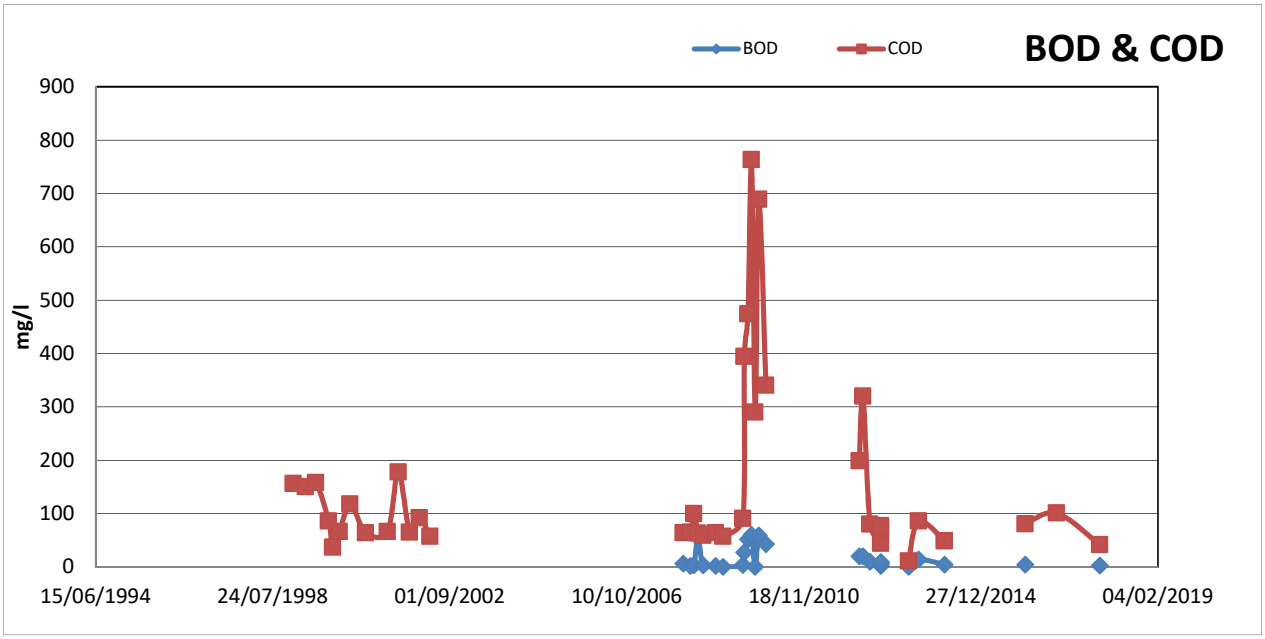
01/09/2002
10/10/2006
18/11/2010
27/12/2014
04/02/2019


BOD & COD
BOD
COD
mg/l
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600
500
400
300
200
100
0
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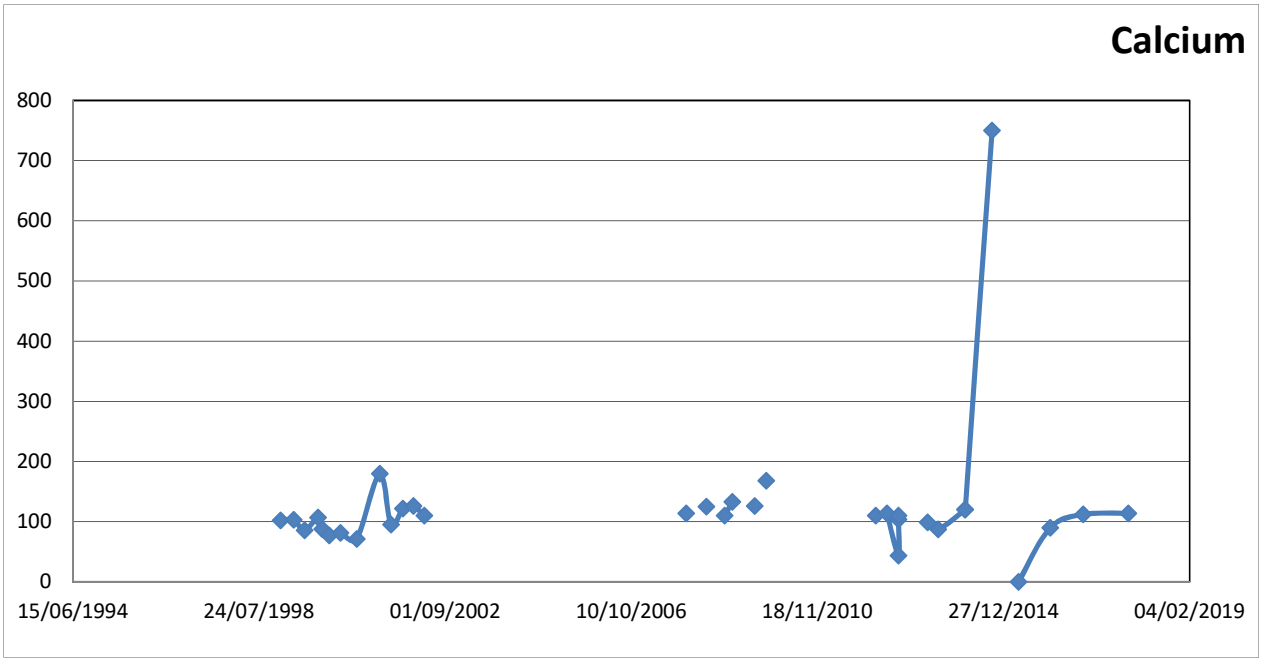
24/07/1998
01/09/2002
10/10/2006
18/11/2010
27/12/2014
04/02/2019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600
500
400
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200
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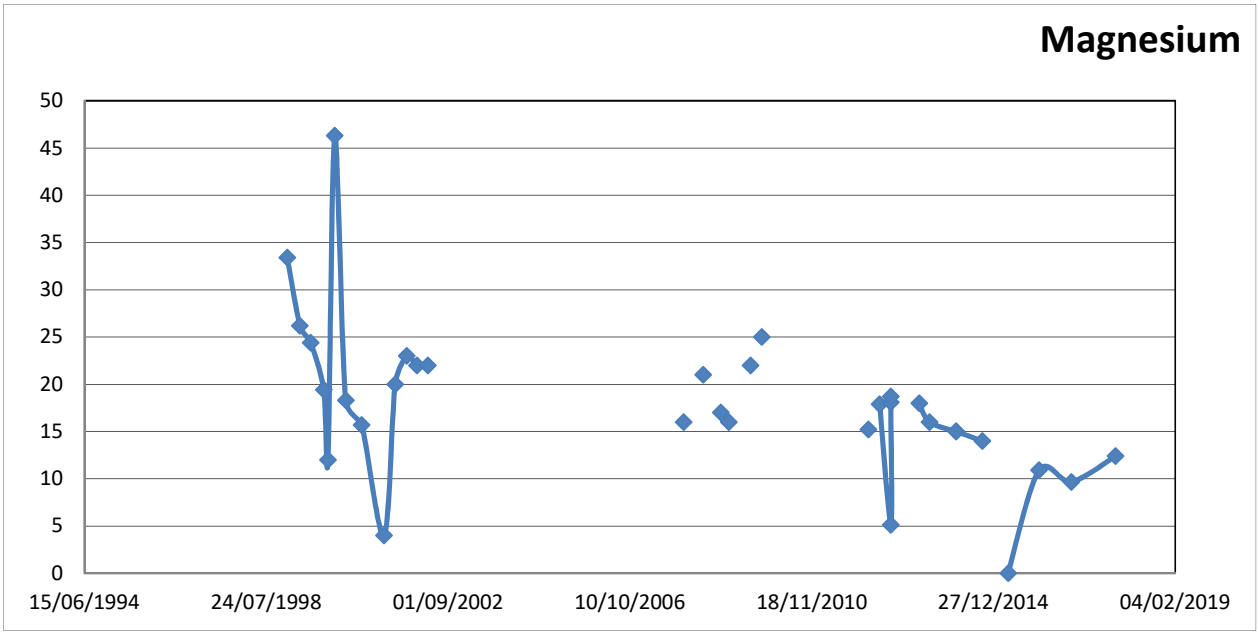
01/09/2002
10/10/2006
18/11/2010
27/12/2014
04/02/2019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40
35
30
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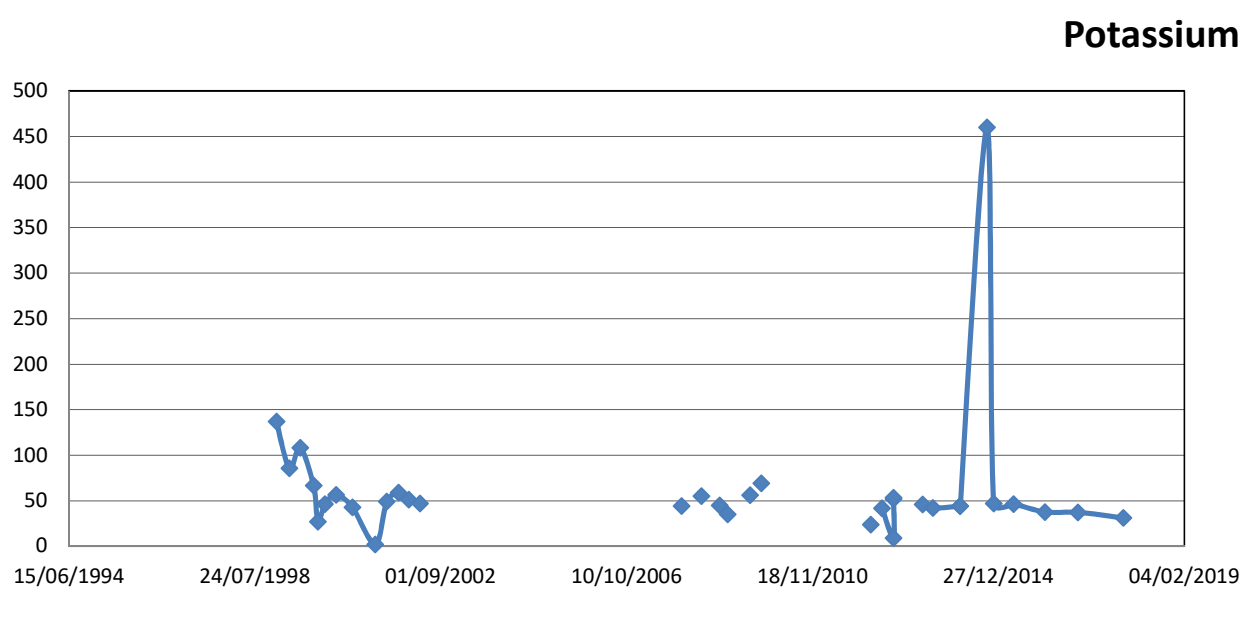
10/10/2006
18/11/2010
27/12/2014
04/02/2019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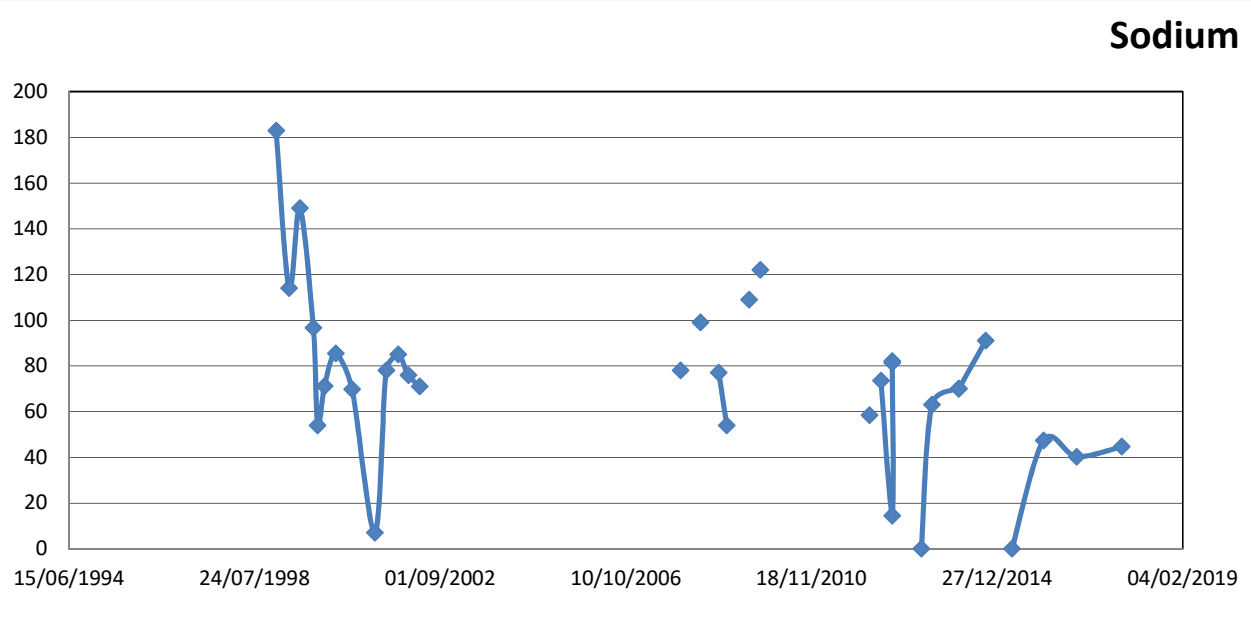
27/12/2014
04/02/2019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120
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80
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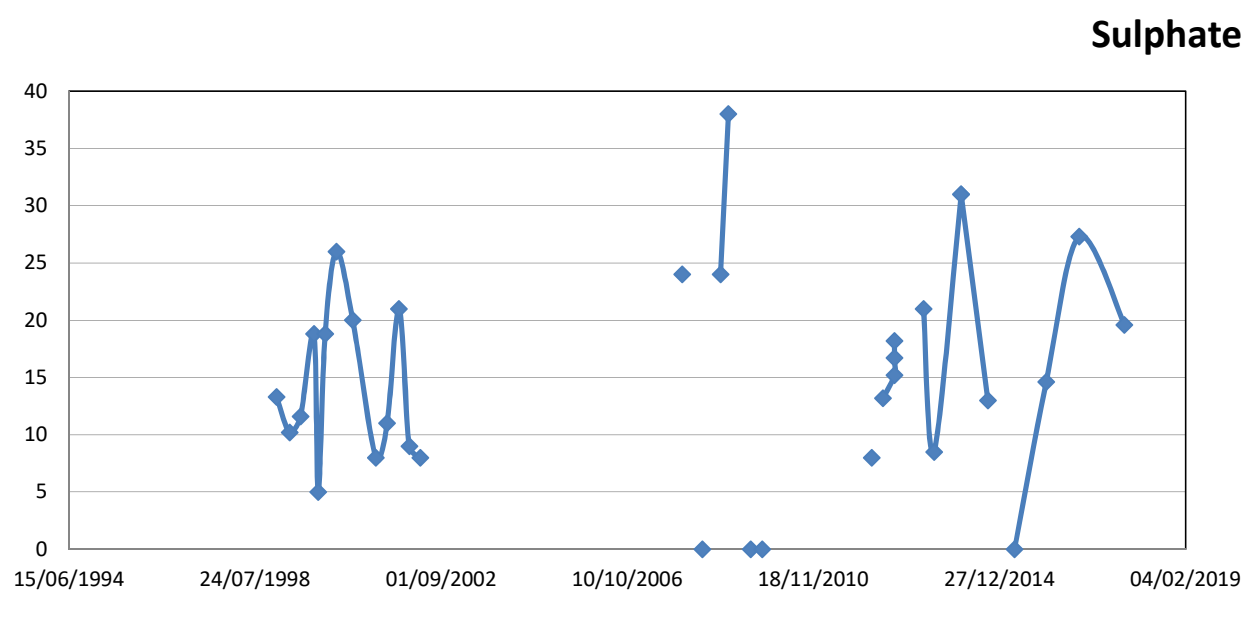
18/11/2010
27/12/2014
04/02/2019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35
30
25
20
15
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01/09/2002
10/10/2006
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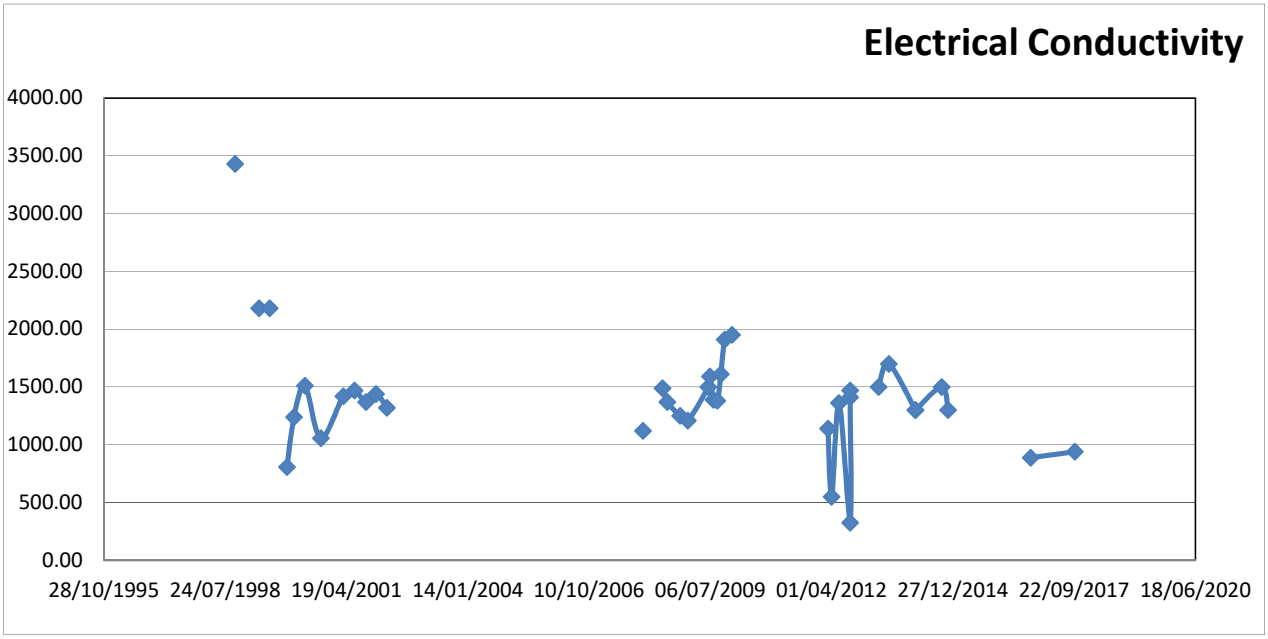
04/02/2019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3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
28/10/1995
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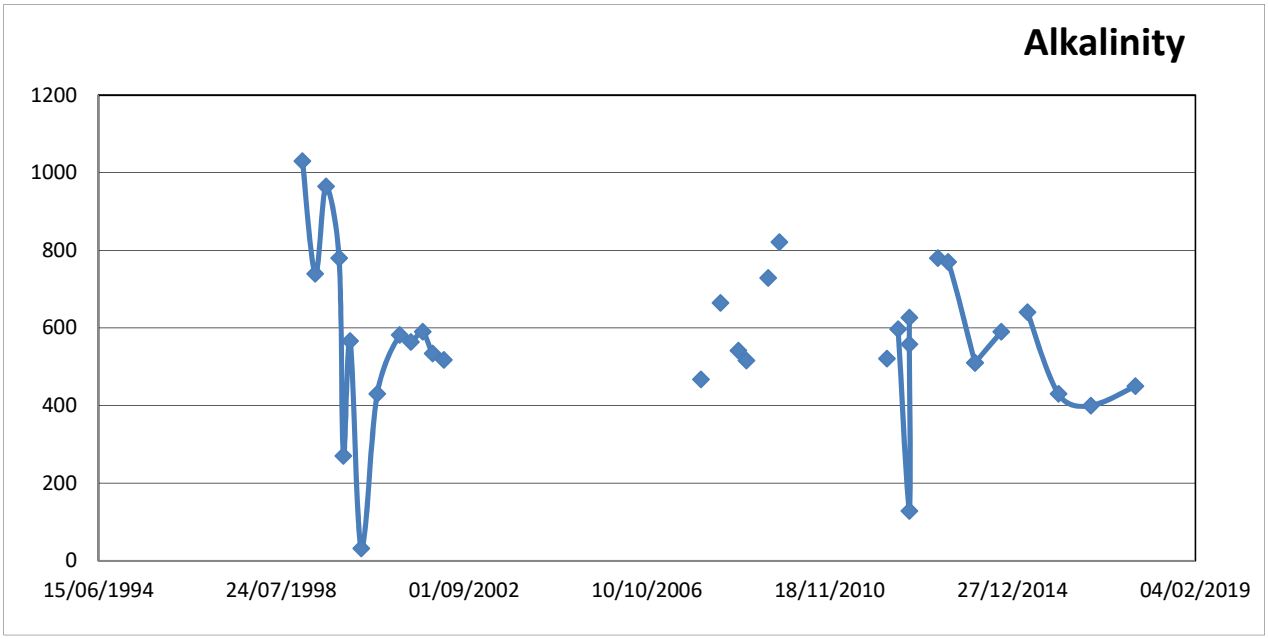
18/06/2020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200
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01/09/2002
10/10/2006
18/11/2010
27/12/2014
04/02/2019

NANT Y CAWS
PHASE 1
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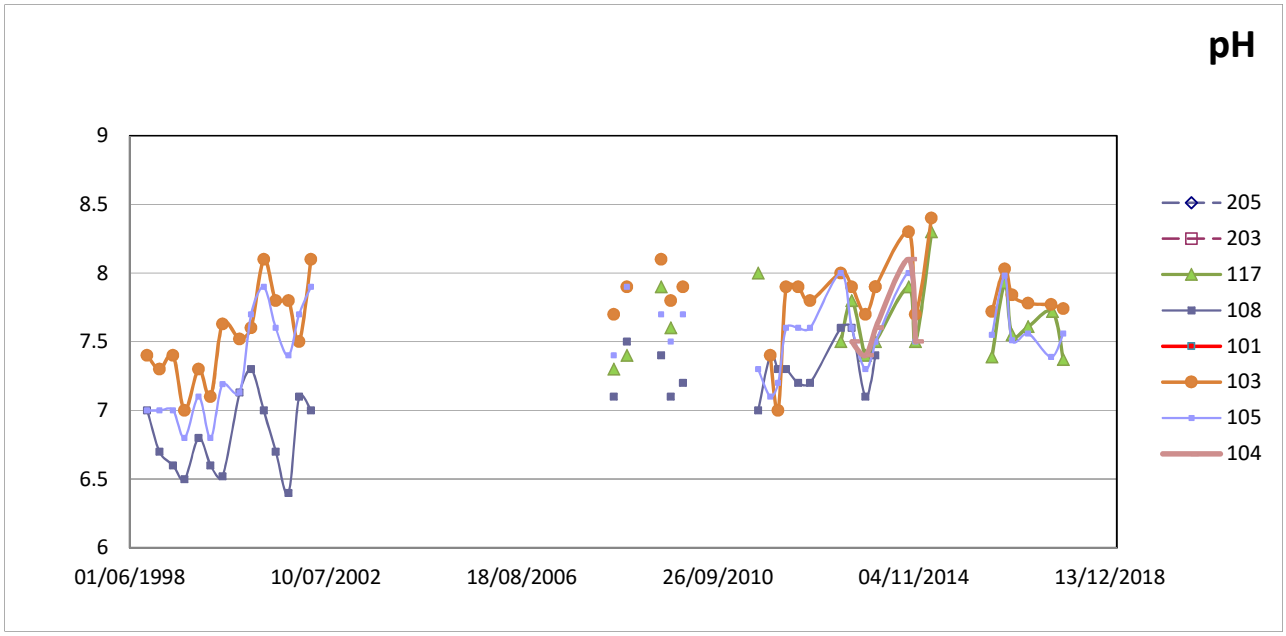
ENVIRONMENTAL
PERMIT EA WML 34183

2017 Annual Environmental Monitoring Report

Appendix 3 Groundwater Chemistry

Report Number 1760r1v1d0218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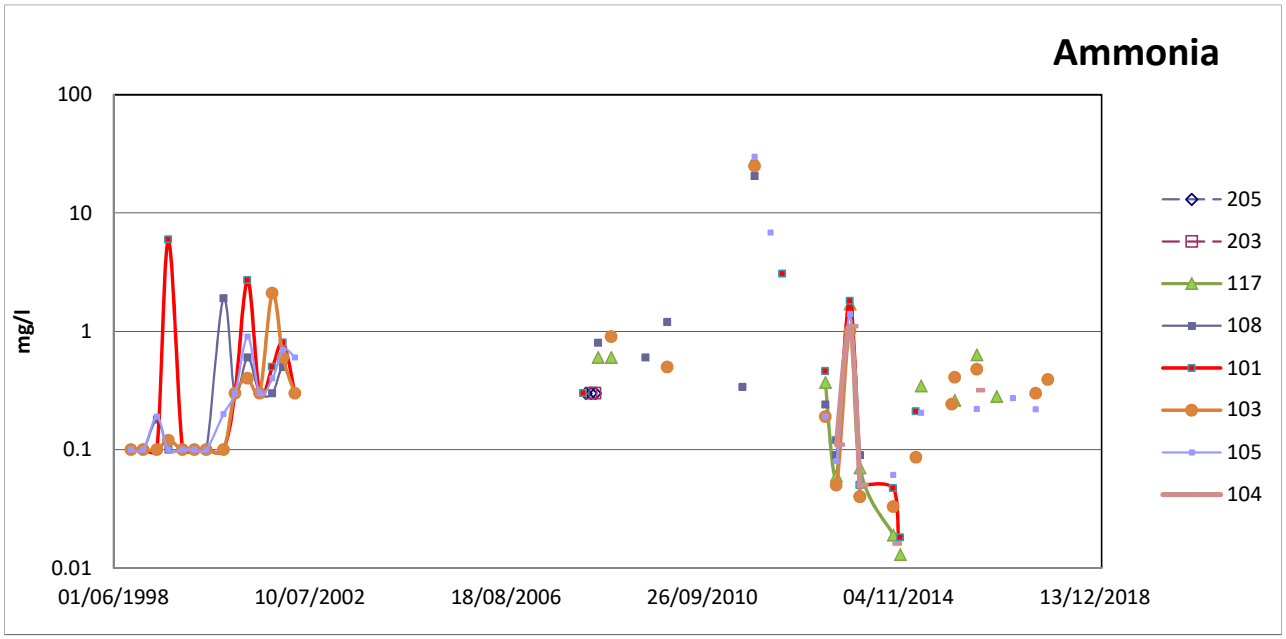
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26/09/2010
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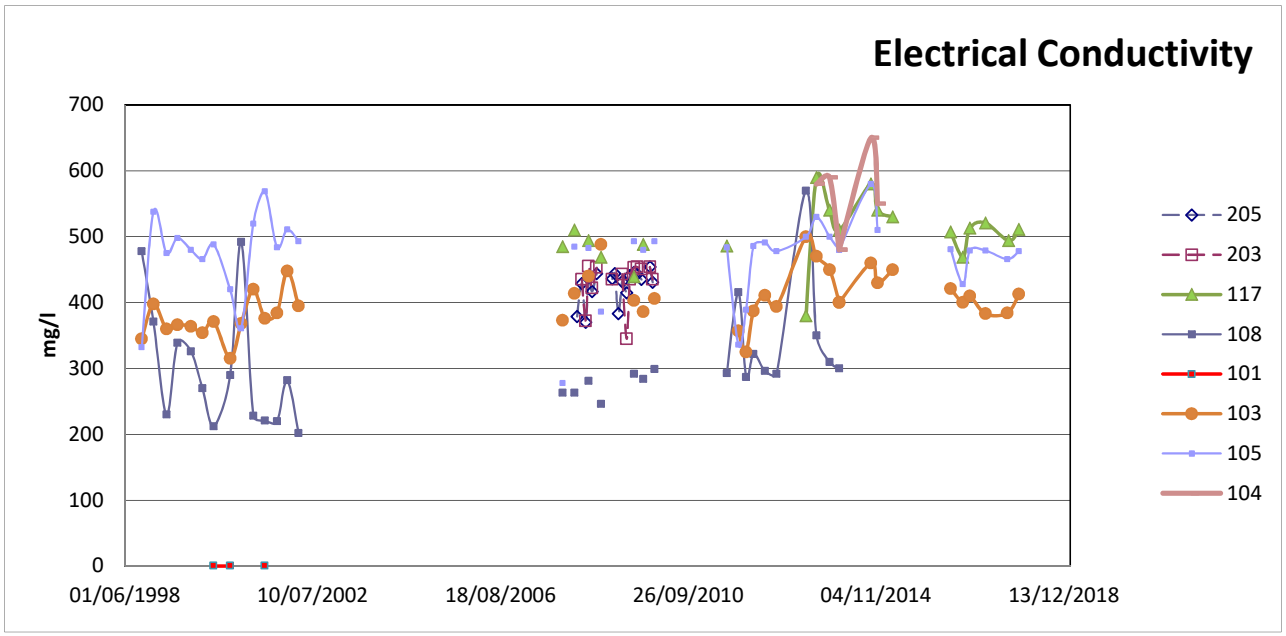
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mg/l
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300
200
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01/06/1998
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26/09/2010
04/11/2014
13/12/2018
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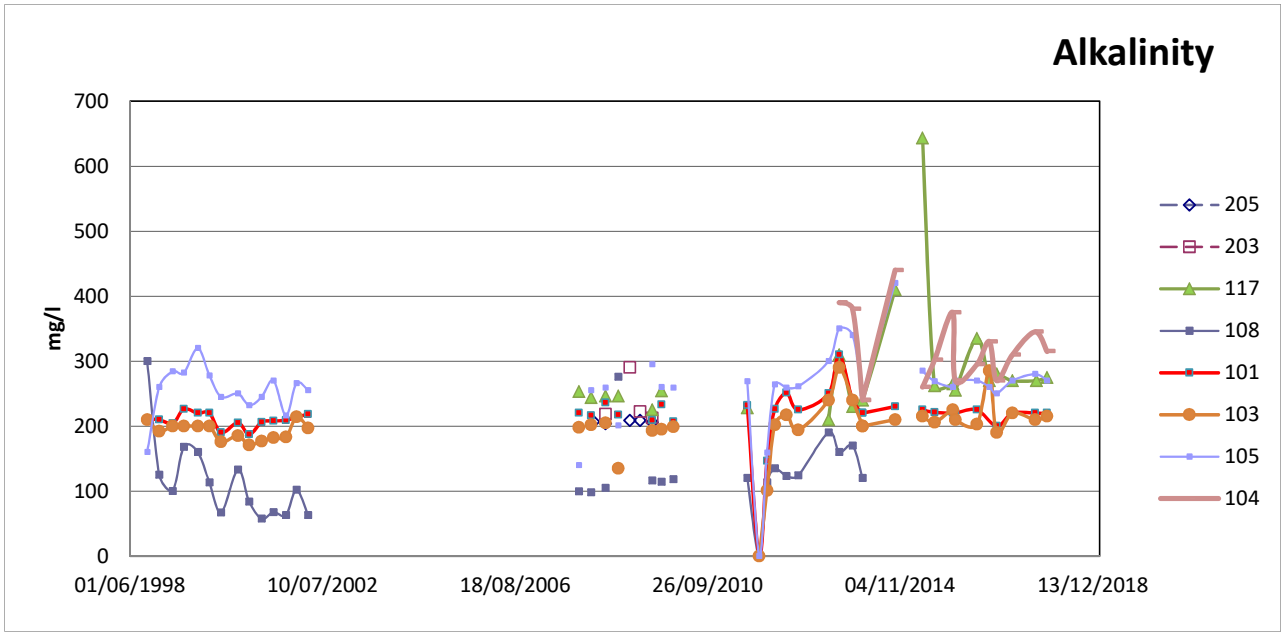
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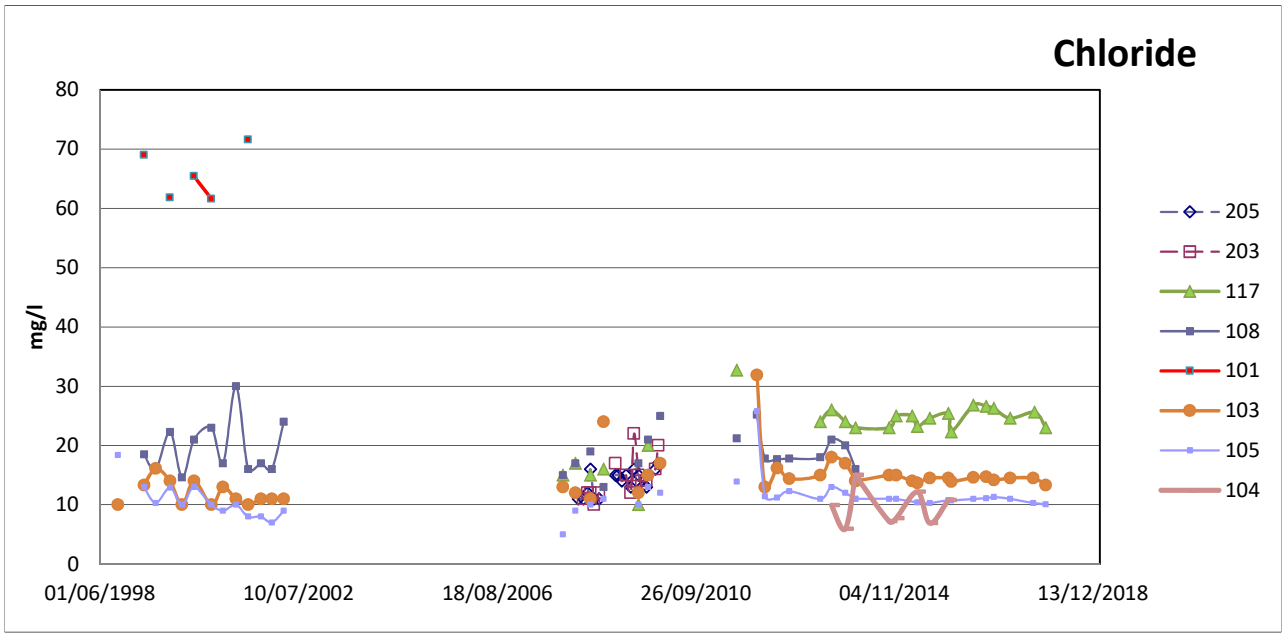
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04/11/2014
13/12/2018
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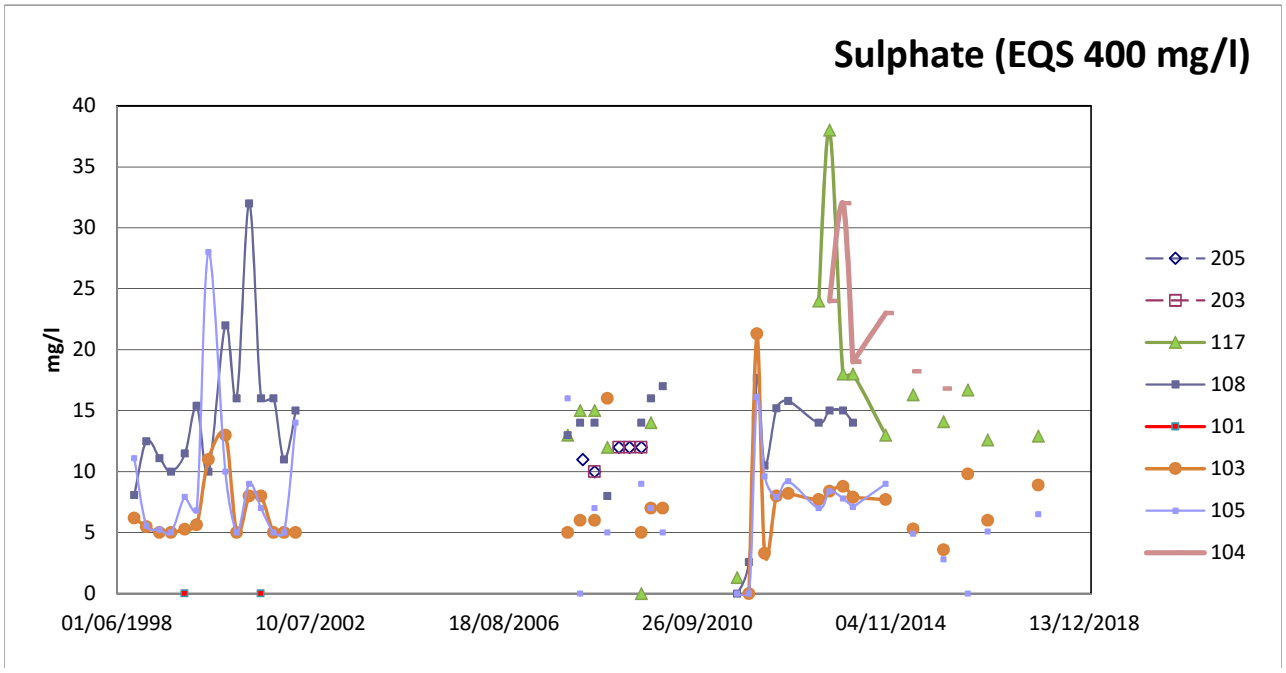
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mg/l
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15
10
5
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10/07/2002
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26/09/2010
04/11/2014
13/12/2018
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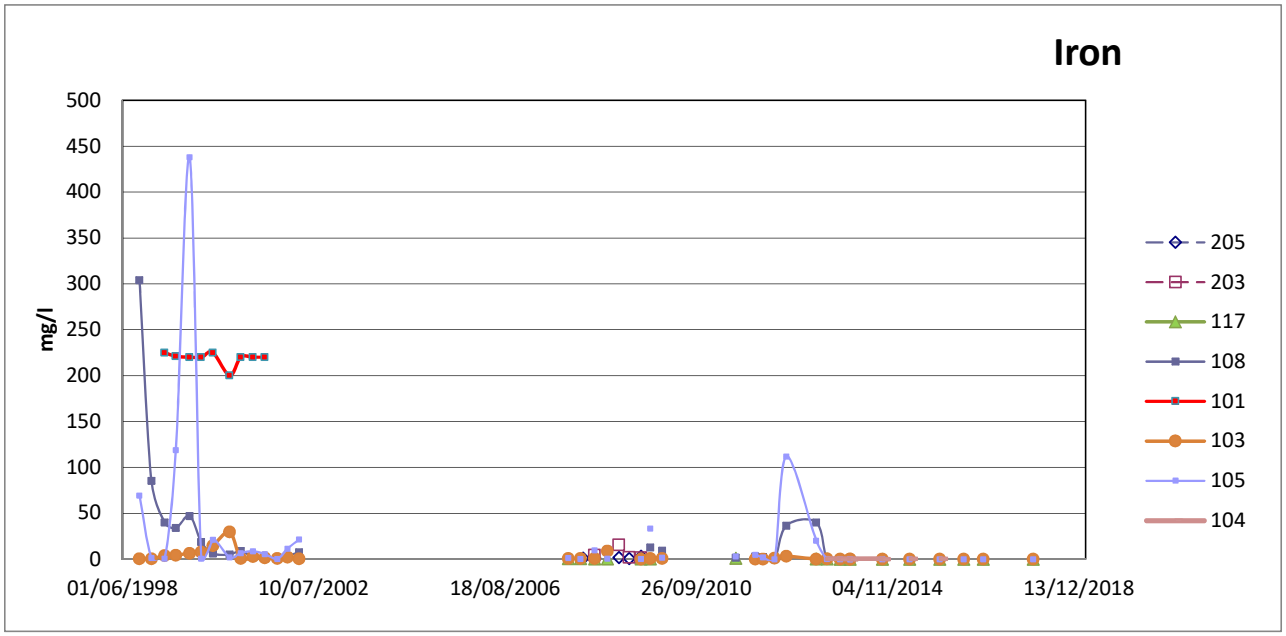
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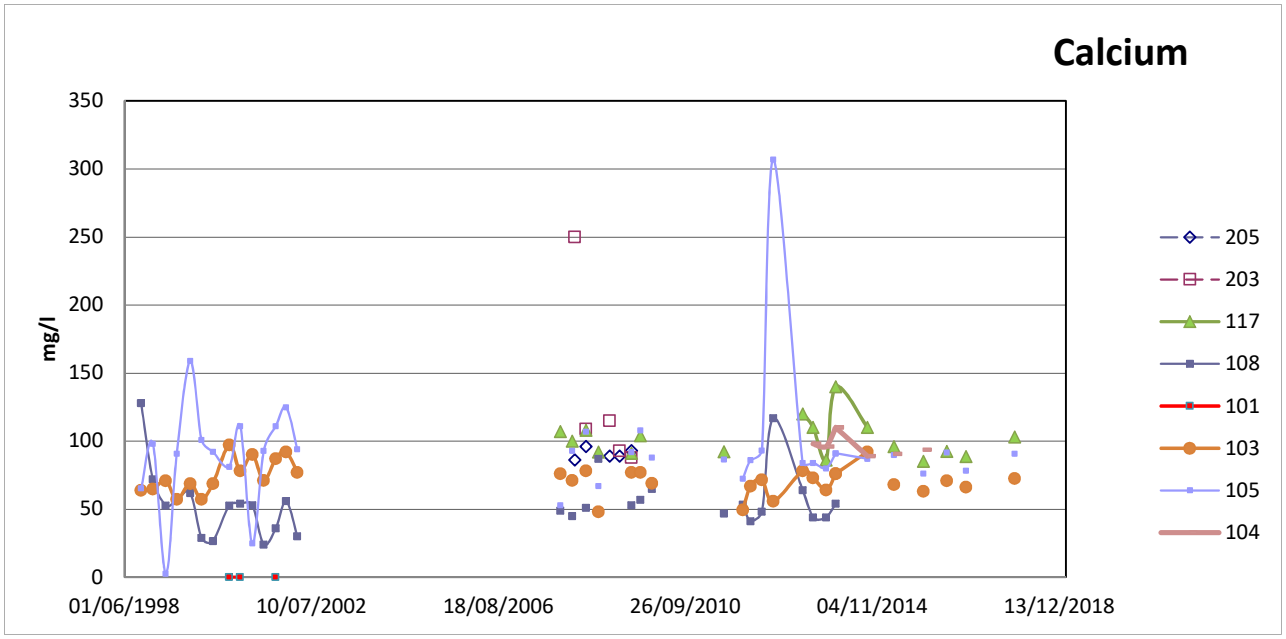
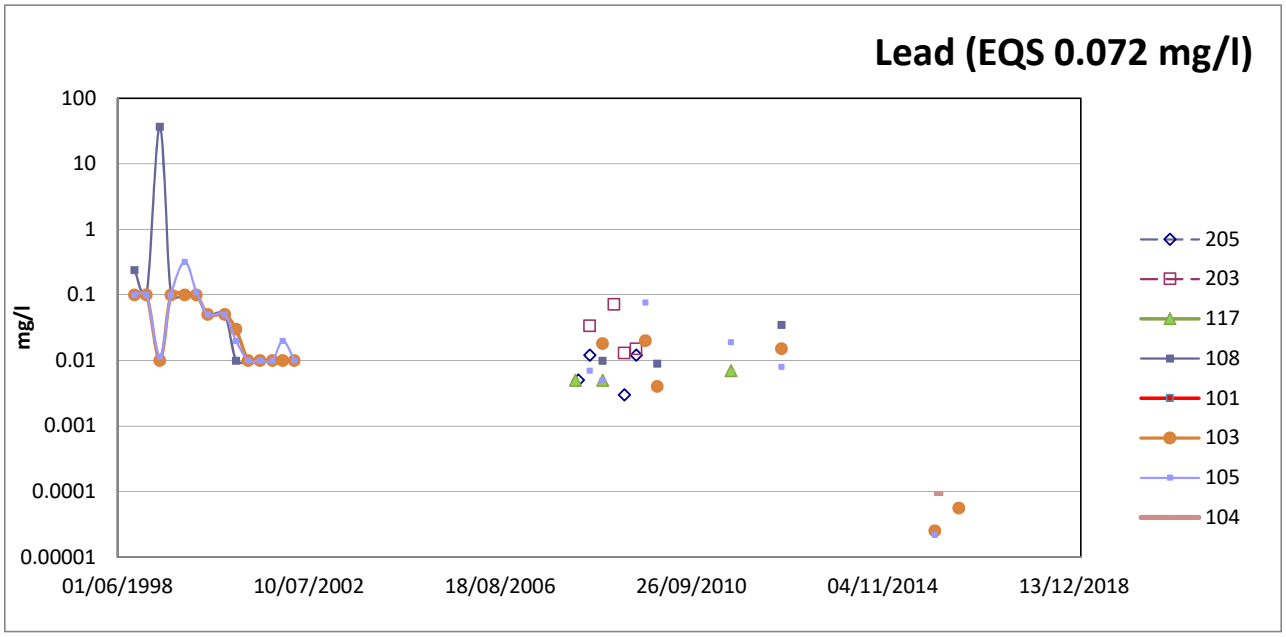
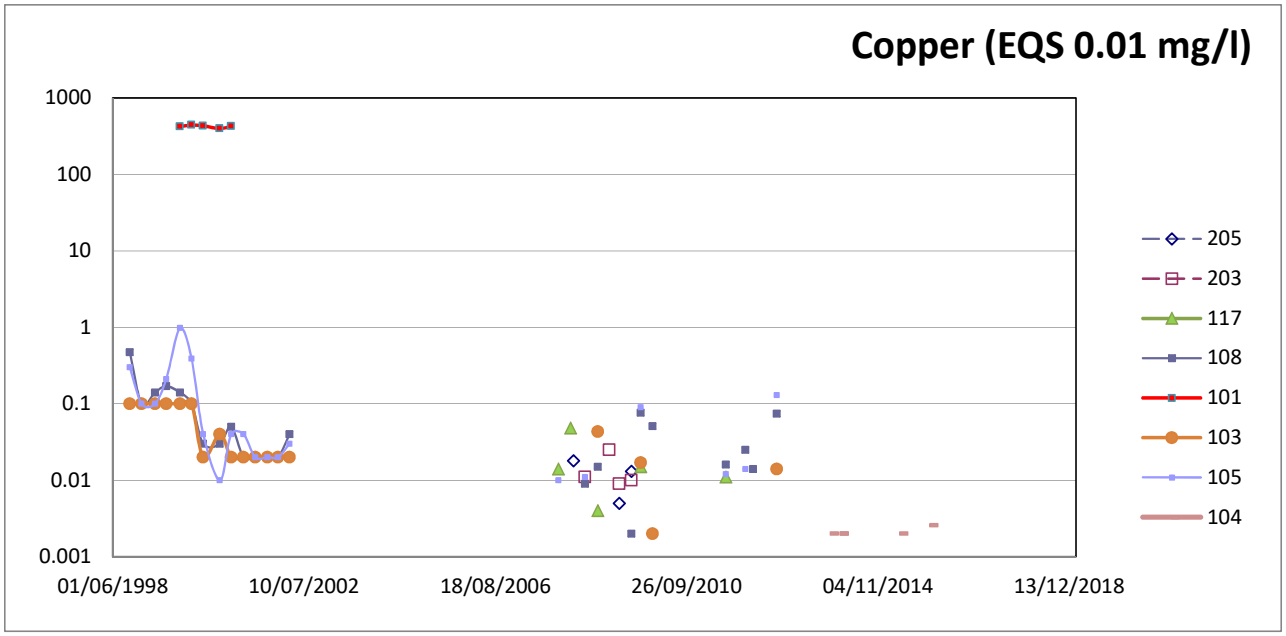
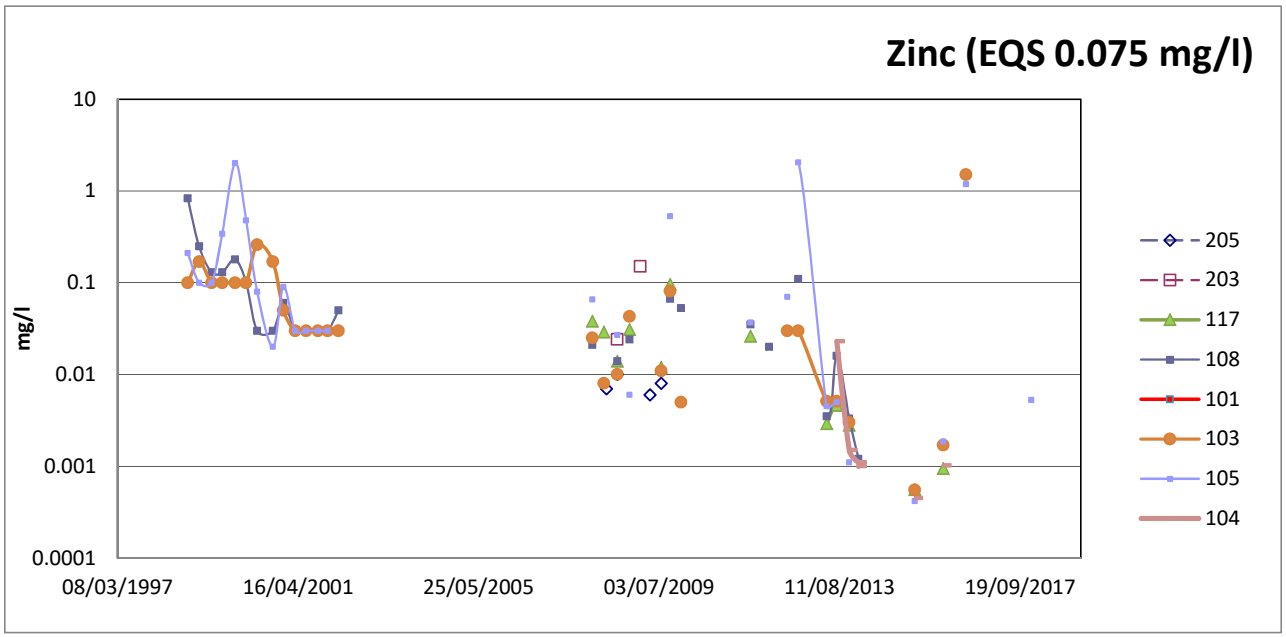
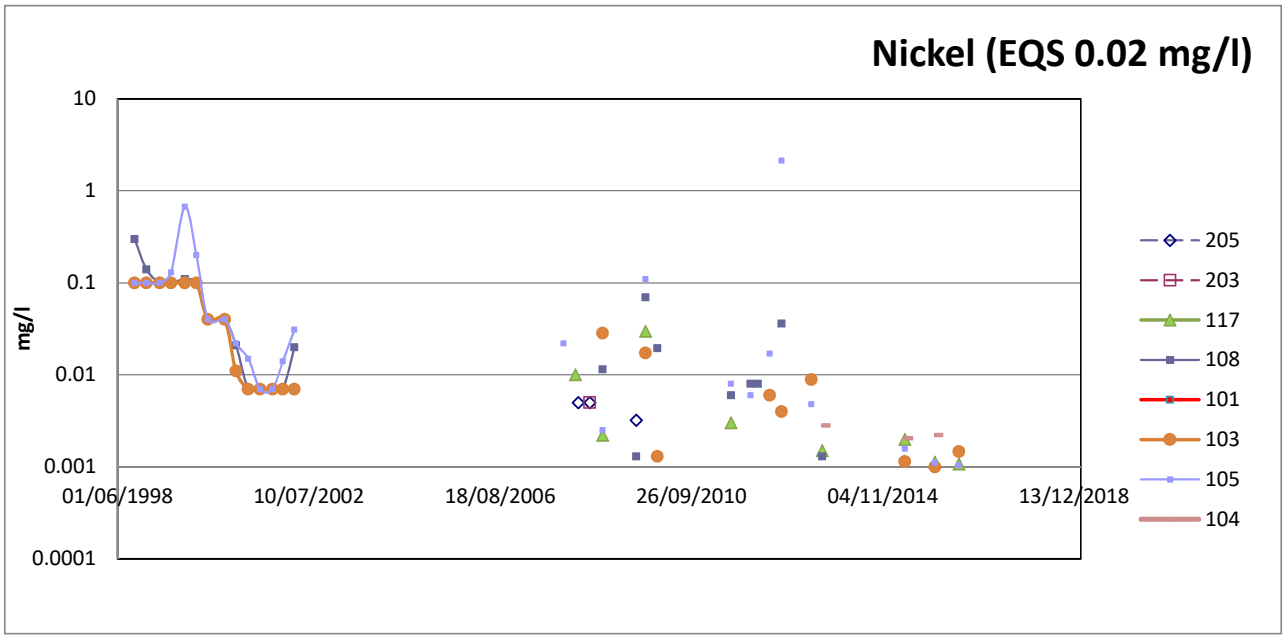
50
0
mg/l
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104

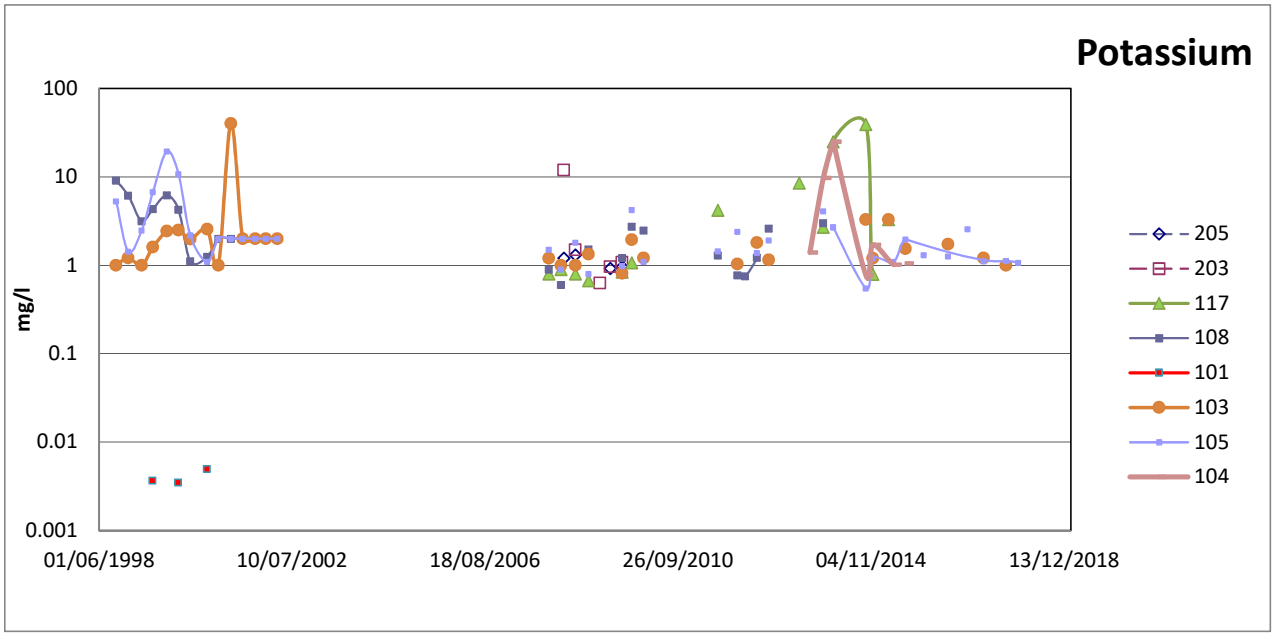

Calcium
350
300
250
200
150
100
50
0
mg/l
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104


Lead (EQS 0.072 mg/l)
100
10
1
0.1
0.01
0.001
0.0001
0.00001
mg/l
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104


Copper (EQS 0.01 mg/l)
1000
100
10
1
0.1
0.01
0.001
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104


Zinc (EQS 0.075 mg/l)
mg/l
10
1
0.1
0.01
0.001
0.0001
08/03/1997
16/04/2001
25/05/2005
03/07/2009
11/08/2013
19/09/2017
205
203
117
108
101
103
105
104


Nickel (EQS 0.02 mg/l)
mg/l
10
1
0.1
0.01
0.001
0.0001
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104


Potassium
100
10
1
0.1
0.01
0.001
mg/l
01/06/1998
10/07/2002
18/08/2006
26/09/2010
04/11/2014
13/12/2018
205
203
117
108
101
103
105
104

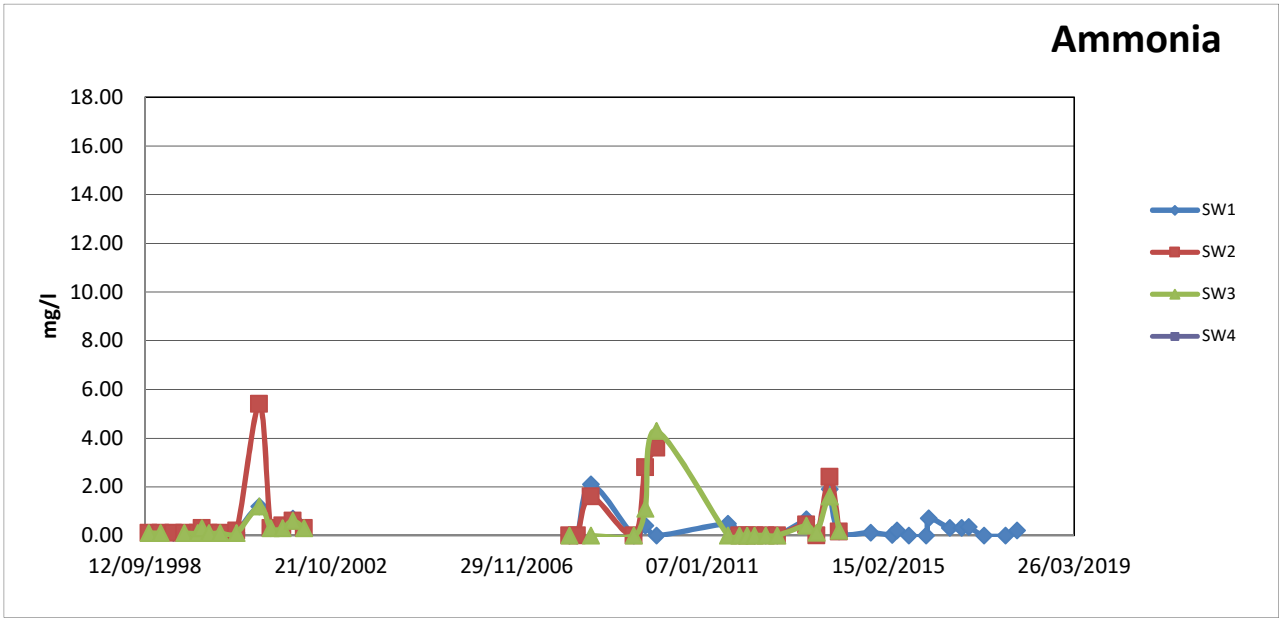
NANT Y CAWS
PHASE 1
CLOSED LANDFILL

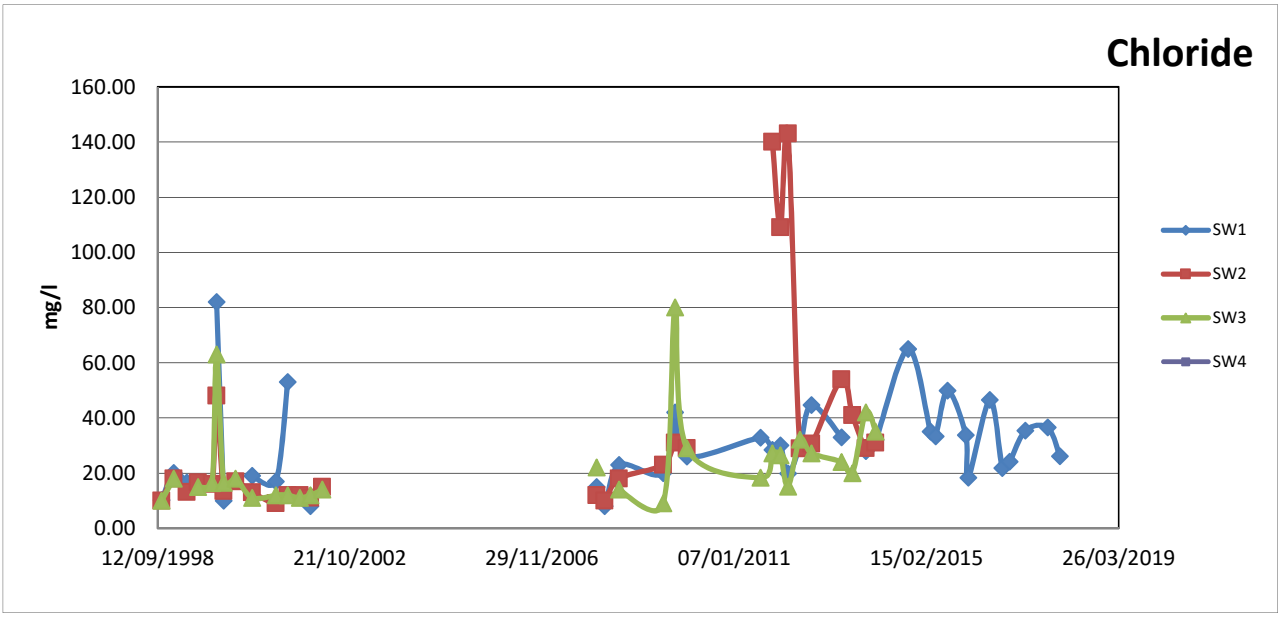
ENVIRONMENTAL
PERMIT EA WML 34183

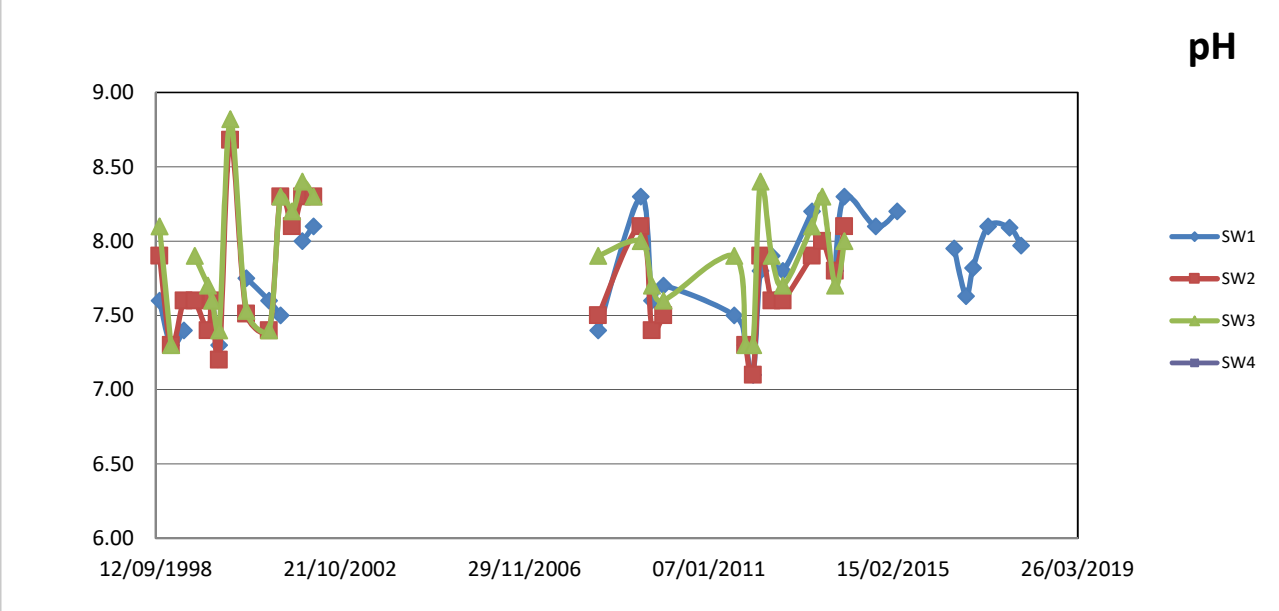
2017 Annual Environmental Monitoring Report

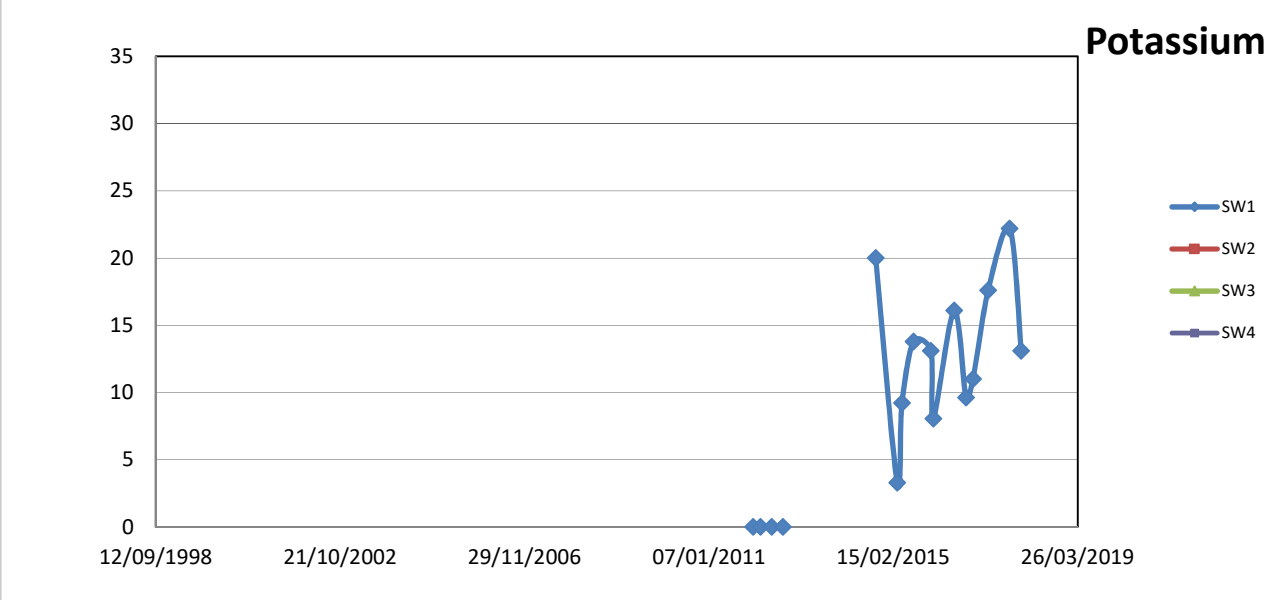
Appendix 4
Surface Water Chemistry

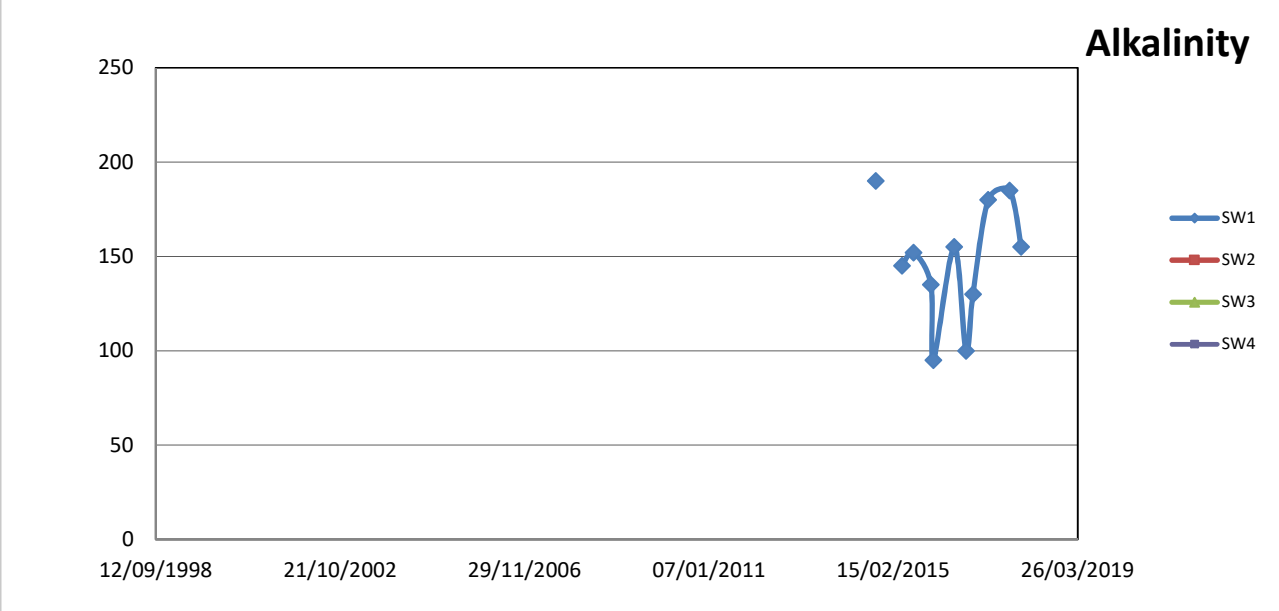
Report Number 1760r1v1d0218

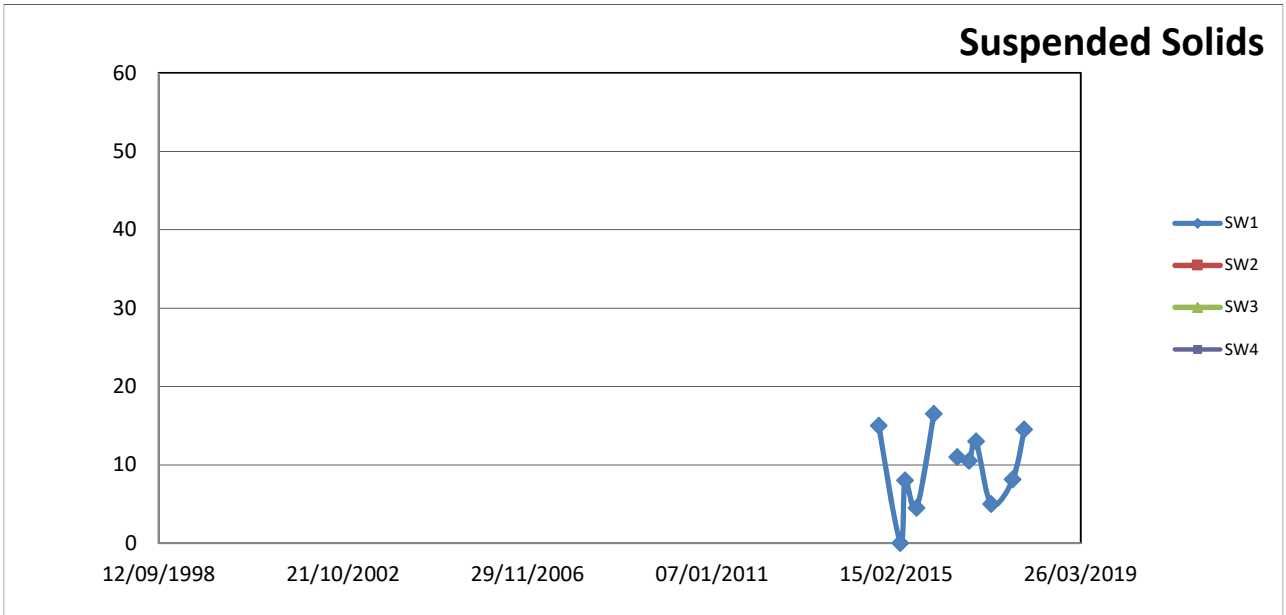

Ammonia
mg/l
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4


Chloride
mg/l
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4


pH
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4


Potassium
35
30
25
20
15
10
5
0
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4


Alkalinity
250
200
150
100
50
0
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4


Suspended Solids
60
50
40
30
20
10
0
12/09/1998
21/10/2002
29/11/2006
07/01/2011
15/02/2015
26/03/2019
SW1
SW2
SW3
SW4