

**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

**ENVIRONMENTAL
PERMIT EA WML 34183**

**2018 Annual Environmental
Monitoring Report**

Report Number 1926r1v1d0419

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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 2018.

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 Jan 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 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 gas currently undertaken by Geotechnology. 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	Needs to be clarified*
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	Needs to be clarified *
I	Run-off Discharge	Composition	Quarterly	See WP12	Geo
J	Leachate Discharge	Composition	Monthly	See WP10	Needs to be clarified *
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 understands 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 still 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 collect leachate outbreaks. It is unclear if this data is still being gathered by the new contractor.

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 2018.

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

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

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.

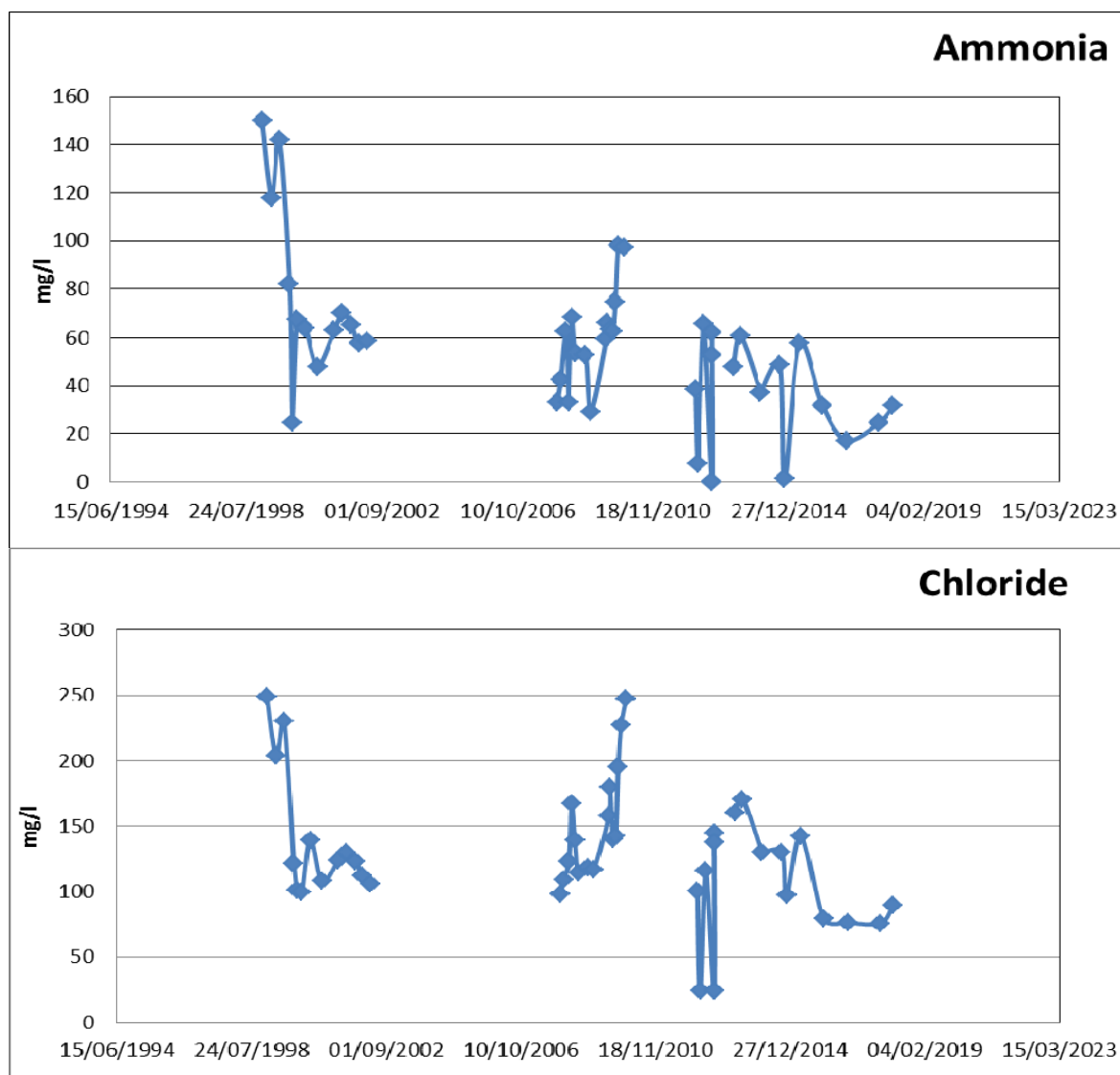
5 LEACHATE

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 1000 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 variation in ammonia and chloride is shown below.

Trace metals within the leachate are at very low concentrations, with several non-detectable. 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. In 2018, polyaromatic hydrocarbons were not detected and 0.00255 mg/l mecoprop was found.



The leachate currently has BOD values of <20 mg/l and total organic carbon (TOC) content of <50 mg/l suggesting that the biodegradable component is now low.

Given the potentially declining source concentrations, Geotechnology suggests 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. The source term is clearly declining which may present opportunities for rationalising treatment management.

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
2018 Maximum value from spot sampling at L1	31.6	89.4	30.7

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 0.26 mg/l in 2018 and potassium was less than 1 mg/l on all occasions in 2018.

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 or 2018.

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 polycyclic aromatic hydrocarbons (PAHs) were only detected at BH104 (0.3 microg/l total PAH). In 2018, similar hydrocarbons were found but at concentrations never exceeding 0.0000532 mg/l.

6.2 Assessment against Compliance Levels

The groundwater chemistry observed in 2018 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
	Maximum Value in Groundwater (2017)	0.966	0.261	25.3

7 SURFACE WATER

All the surface water results are presented in Appendix 4.

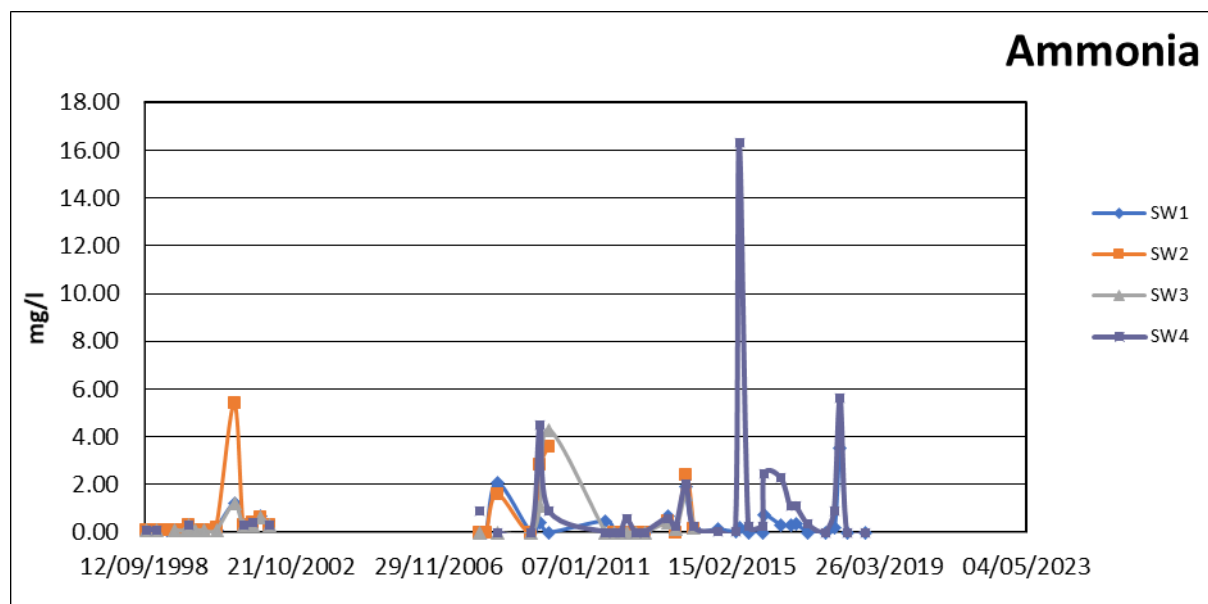
7.1 Contributions

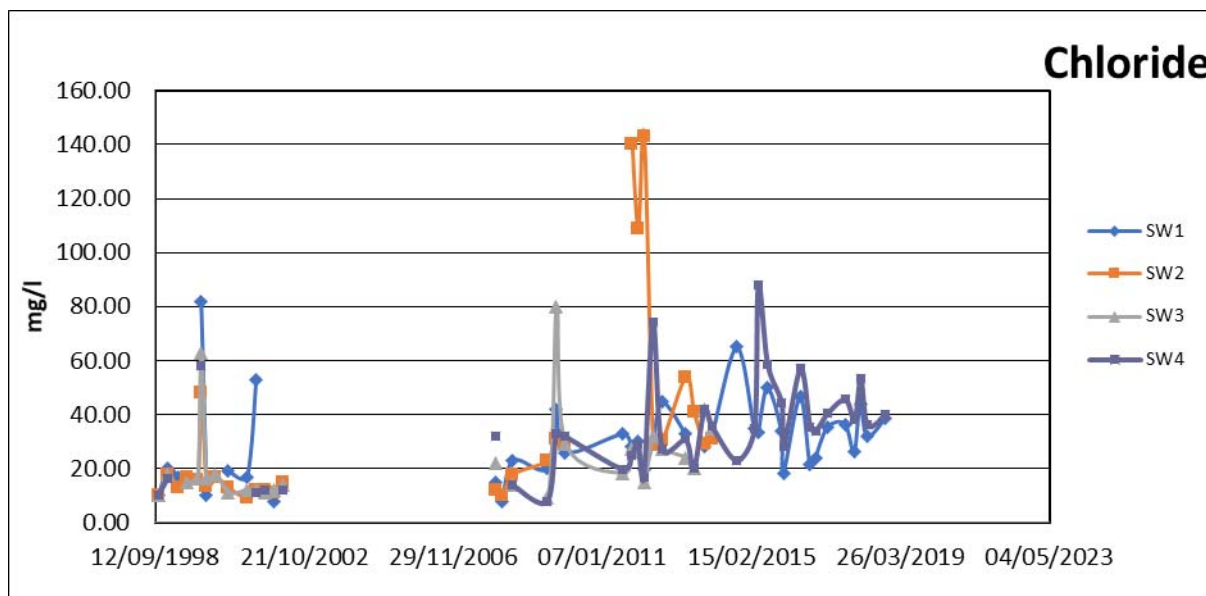
Sample points SW1, SW2, SW3 and SW4 monitor the stream that runs west to east along the southern boundary of the landfill. The location of the surface water sample points is shown on Figure 2.

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 2018 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 closed landfill.





7.3 Assessment against Control Levels

All surface water quality was below the emission limits in 2018, as summarised in Table 7-1, apart from elevated ammonia. As can be seen by reviewing the graph above, the cause of the increased ammonia at SW1 is due to elevated ammonia upstream of the landfill at SW4. Again, this is linked to the discharge from the lagoons to the west of the site.

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
Max values in 2017			
SW1	0.2	26.1	
Max value in cap runoff			5.95
Max values in 2018			
SW1	3.51	44	

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 (CO₂) 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. In 2018, less than 2.2% was the maximum concentration of carbon dioxide detected. This was found at monitoring position BH118 on eastern perimeter. Gas flow was 0.1 l/h at the time.

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

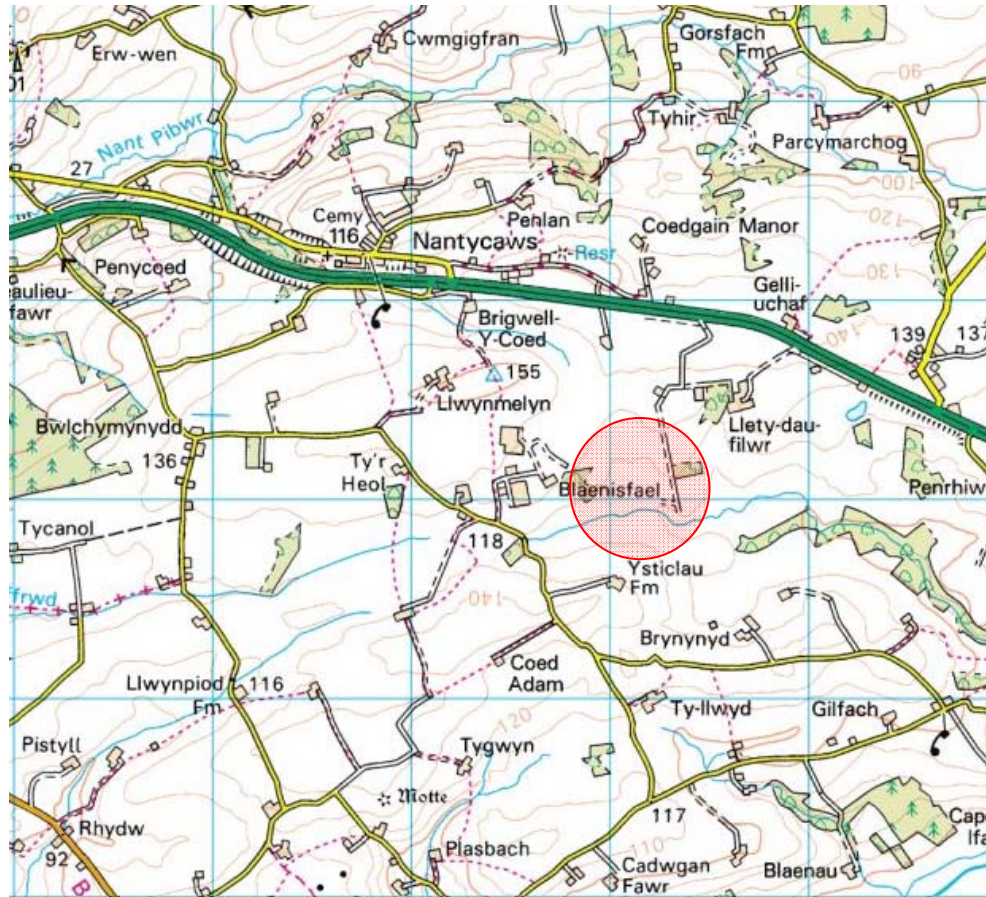
Media	Groundwater		Surface Water	Leachate	Runoff Discharge	Perimeter Gas	Leachate Discharge	French Drain
Suite ID	NYC1	NYC2	NYC3	NYC4	NYC5			
Time of Year	Q1, Q3	Q2, Q4	Q1, Q2, Q3, Q4	Q2, Q4	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Monthly	When flowing
Sampling locations	BH101, 103, 104, 105, 117		SW1 and SW4	L1	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 understands 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



Reproduced from the Ordnance Survey Land Ranger Map
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Figure 2 Available Monitoring Network

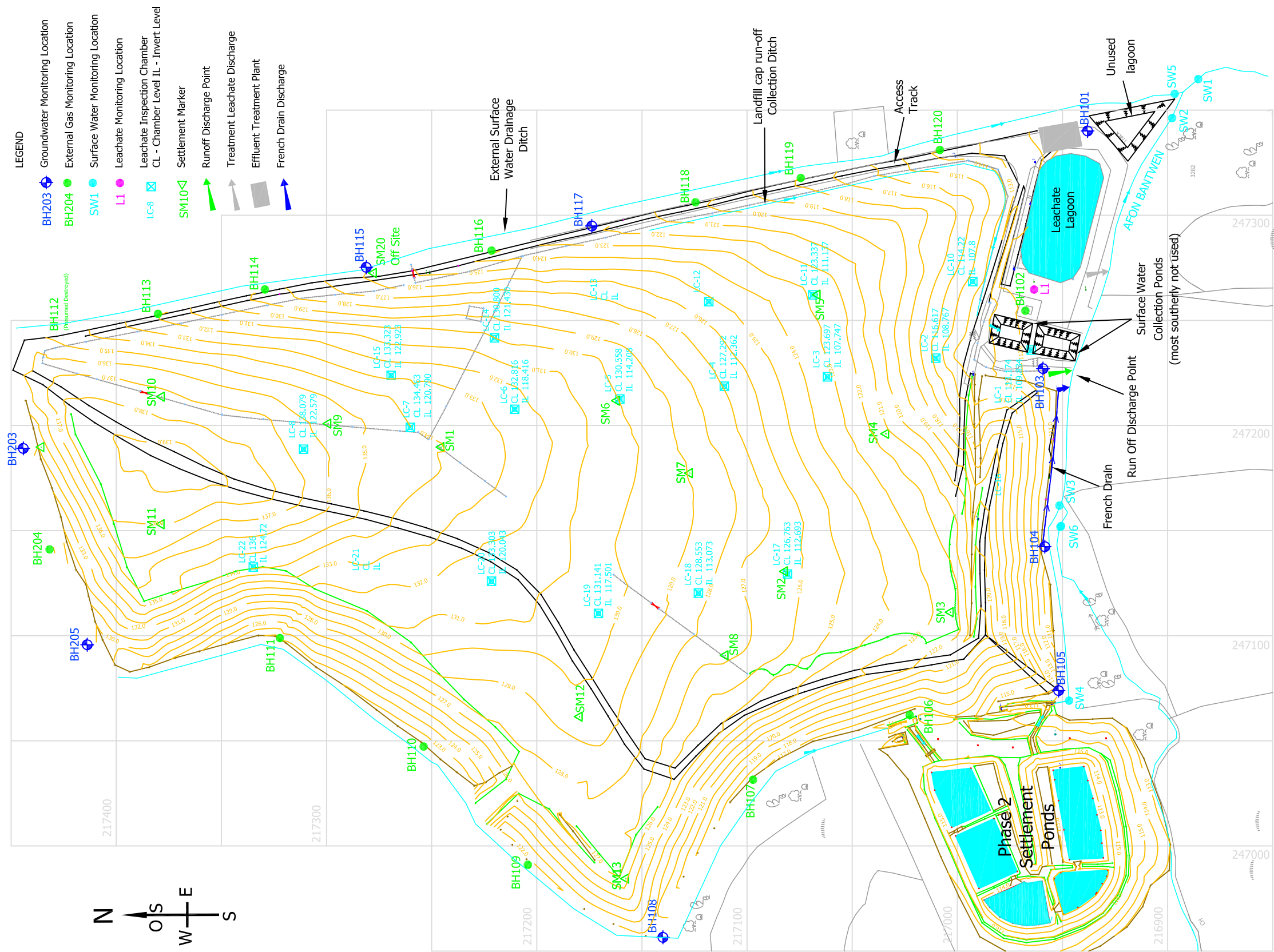
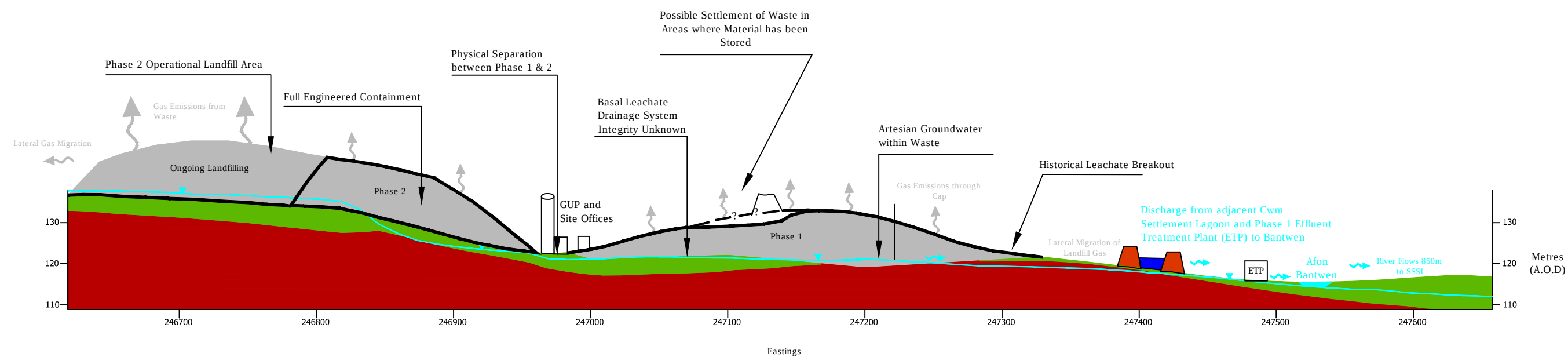


Figure 3 Conceptual Site Model



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**

**2018 Annual
Environmental
Monitoring Report**

**Appendix 1
Laboratory Certificates**

Report Number 1926r1v1d0419



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

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

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date: 20 March 2018
Customer: H_GETCNO_NAH
Sample Delivery Group (SDG): 180222-16
Your Reference:
Location: Carmarthen
Report No: 448672

This report has been revised and directly supersedes 447891 in its entirety.

We received 13 samples on Thursday February 22, 2018 and 13 of these samples were scheduled for analysis which was completed on Tuesday March 13, 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





CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17095173	NYC BH101			20/02/2018
17095166	NYC BH103			20/02/2018
17095168	NYC BH104			20/02/2018
17095169	NYC BH105			20/02/2018
17095172	NYC BH117			20/02/2018
17095161	NYC RUN OFF			20/02/2018
17095165	NYC SW1			20/02/2018
17095164	NYC SW4			20/02/2018
17095160	NYG L1			20/02/2018
17095171	WERNDDU BH10			20/02/2018
17095174	WERNDDU BH12			20/02/2018
17095170	WERNDDU SW2			20/02/2018
17095163	WERNDDU SW4			20/02/2018

Maximum Sample/Coolbox Temperature (°C) :

5.6

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.



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

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)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	17095173	17095166	17095168	17095169	17095172	17095161	17095165	17095164	17095160
						NYC BH101	NYC BH103	NYC BH104	NYC BH105	NYC BH117	NYC RUN OFF	NYC SW1	NYC SW4	NYC LI
						500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)
						500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)
Sample Type	Sample Type	Sample Type	Sample Type	Sample Type	Sample Type	GW	GW	GW	GW	GW	UNL	SW	SW	UNL
						GW	GW	GW	GW	GW	UNL	SW	SW	UNL
						GW	GW	GW	GW	GW	UNL	SW	SW	UNL
						GW	GW	GW	GW	GW	UNL	SW	SW	UNL
						GW	GW	GW	GW	GW	UNL	SW	SW	UNL
						GW	GW	GW	GW	GW	UNL	SW	SW	UNL
Acid Herbicides*	All	NDPs: 0 Tests: 1												
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1												
		NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 5												
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1												
		NDPs: 0 Tests: 4												
		NDPs: 0 Tests: 7												
Anions by Kone (w)	All	NDPs: 0 Tests: 1												
		NDPs: 0 Tests: 4												
		NDPs: 1 Tests: 7												
BOD True Total	All	NDPs: 0 Tests: 1												
COD Unfiltered	All	NDPs: 0 Tests: 1												
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 4												
		NDPs: 1 Tests: 7												

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

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)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	17095160		NYC L1						H2SO4 (ALE244)	UNL		
	17095164		NYC SW4						1000ml glass bottle (ALE220)	UNL		
	17095165		NYC SW1						500ml Plastic (ALE208)	SW		
	17095161		NYC RUN OFF						500ml Plastic (ALE208)	SW		
	17095172		NYC BH117						500ml Plastic (ALE208)	UNL		
Cyanide Comp/Free/Total/Thiocyanate	17095169		NYC BH105						500ml Plastic (ALE208)	GW		
	17095168		NYC BH104						500ml Plastic (ALE208)	GW		
	17095166		NYC BH103						500ml Plastic (ALE208)	GW		
	17095173		NYC BH101						500ml Plastic (ALE208)	GW		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1										
Mercury Dissolved	All	NDPs: 0 Tests: 1										
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1										
		NDPs: 0 Tests: 4										
		NDPs: 1 Tests: 7										
Metals by iCap-OES Unfiltered (W)	All	NDPs: 0 Tests: 1										
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 1										
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 1										
Organochlorine Pesticides (Aq)	All	NDPs: 0 Tests: 1										
Organophosphorus Pesticides (Aq)	All	NDPs: 0 Tests: 1										
Organotins in Aqueous Samples	All	NDPs: 0 Tests: 1										
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 1										
pH Value	All	NDPs: 0 Tests: 2										
		NDPs: 0 Tests: 4										



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

Results Legend



Test


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

pH Value

All

NDPs: 1
Tests: 7

X

X

X

X

X

Phosphate by Kone (w)

All

NDPs: 0
Tests: 1

X

Suspended Solids

All

NDPs: 0
Tests: 1

NDPs: 0
Tests: 2

X

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

Results Legend	Lab Sample No(s)		17095173	17095166	17095168	17095169	17095172	17095161	17095165	17095164	17095160
	Customer Sample Reference		NYC BH101	NYC BH103	NYC BH104	NYC BH105	NYC BH117	NYC RUN OFF	NYC SW1	NYC SW4	NYC L1
	AGS Reference										
	Depth (m)										
	Container		500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)	500ml Plastic (ALE208)
	Sample Type		GW	GW	GW	GW	GW	UNL	SW	SW	UNL
pH Value	All	NDPs: 1 Tests: 7	X	X	X	X	X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 1									X
Suspended Solids	All	NDPs: 0 Tests: 1						X			
		NDPs: 0 Tests: 2							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									

17095163	WERNDDU SW4			H2SO4 (ALE244)	SW														
				500ml Plastic (ALE208)	SW														
				H2SO4 (ALE244)	SW														
17095170	WERNDDU SW2			500ml Plastic (ALE208)	SW														
				500ml Plastic (ALE208)	SW														
				H2SO4 (ALE244)	CW														
17095174	WERNDDU BH12			H2SO4 (ALE244)	CW														
				500ml Plastic (ALE208)	CW	N	X												
				H2SO4 (ALE244)	CW														
17095171	WERNDDU BH10			500ml Plastic (ALE208)	CW														
				500ml Plastic (ALE208)	CW		X												
				Vial (ALE297)	UNL														
17095160	NYC L1			HNO3 Unfiltered (ALE204)	UNL														
																			X



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

Results Legend			Customer Sample Ref.		NYC SW1	NYC SW4	NYG L1	WERNDU BH10	WERNDU BH12	WERNDU SW2
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Surface Water (SW)	Surface Water (SW)	Unspecified Liquid (UNL)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
M	mCERTS accredited.				20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018	20/02/2018
aq	Aqueous / settled sample.									
diss.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.									
*	Subcontracted test.				22/02/2018	22/02/2018	22/02/2018	22/02/2018	22/02/2018	22/02/2018
**	% 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				180222-16	180222-16	180222-16	180222-16	180222-16	180222-16
(F)	Trigger breach confirmed				17095165	17095164	17095160	17095171	17095174	17095170
1-5&+5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Suspended solids, Total	<2 mg/l	TM022	165		16.5					
			#		#					
Alkalinity, Total as CaCO3	<2 mg/l	TM043	186		219		450			
			#		#					
BOD, unfiltered	<1 mg/l	TM045					2.89			
Organic Carbon, Total	<3 mg/l	TM090					12			
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	3.51		5.61		31.6	144	105	<0.2
			#		#			#	#	#
COD, unfiltered	<7 mg/l	TM107					52.2			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.513		0.576		1.01	2.61	1.78	0.628
			#		#			#	#	#
Arsenic (diss.filt)	<0.5 µg/l	TM152					0.573			
Barium (diss.filt)	<0.2 µg/l	TM152					94.8			
Beryllium (diss.filt)	<0.1 µg/l	TM152					<0.1			
Boron (diss.filt)	<5 µg/l	TM152					119			
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					2.33			
Lead (diss.filt)	<0.2 µg/l	TM152					<0.2			
Manganese (diss.filt)	<1 µg/l	TM152					306			
Nickel (diss.filt)	<0.4 µg/l	TM152					3.05			
Phosphorus (diss.filt)	<10 µg/l	TM152					<10			
Zinc (diss.filt)	<1 µg/l	TM152					8.38			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172					<100			
Mercury (diss.filt)	<0.01 µg/l	TM183					<0.01			
							2			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184					<0.05			
Sulphate	<2 mg/l	TM184					15.3			
Chloride	<2 mg/l	TM184	44		53.3		89.4	232	75.9	12.1
			#		#			#	#	#
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184					2.43			
Cyanide, Total	<0.05 mg/l	TM227					<0.05			
							2			
Cyanide, Free	<0.05 mg/l	TM227					<0.05			
							2			
Calcium (diss.filt)	<0.012 mg/l	TM228					106			
							2			
Sodium (diss.filt)	<0.076 mg/l	TM228					50			
							2			
Magnesium (diss.filt)	<0.036 mg/l	TM228					13.8			
							2			
Potassium (diss.filt)	<1 mg/l	TM228	26.8		37.6		30.7	65.5	41.7	6.62
			2 #		2 #		2	2	2	2 #
Iron (diss.filt)	<0.019 mg/l	TM228					0.0486			
							2			
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM228					341			

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CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

OC, OP Pesticides and Triazine Herb

Results Legend		Customer Sample Ref.	NYG L1					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Unspecified Liquid (UNL) 20/02/2018 22/02/2018 180222-16 17095160					
M	mCERTS 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						
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					
Chlorpyrifos 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	<0.01					
Pirimiphos-methyl	<0.01 µg/l	TM231	<0.01					
beta-Hexachlorocyclohexane (HCH / Lindane)	<0.01 µg/l	TM231	<0.01					
Chlorpyrifos	<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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SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	NYG L1					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Unspecified Liquid (UNL) 20/02/2018 22/02/2018 180222-16 17095160					
M	mCERTS 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						
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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CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

VOC MS (W)

Results Legend		Customer Sample Ref.	NYG L1					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Unspecified Liquid (UNL) 20/02/2018 22/02/2018 180222-16 17095160					
M	mCERTS 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						
Dibromofluoromethane**	%	TM208	120					
Toluene-d8**	%	TM208	100					
4-Bromofluorobenzene**	%	TM208	96					
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					

09:11:55 20/03/2018



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

VOC MS (W)

Results Legend		Customer Sample Ref.	NYG L1				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Unspecified Liquid (UNL) 20/02/2018 22/02/2018 180222-16 17095160				
M	mCERTS 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					
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				



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

Notification of NDPs (No determination possible)

Date Received : 22/02/2018 07:39:12

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
17095174	WERNDDU BH12		Conductivity (at 20 deg.C)	Sample unsuitable for analysis
17095174	WERNDDU BH12		Anions by Kone (w)	Sample unsuitable for analysis
17095174	WERNDDU BH12		Metals by iCap-OES Dissolved (W)	Sample unsuitable for analysis
17095174	WERNDDU BH12		pH Value	Sample unsuitable for analysis



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

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).



CERTIFICATE OF ANALYSIS

Validated

SDG: 180222-16
Location: Carmarthen

Client Reference:
Order Number: 1349/1760

Report Number: 448672
Superseded Report: 447891

Test Completion Dates

Lab Sample No(s)	17095173	17095166	17095168	17095169	17095172	17095161	17095165	17095164	17095160	17095171
Customer Sample Ref.	NYC BH101	NYC BH103	NYC BH104	NYC BH105	NYC BH117	NYC RUN OFF	NYC SW1	NYC SW4	NYG L1	WERNDU BH10
AGS Ref.										
Depth										
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Unspecified	Surface Water	Surface Water	Unspecified	Ground Water
Acid Herbicides*									13-Mar-2018	
Alkalinity as CaCO ₃	28-Feb-2018	28-Feb-2018	01-Mar-2018	01-Mar-2018	01-Mar-2018		01-Mar-2018	01-Mar-2018	28-Feb-2018	
Ammoniacal Nitrogen	01-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018		02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018
Anions by Kone (w)	02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018		02-Mar-2018	02-Mar-2018	02-Mar-2018	03-Mar-2018
BOD True Total									27-Feb-2018	
COD Unfiltered									01-Mar-2018	
Conductivity (at 20 deg.C)	28-Feb-2018	01-Mar-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	01-Mar-2018	01-Mar-2018	28-Feb-2018	28-Feb-2018
Cyanide Comp/Free/Total/Thiocyanate									05-Mar-2018	
Dissolved Metals by ICP-MS									02-Mar-2018	
Mercury Dissolved									28-Feb-2018	
Metals by iCap-OES Dissolved (W)	02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018		02-Mar-2018	02-Mar-2018	02-Mar-2018	02-Mar-2018
Metals by iCap-OES Unfiltered (W)									02-Mar-2018	
Mineral Oil C10-40 Aqueous (W)									28-Feb-2018	
OC, OP Pesticides and Triazine Herb									08-Mar-2018	
Organochlorine Pesticides (Aq)									09-Mar-2018	
Organophosphorus Pesticides (Aq)									09-Mar-2018	
Organotins in Aqueous Samples									28-Feb-2018	
PAH Spec MS - Aqueous (W)									28-Feb-2018	
pH Value	28-Feb-2018	27-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018	28-Feb-2018
Phosphate by Kone (w)									01-Mar-2018	
Suspended Solids						02-Mar-2018	02-Mar-2018	02-Mar-2018		
SVOC MS (W) - Aqueous									02-Mar-2018	
Total Organic and Inorganic Carbon									01-Mar-2018	
VOC MS (W)									25-Feb-2018	

Lab Sample No(s)	17095174	17095170	17095163
Customer Sample Ref.	WERNDU BH12	WERNDU SW2	WERNDU SW4
AGS Ref.			
Depth			
Type	Ground Water	Surface Water	Surface Water
Ammoniacal Nitrogen	02-Mar-2018	02-Mar-2018	02-Mar-2018
Anions by Kone (w)	03-Mar-2018	03-Mar-2018	02-Mar-2018
Conductivity (at 20 deg.C)	28-Feb-2018	28-Feb-2018	28-Feb-2018
Metals by iCap-OES Dissolved (W)	02-Mar-2018	02-Mar-2018	02-Mar-2018
pH Value	28-Feb-2018	28-Feb-2018	28-Feb-2018



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Certificate of Analysis

Report No.: 18-69524-1

Issue No.: 1

Date of Issue 12/03/2018

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.: 43204

Customer Reference: 180222-16

Quotation Reference: 180111/11

Description: 1 water sample

Date Received: 26/02/2018

Date Started: 27/02/2018

Date Completed: 12/03/2018

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.: 18-69524-1

Customer Reference: 180222-16

Customer Order No: 43204

Customer Sample No	17105679
Customer Sample ID	NYGL1
RPS Sample No	355790
Sample Type	WATER
Sampling Date	20/02/2018

Determinand	CAS No	Codes	SOP	Units	RL	
2,3,6-TBA	50-31-7	N	303	ug/l	0.02	< 0.02
benazolin	3813-05-6	N	303	ug/l	0.02	< 0.02
bentazone	25057-89-0	N	303	ug/l	0.02	0.13
bromoxynil	1689-84-5	N	303	ug/l	0.02	< 0.02
clopyralid	1702-17-6	N	303	ug/l	0.02	< 0.20
2-methyl-4,6-dinitrophenol (DNOC)	534-52-1	N	303	ug/l	0.02	< 0.02
dicamba	1918-00-9	N	303	ug/l	0.02	< 0.02
ioxynil	1689-83-4	N	303	ug/l	0.02	< 0.02
MCPB	94-81-5	N	303	ug/l	0.02	< 0.02
mecoprop (MCP)	93-65-2	N	303	ug/l	0.02	2.55
pentachlorophenol (PCP)	87-86-5	N	303	ug/l	0.02	< 0.02



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Report No.: 18-69524-1
Customer Reference: 180222-16
Customer Order No: 43204

Comments

RPS Sample Number	Customer Number	Sample Comments
355790	17105679	Sample extract for Clopyralid was diluted (1:10) because of the nature of the sample matrix. Reporting limit has been raised to 0.2 ug/l. The result for MCPP was outside the normal dynamic range of the method and it was necessary to dilute the extract (1:10) in order to bring the response within the calibrated range.



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Deviating Samples

Report No.: 18-69524-1

Customer Reference: 180222-16

Customer Order No: 43204

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-submission may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating Sample	Reason for Sample Deviation
355790	17105679		20/02/2018	500ml green glass bottle	No	



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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



CERTIFICATE OF ANALYSIS

SDG:	180222-16	Client Reference:	448672
Location:	Carmarthen	Order Number:	1349/1760
		Superseded Report:	447891

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) 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 Dimethylphenol, 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 preservation 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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West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date: 22 May 2018
Customer: H_GETCNO_NAH
Sample Delivery Group (SDG): 180502-48
Your Reference:
Location: Carmarthen
Report No: 457073

This report has been revised and directly supersedes 456482 in its entirety.

We received 10 samples on Wednesday May 02, 2018 and 10 of these samples were scheduled for analysis which was completed on Tuesday May 22, 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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen

Client Reference:
Order Number: 1353/1760

Report Number: 457073
Superseded Report: 456482

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17484399	BH101			30/04/2018
17484397	BH103			30/04/2018
17484396	BH104			30/04/2018
17484395	BH105			30/04/2018
17484400	BH117			30/04/2018
17484405	RUNOFF			30/04/2018
17484404	SW1NYC			30/04/2018
17484401	SW4NYC			30/04/2018
17484406	SW2WERN			30/04/2018
17484409	SW4WERN			30/04/2018

Maximum Sample/Coolbox Temperature (°C) :

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.

9.4

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.



CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen

Client Reference:
Order Number: 1353/1760

Report Number: 457073
Superseded Report: 456482

Results Legend			Customer Sample Ref.		BH101	BH103	BH104	BH105	BH117	RUNOFF
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Surface Water (SW)
M	mCERTS accredited.				30/04/2018	30/04/2018	30/04/2018	30/04/2018	30/04/2018	30/04/2018
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				02/05/2018	02/05/2018	02/05/2018	02/05/2018	02/05/2018	02/05/2018
(F)	Trigger breach confirmed				180502-48	180502-48	180502-48	180502-48	180502-48	180502-48
1-5&*\$@	Sample deviation (see appendix)				17484399	17484397	17484396	17484395	17484400	17484405
Component	LOD/Units	Method								
2,4,5-Trichlorophenol (2,4,5-T)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
2,4,5-TP (fenoprop, silvex)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
2,4-Dichlorophenoxy acetic acid (2,4-D)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
4-(2,4-Dichlorophenoxy) butyric acid (2,4-D)*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
2,4-DP (isomers)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
4-CPP*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Acifluorfen*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Aminopyralide*	<0.05 µg/l	SUB			<0.05	<0.05	<0.05	<0.05	<0.05	
Bentazone*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Bromoxynil*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Clopyralid*	<0.03 µg/l	SUB			<0.03	<0.03	<0.03	<0.03	<0.03	
Dicamba*	<0.03 µg/l	SUB			<0.03	<0.03	<0.03	<0.03	<0.03	
Diclofop*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
Dinoseb*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
Dinoterb*	<0.04 µg/l	SUB			<0.04	<0.04	<0.04	<0.04	<0.04	
DNOC*	<0.03 µg/l	SUB			<0.03	<0.03	<0.03	<0.03	<0.03	
Fluroxypyr*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
Ioxynil*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
2-Methyl-4-chlorophenoxyacetic acid (MCPA)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
4-(4-Chloro-o-tolylxy) butyric acid (MCPB)*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
MCPB (isomers)*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Picloram*	<0.02 µg/l	SUB			<0.02	<0.02	<0.02	<0.02	<0.02	
Propoxycarbazone-sodium*	<0.01 µg/l	SUB			<0.01	<0.01	<0.01	<0.01	<0.01	
Triclopyr*	<0.03 µg/l	SUB			<0.03	<0.03	<0.03	<0.03	<0.03	
Triclosan*	<0.05 µg/l	SUB			<0.05	<0.05	<0.05	<0.05	<0.05	
Suspended solids, Total	<2 mg/l	TM022								2.5
Alkalinity, Total as CaCO3	<2 mg/l	TM043			245	230	330	290	290	#
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099			<0.2	<0.2	<0.2	<0.2	0.261	#
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120			0.43	0.398	0.499	0.468	0.512	#
Arsenic (diss.filt)	<0.5 µg/l	TM152			<0.5	0.973	0.964	0.681	0.59	#
Barium (diss.filt)	<0.2 µg/l	TM152			123	56.5	15.5	58.9	87.2	#
Beryllium (diss.filt)	<0.1 µg/l	TM152			<0.1	<0.1	<0.1	<0.1	<0.1	#
Boron (diss.filt)	<10 µg/l	TM152			<10	<10	<10	<10	<10	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen

Client Reference:
Order Number: 1353/1760

Report Number: 457073
Superseded Report: 456482

VOC MS (W)

Results Legend			Customer Sample Ref.		BH101	BH103	BH104	BH105		
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s)		Ground Water (GW) 30/04/2018 180502-48 17484399	Ground Water (GW) 30/04/2018 180502-48 17484397	Ground Water (GW) 30/04/2018 180502-48 17484396	Ground Water (GW) 30/04/2018 180502-48 17484395		
M	mCERTS 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&5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Dibromofluoromethane**	%	TM208			112	115	113	109		
Toluene-d8**	%	TM208			98.7	99.8	100	100		
4-Bromofluorobenzene**	%	TM208			99.8	97.4	99	99.3		
Dichlorodifluoromethane	<1 µg/l	TM208			<1	<1	<1	<1		
Chloromethane	<1 µg/l	TM208			<1	<1	<1	<1		
Vinyl chloride	<1 µg/l	TM208			<1	<1	<1	<1		
Bromomethane	<1 µg/l	TM208			<1	<1	<1	<1		
Chloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
Trichlorofluoromethane	<1 µg/l	TM208			<1	<1	<1	<1		
1,1-Dichloroethene	<1 µg/l	TM208			<1	<1	<1	<1		
Carbon disulphide	<1 µg/l	TM208			<1	<1	<1	<1		
Dichloromethane	<3 µg/l	TM208			<3	<3	<3	<3		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208			<1	<1	<1	<1		
trans-1,2-Dichloroethene	<1 µg/l	TM208			<1	<1	<1	<1		
1,1-Dichloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
cis-1,2-Dichloroethene	<1 µg/l	TM208			<1	<1	<1	<1		
2,2-Dichloropropane	<1 µg/l	TM208			<1	<1	<1	<1		
Bromochloromethane	<1 µg/l	TM208			<1	<1	<1	<1		
Chloroform	<1 µg/l	TM208			<1	<1	<1	<1		
1,1,1-Trichloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
1,1-Dichloropropene	<1 µg/l	TM208			<1	<1	<1	<1		
Carbontetrachloride	<1 µg/l	TM208			<1	<1	<1	<1		
1,2-Dichloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
Benzene	<1 µg/l	TM208			<1	<1	<1	<1		
Trichloroethene	<1 µg/l	TM208			<1	<1	<1	<1		
1,2-Dichloropropane	<1 µg/l	TM208			<1	<1	<1	<1		
Dibromomethane	<1 µg/l	TM208			<1	<1	<1	<1		
Bromodichloromethane	<1 µg/l	TM208			<1	<1	<1	<1		
cis-1,3-Dichloropropene	<1 µg/l	TM208			<1	<1	<1	<1		
Toluene	<1 µg/l	TM208			<1	<1	<1	<1		
trans-1,3-Dichloropropene	<1 µg/l	TM208			<1	<1	<1	<1		
1,1,2-Trichloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
1,3-Dichloropropane	<1 µg/l	TM208			<1	<1	<1	<1		



CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen

Client Reference:
Order Number: 1353/1760

Report Number: 457073
Superseded Report: 456482

VOC MS (W)

Results Legend			Customer Sample Ref.		BH101	BH103	BH104	BH105		
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
M	mCERTS accredited.				30/04/2018	30/04/2018	30/04/2018	30/04/2018		
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				02/05/2018	02/05/2018	02/05/2018	02/05/2018		
(F)	Trigger breach confirmed				180502-48	180502-48	180502-48	180502-48		
1-5&*\$@	Sample deviation (see appendix)				17484399	17484397	17484396	17484395		
Component	LOD/Units	Method								
Tetrachloroethene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Dibromochloromethane	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2-Dibromoethane	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Chlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208			<1	<1	<1	<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		
					#	#	#	#		
Styrene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Bromoform	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Isopropylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2,3-Trichloropropane	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Bromobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Propylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
2-Chlorotoluene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,3,5-Trimethylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
4-Chlorotoluene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
tert-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2,4-Trimethylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
sec-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
4-iso-Propyltoluene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,3-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,4-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
n-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208			<1	<1	<1	<1		
1,2,4-Trichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Hexachlorobutadiene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
Naphthalene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		
1,2,3-Trichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1		
					#	#	#	#		



CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen**Client Reference:**
Order Number: 1353/1760**Report Number:** 457073
Superseded Report: 456482

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
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
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 180502-48
Location: Carmarthen

Client Reference:
Order Number: 1353/1760

Report Number: 457073
Superseded Report: 456482

Test Completion Dates

Lab Sample No(s)	17484399	17484397	17484396	17484395	17484400	17484405	17484404	17484401	17484406	17484409
Customer Sample Ref.	BH101	BH103	BH104	BH105	BH117	RUNOFF	SW1NYC	SW4NYC	SW2WERN	SW4WERN
AGS Ref.										
Depth										
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Acid Herbicides by LCMS (W)*	22-May-2018	22-May-2018	22-May-2018	22-May-2018	22-May-2018					
Alkalinity as CaCO ₃	08-May-2018	08-May-2018	08-May-2018	08-May-2018	11-May-2018		08-May-2018	08-May-2018	11-May-2018	11-May-2018
Ammoniacal Nitrogen	09-May-2018	09-May-2018	10-May-2018	10-May-2018	14-May-2018		09-May-2018	09-May-2018	09-May-2018	09-May-2018
Anions by Kone (w)	10-May-2018	10-May-2018	10-May-2018	10-May-2018	14-May-2018		10-May-2018	10-May-2018	10-May-2018	10-May-2018
Conductivity (at 20 deg.C)	08-May-2018	08-May-2018	08-May-2018	08-May-2018	10-May-2018	04-May-2018	04-May-2018	08-May-2018	04-May-2018	04-May-2018
Dissolved Metals by ICP-MS	10-May-2018	14-May-2018	14-May-2018	14-May-2018	14-May-2018		10-May-2018	10-May-2018	10-May-2018	10-May-2018
Mercury Dissolved	09-May-2018	09-May-2018	09-May-2018	09-May-2018	16-May-2018					
PAH Spec MS - Aqueous (W)	08-May-2018	09-May-2018	09-May-2018	09-May-2018	14-May-2018	16-May-2018				
pH Value	08-May-2018	08-May-2018	08-May-2018	08-May-2018	11-May-2018	04-May-2018	04-May-2018	08-May-2018	04-May-2018	04-May-2018
Phosphate by Kone (w)	11-May-2018	11-May-2018	15-May-2018	15-May-2018	15-May-2018					
Suspended Solids						04-May-2018	04-May-2018	04-May-2018	10-May-2018	10-May-2018
Total Metals by ICP-MS	11-May-2018	11-May-2018	10-May-2018	10-May-2018	15-May-2018					
VOC MS (W)	04-May-2018	04-May-2018	04-May-2018	04-May-2018						



CERTIFICATE OF ANALYSIS

Work Order	: PR1844585	Issue Date	: 18-May-2018
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Reporting	Contact	: Client Service
Address	: Unit 7-8 Hawarden Business Park Manor Road, Hawarden CH5 3US Deeside United Kingdom	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: euhdnsbconresults@ALSGlobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Facsimile	: ----	Facsimile	: +420 284 081 635
Project	: 180502-48	Page	: 1 of 3
Order number	:	Date Samples Received	: 11-May-2018
C-O-C number	: ----	Quote number	: PR2017ALSAL-GB0002 (CZ-251-17-0022)
Site	: ----	Date of test	: 16-May-2018 - 18-May-2018
Sampled by	: client	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory.
The laboratory declares that the test results relate only to the listed samples.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2005

Signatories

Zdeněk Jiráček

Position

Environmental Business Unit
Manager





Analytical Results

Sub-Matrix: GROUNDWATER

Client sample ID

Laboratory sample ID

Client sampling date / time

				17526818 BH101		17526786 BH103		17526785 BH104	
				PR1844585-001		PR1844585-002		PR1844585-003	
				30-Apr-2018 00:00		30-Apr-2018 00:00		30-Apr-2018 00:00	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
Pesticides									
2,3,6-Trichlorobenzoic acid	W-PESLMS04	0.100	µg/L	<0.100	----	<0.100	----	<0.100	----
2,4,5-T	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
2,4,5-TP	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
2,4-D	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
2,4-DB	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
2,4-DP (isomers)	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
4-CPP	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Acifluorfen	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Aminopyralide	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	<0.050	----
Benazolin	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	<0.050	----
Bentazone	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Bromoxynil	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Clopyralid	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	<0.030	----
Dicamba	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	<0.030	----
Diclofop	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
Dinoseb	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
Dinoterb	W-PESLMS04	0.040	µg/L	<0.040	----	<0.040	----	<0.040	----
DNOC	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	<0.030	----
Fluroxypyr	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
Ioxynil	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
MCPA	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
MCPB	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
MCPP (isomers)	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Picloram	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	<0.020	----
Propoxycarbazone-sodium	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	<0.010	----
Triclopyr	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	<0.030	----
Triclosan	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	<0.050	----

Sub-Matrix: GROUNDWATER

Client sample ID

Laboratory sample ID

Client sampling date / time

				17526830 BH105		17526812 BH117		-----	
				PR1844585-004		PR1844585-005		-----	
				30-Apr-2018 00:00		30-Apr-2018 00:00		-----	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
Pesticides									
2,3,6-Trichlorobenzoic acid	W-PESLMS04	0.100	µg/L	<0.100	----	<0.100	----	-----	----
2,4,5-T	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
2,4,5-TP	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
2,4-D	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
2,4-DB	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	-----	----
2,4-DP (isomers)	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
4-CPP	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
Acifluorfen	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
Aminopyralide	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	-----	----
Benazolin	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	-----	----
Bentazone	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
Bromoxynil	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	-----	----
Clopyralid	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	-----	----
Dicamba	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	-----	----
Diclofop	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	-----	----
Dinoseb	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	-----	----
Dinoterb	W-PESLMS04	0.040	µg/L	<0.040	----	<0.040	----	-----	----
DNOC	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	-----	----
Fluroxypyr	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	-----	----



Sub-Matrix: GROUNDWATER

Client sample ID

17526830
BH105

17526812
BH117

Laboratory sample ID

PR1844585-004

PR1844585-005

Client sampling date / time

30-Apr-2018 00:00

30-Apr-2018 00:00

Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
Pesticides - Continued									
Ioxynil	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	----	----
MCPA	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	----	----
MCPB	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	----	----
MCPP (isomers)	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	----	----
Picloram	W-PESLMS04	0.020	µg/L	<0.020	----	<0.020	----	----	----
Propoxycarbazone-sodium	W-PESLMS04	0.010	µg/L	<0.010	----	<0.010	----	----	----
Triclopyr	W-PESLMS04	0.030	µg/L	<0.030	----	<0.030	----	----	----
Triclosan	W-PESLMS04	0.050	µg/L	<0.050	----	<0.050	----	----	----

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, delivery date in brackets without a time component will be displayed instead. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor k = 2, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty

The end of result part of the certificate of analysis

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: Na Harfe 336/9 Prague 9 - Vysocany Czech Republic 190 00	
W-PESLMS04	CZ_SOP_D06_03_182.A (DIN 38407-35, CEN/TS 15968) Determination of acidic herbicides, drug residues and other pollutants by liquid chromatography method with MS/MS detection and calculation of acidic herbicides, drug residues and other pollutants sums from measured values. The method has been modified within a flexible scope of accreditation, see Certificate of Accreditation No. 610/2017 dated 16th October 2017. It refers to parameters 2,3,6-Trichlorobenzoic acid, 2-Methylsulfonyl-4-trifluoromethyl benzoic acid, 6-Chloroquinoxaline-2,3-diol, Benazolin, Metribuzin-desamino diketo, Metribuzin-diketo, Paraxanthine, Salicylic acid.

A ** symbol preceding any method indicates laboratory or subcontractor non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited. Please refer to General Comment section on front page for information. If the report contains subcontracted analysis, those are made in a subcontracted laboratory outside the laboratories ALS Czech Republic, s.r.o.

The calculation methods of summation parameters are available on request in the client service.



CERTIFICATE OF ANALYSIS

SDG:	180502-48	Client Reference:		Report Number:	457073
Location:	Carmarthen	Order Number:	1353/1760	Superseded Report:	456482

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) 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 Dimethylphenol, 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 preservation 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).

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

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date: 09 November 2018
Customer: H_GETCNO_NAH
Sample Delivery Group (SDG): 181102-148
Your Reference:
Location: Carmarthen
Report No: 480418

We received 12 samples on Friday November 02, 2018 and 12 of these samples were scheduled for analysis which was completed on Friday November 09, 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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 181102-148
Location: Carmarthen

Client Reference:
Order Number:

Report Number: 480418
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18659675	BH101			31/10/2018
18659674	BH103			31/10/2018
18659673	BH104			31/10/2018
18659672	BH105			31/10/2018
18659676	BH117			31/10/2018
18659680	LAGOON IN			31/10/2018
18659681	LAGOON OUT			31/10/2018
18659679	RUNOFF			31/10/2018
18659678	SW1 NYC			31/10/2018
18659677	SW4 NYC			31/10/2018
18659682	SW2 WERN			31/10/2018
18659683	SW4 WERN			31/10/2018

Maximum Sample/Coolbox Temperature (°C) :

8.2

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.



CERTIFICATE OF ANALYSIS

Validated

SDG: 181102-148
Location: Carmarthen

Client Reference:
Order Number:

Report Number: 480418
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
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
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
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 Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 181102-148
Location: Carmarthen

Client Reference:
Order Number:

Report Number: 480418
Superseded Report:

Test Completion Dates

Lab Sample No(s)	18659675	18659674	18659673	18659672	18659676	18659680	18659681	18659679	18659678	18659677
Customer Sample Ref.	BH101	BH103	BH104	BH105	BH117	LAGOON IN	LAGOON OUT	RUNOFF	SW1 NYC	SW4 NYC
AGS Ref.										
Depth										
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Alkalinity as CaCO ₃	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	06-Nov-2018	06-Nov-2018	06-Nov-2018		08-Nov-2018	08-Nov-2018
Ammoniacal Nitrogen	07-Nov-2018	07-Nov-2018	09-Nov-2018	07-Nov-2018	09-Nov-2018	09-Nov-2018	09-Nov-2018		07-Nov-2018	07-Nov-2018
Anions by Kone (w)	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	09-Nov-2018	09-Nov-2018	08-Nov-2018		08-Nov-2018	08-Nov-2018
Conductivity (at 20 deg.C)	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018
Dissolved Metals by ICP-MS	08-Nov-2018	08-Nov-2018	08-Nov-2018	09-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018		09-Nov-2018	08-Nov-2018
pH Value	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	07-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018	08-Nov-2018
Suspended Solids						06-Nov-2018	06-Nov-2018	07-Nov-2018	07-Nov-2018	07-Nov-2018

Lab Sample No(s)	18659682	18659683
Customer Sample Ref.	SW2 WERN	SW4 WERN
AGS Ref.		
Depth		
Type	Surface Water	Surface Water
Alkalinity as CaCO ₃	08-Nov-2018	06-Nov-2018
Ammoniacal Nitrogen	09-Nov-2018	09-Nov-2018
Anions by Kone (w)	08-Nov-2018	09-Nov-2018
Conductivity (at 20 deg.C)	08-Nov-2018	08-Nov-2018
Dissolved Metals by ICP-MS	09-Nov-2018	09-Nov-2018
pH Value	08-Nov-2018	08-Nov-2018
Suspended Solids	07-Nov-2018	06-Nov-2018



CERTIFICATE OF ANALYSIS

SDG: 181102-148
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Order Number:

Report Number: 480418
Superseded Report:

Appendix

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

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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 preservation 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.

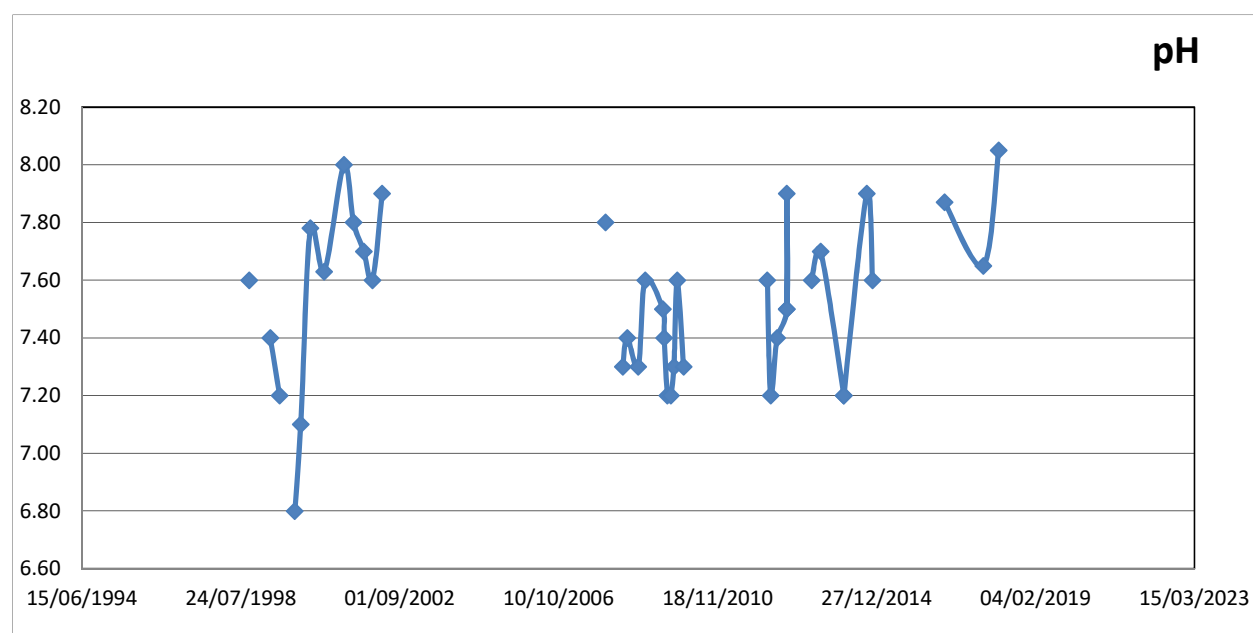
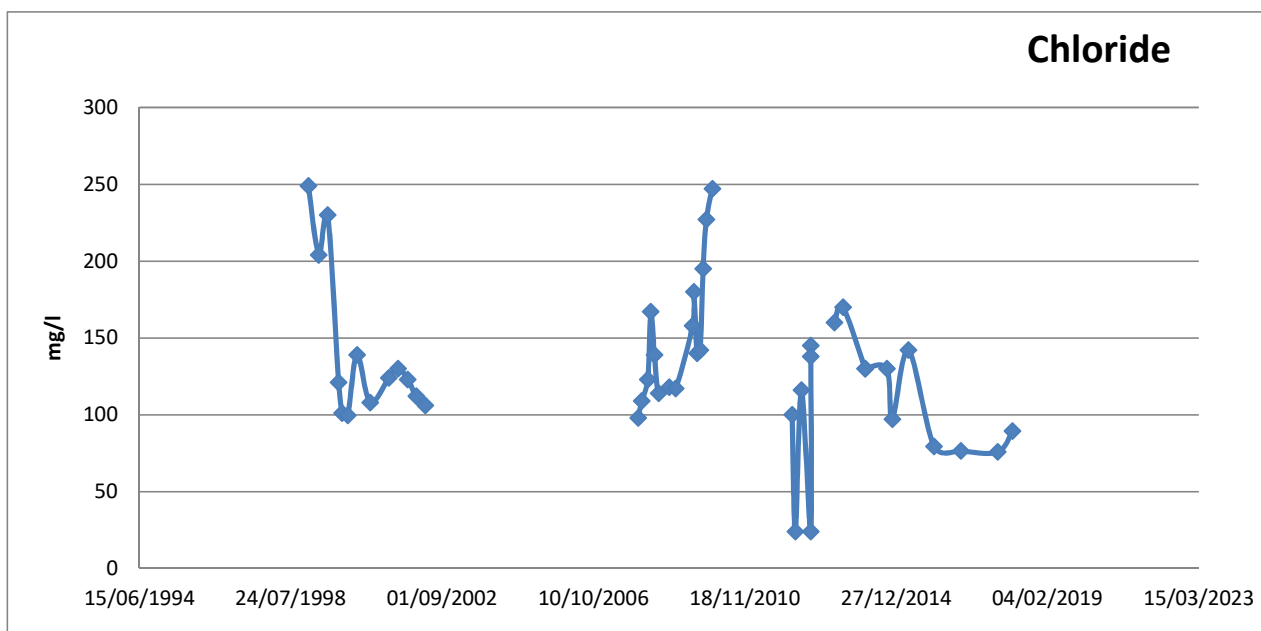
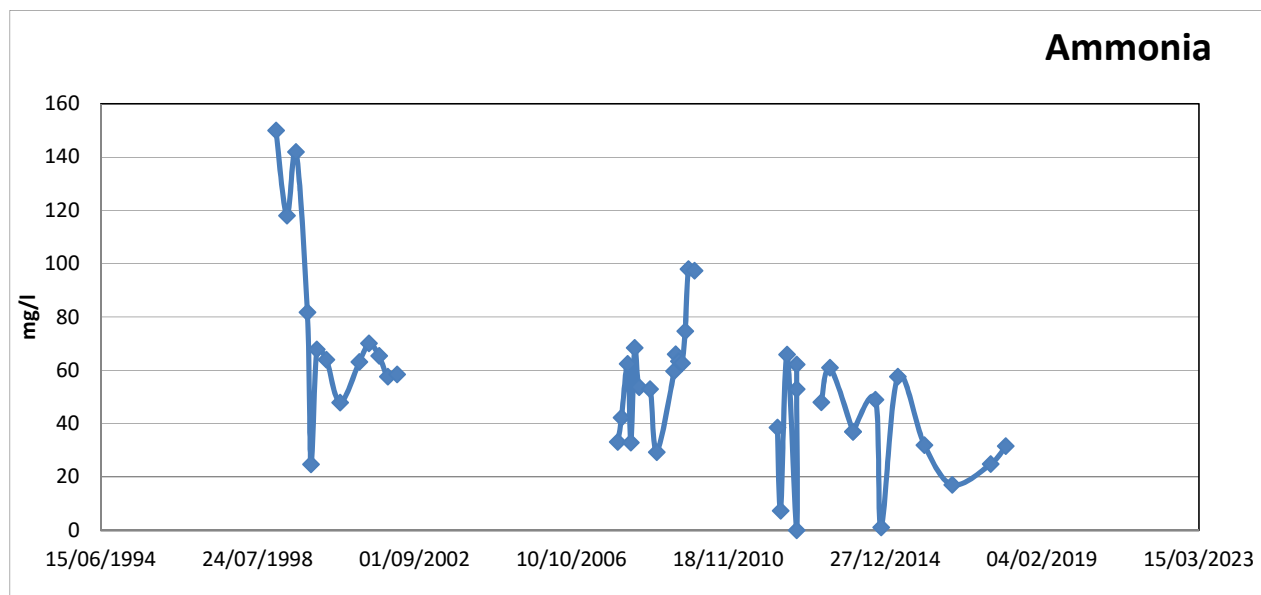
The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

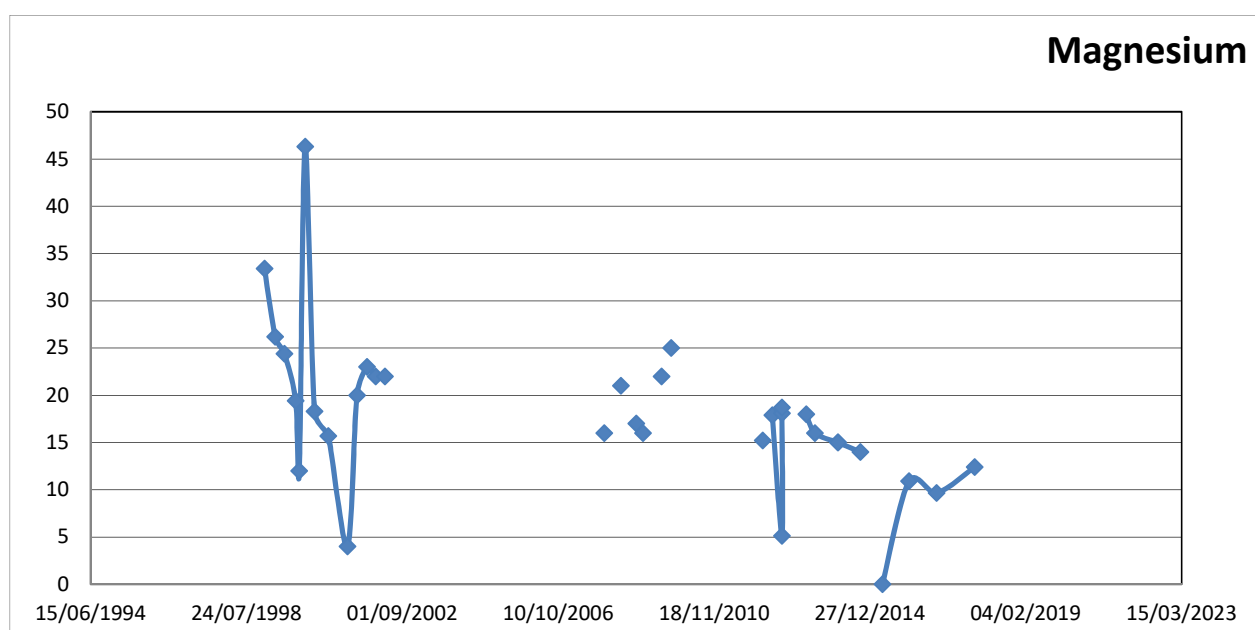
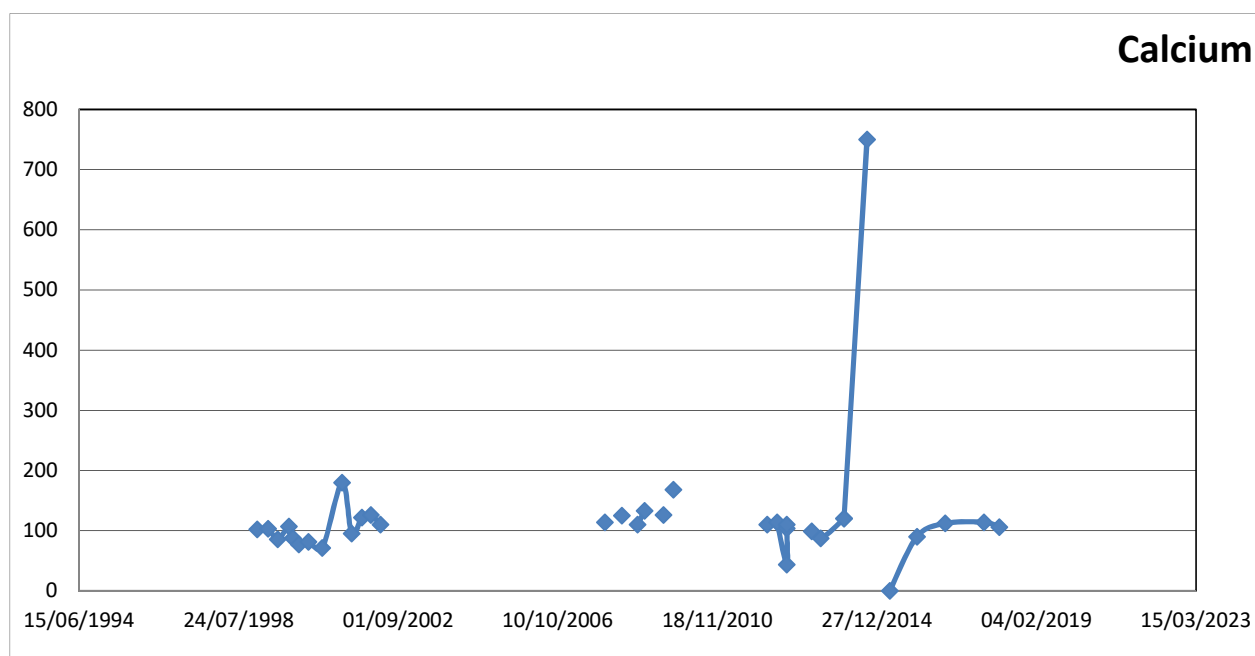
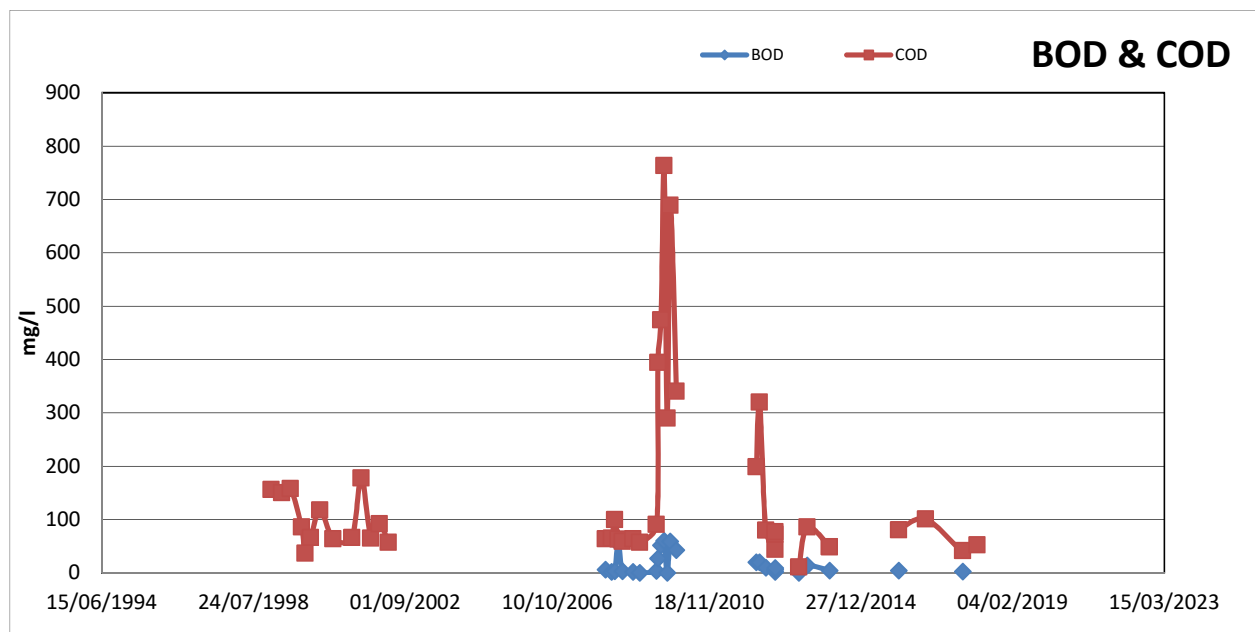
**NANT Y CAWS
PHASE 1
CLOSED LANDFILL**

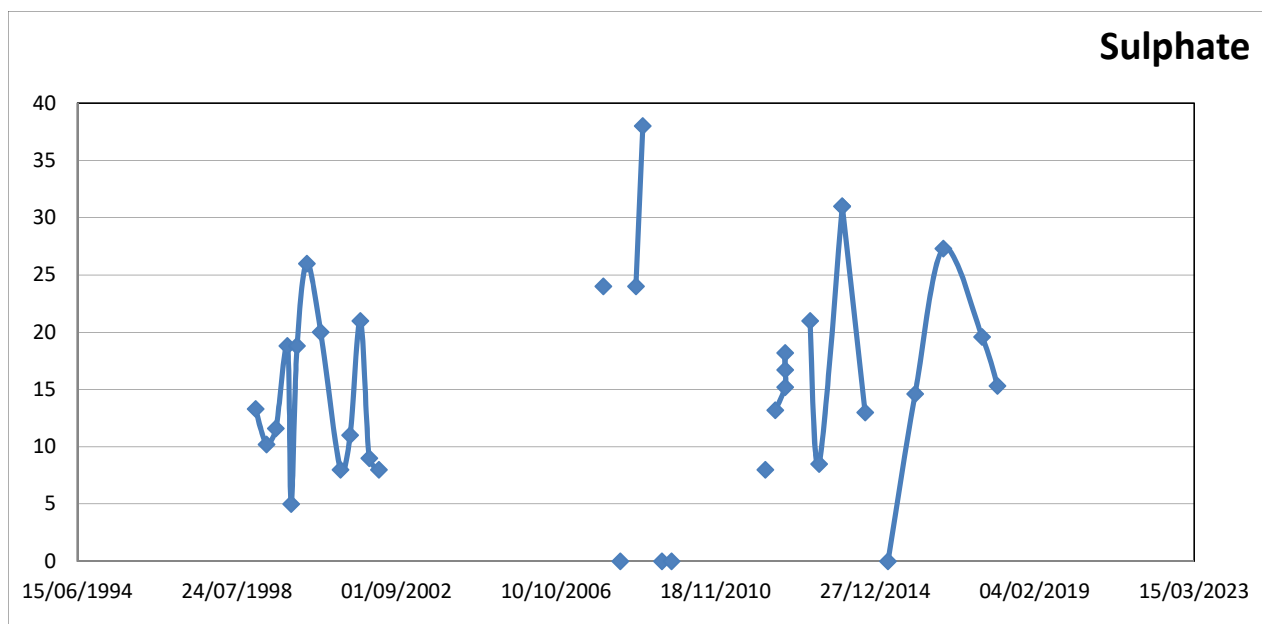
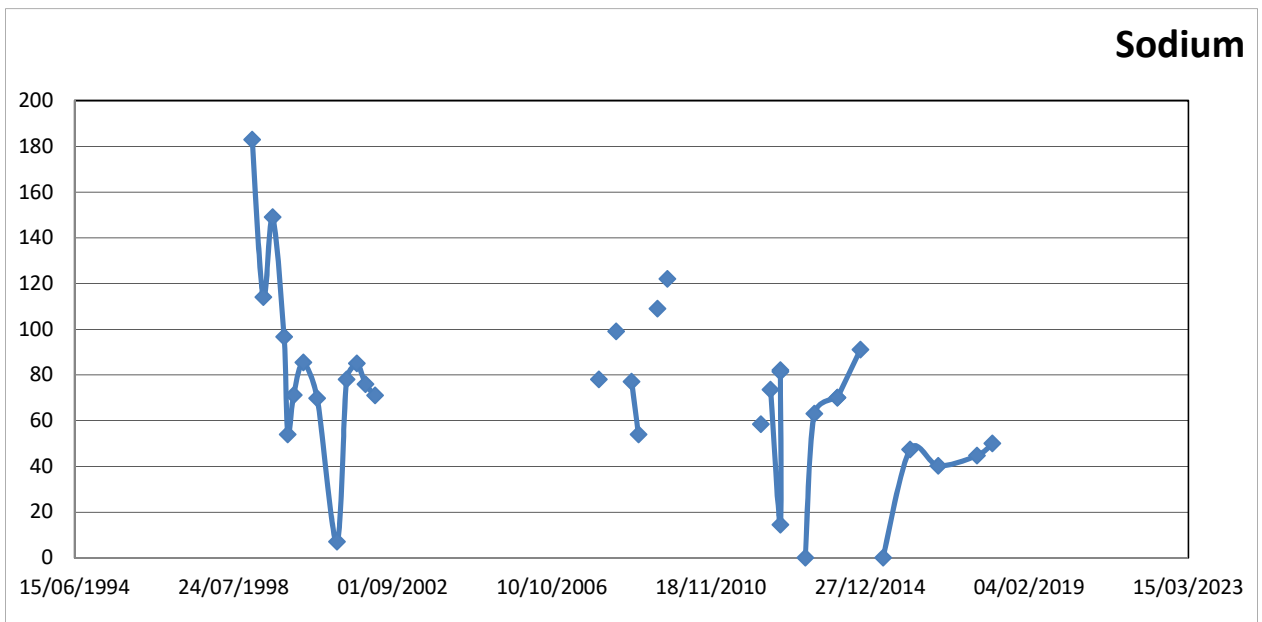
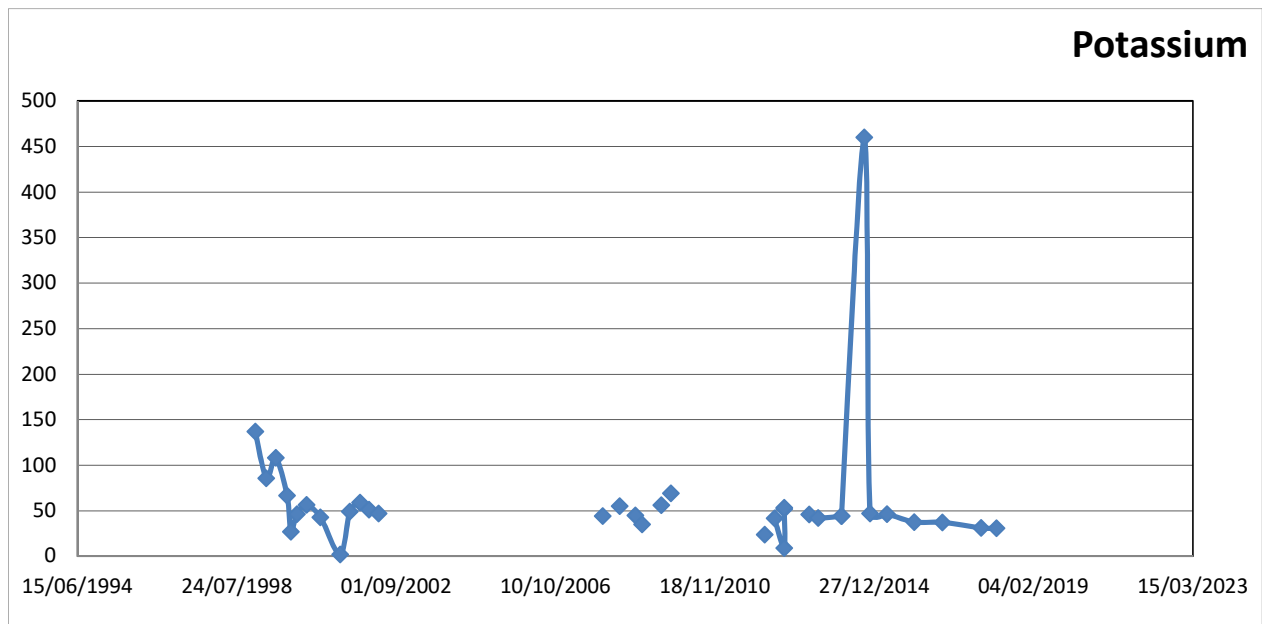
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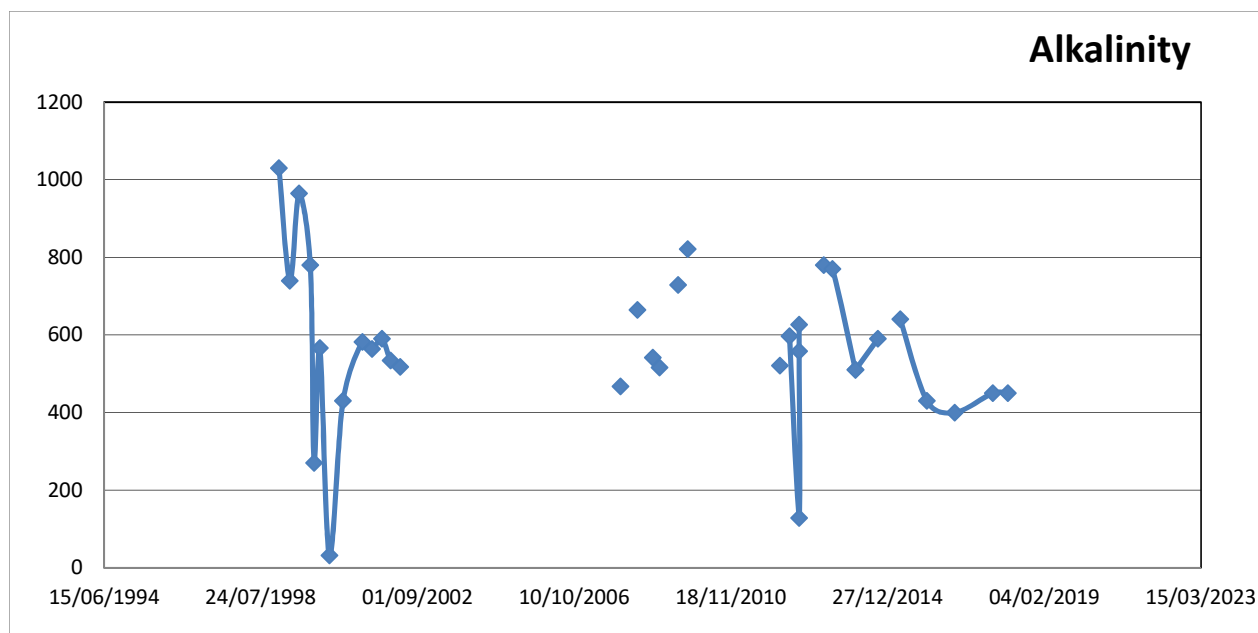
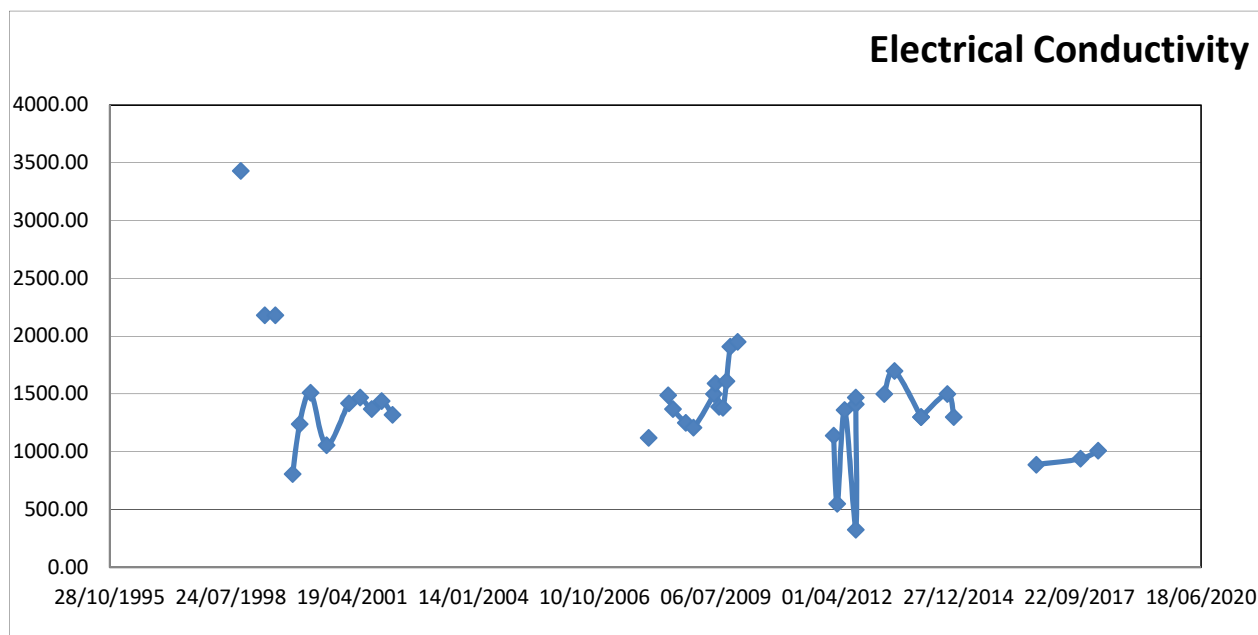
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**Appendix 2
Leachate Chemistry**
Report Number 1926r1v1d0419









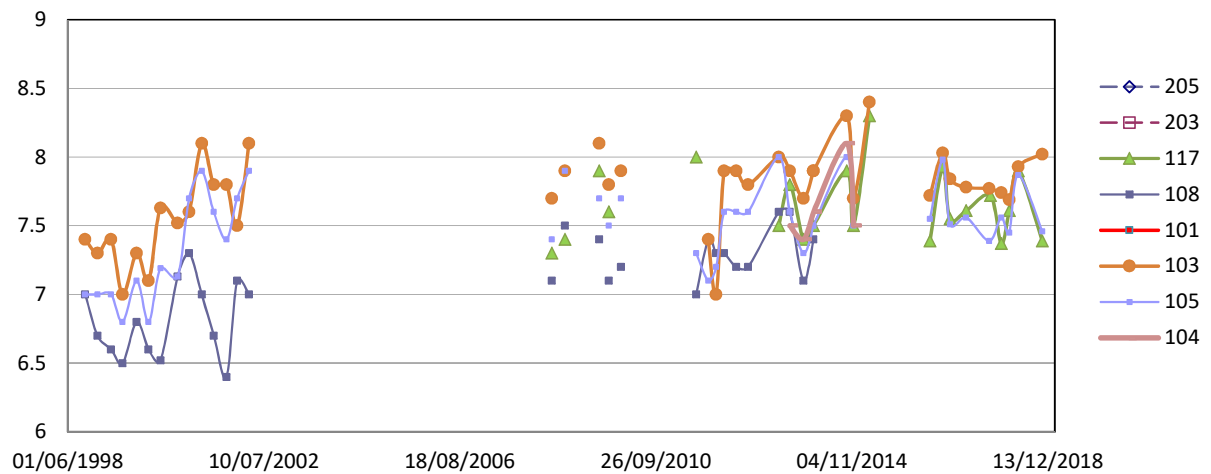
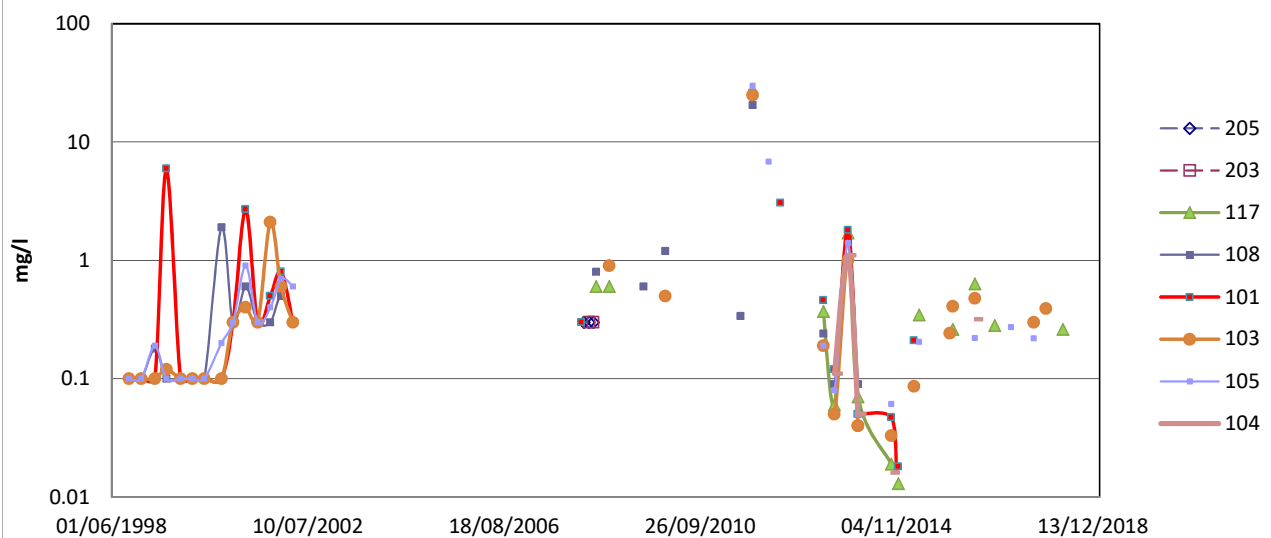
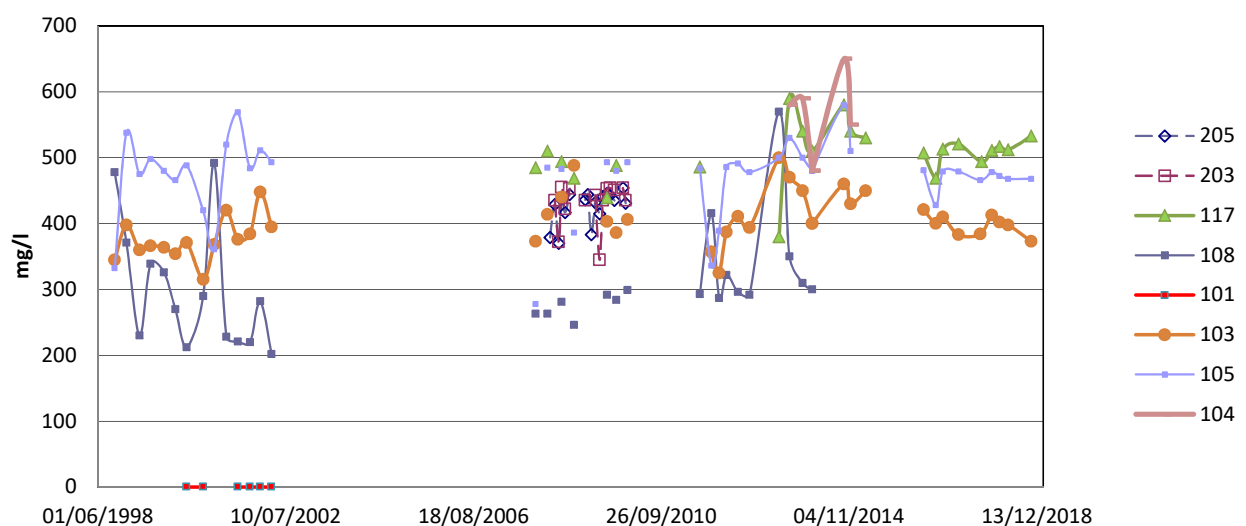
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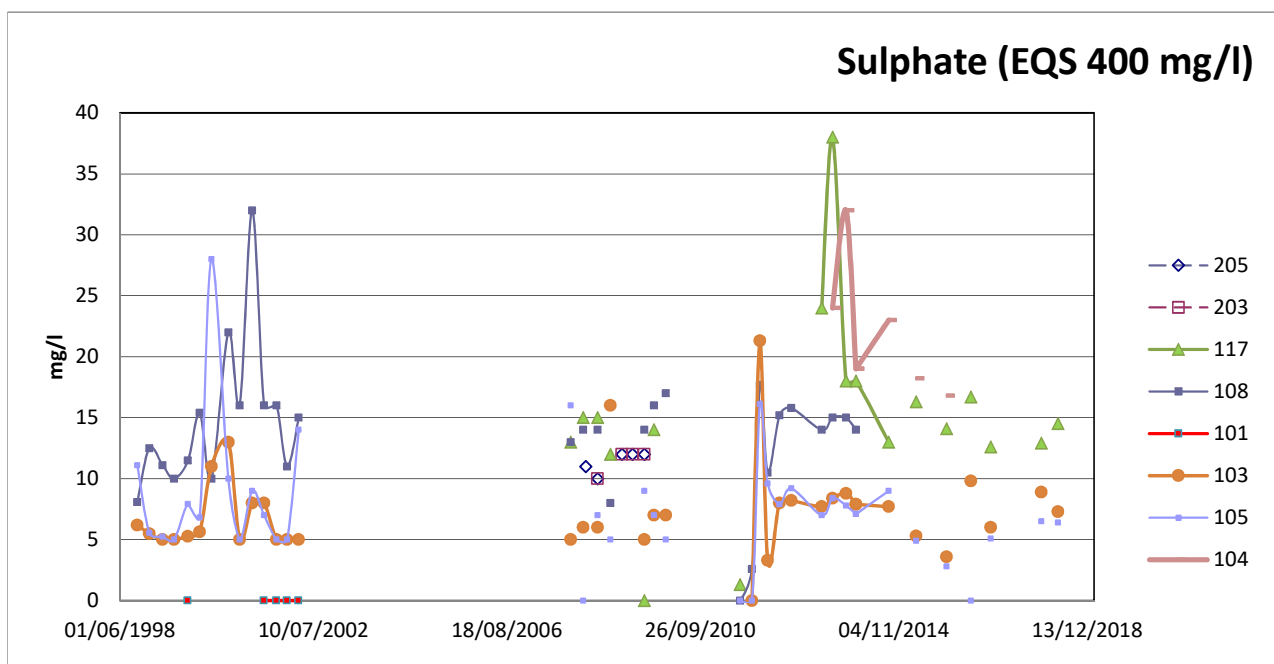
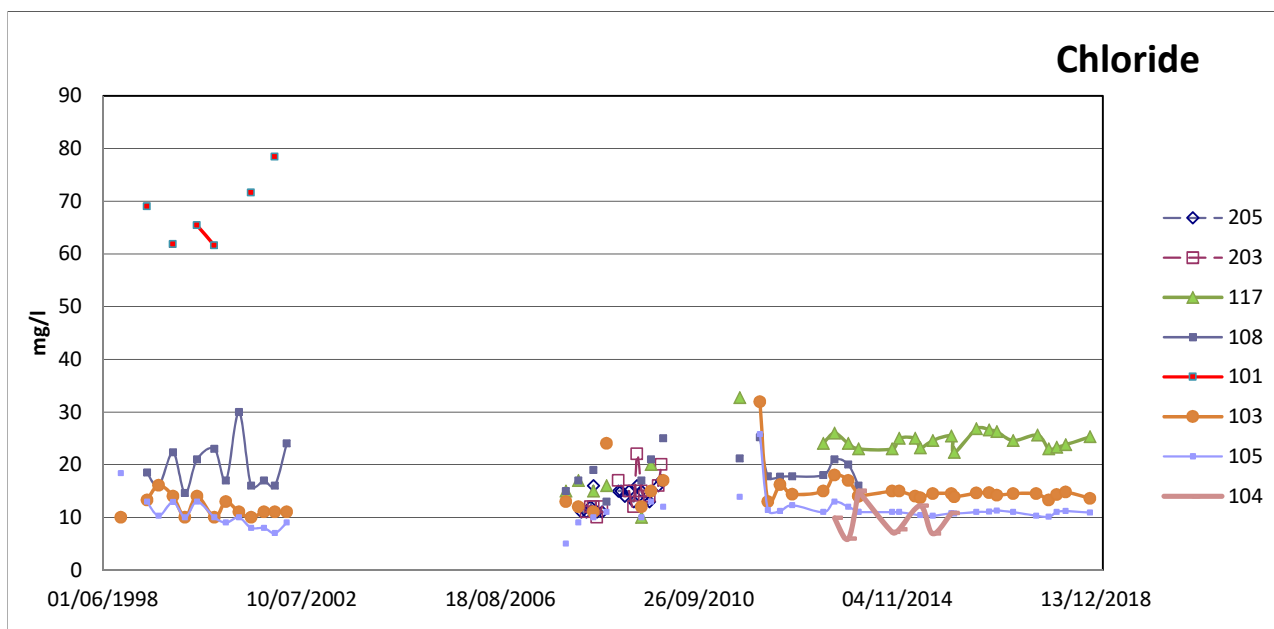
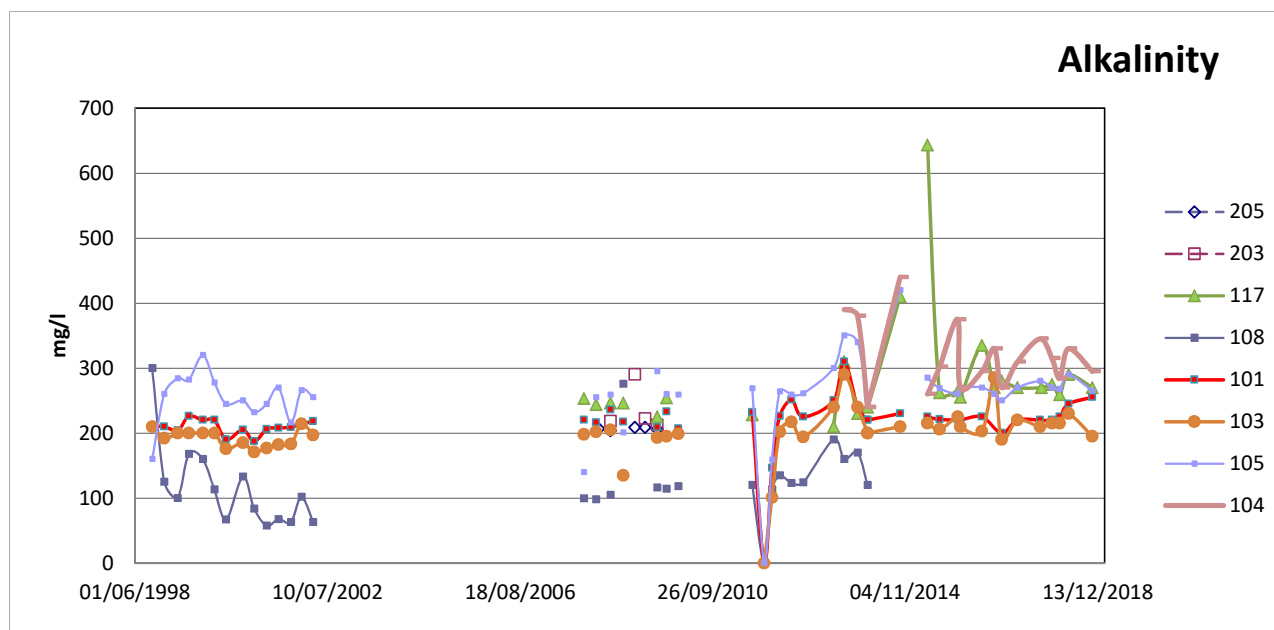
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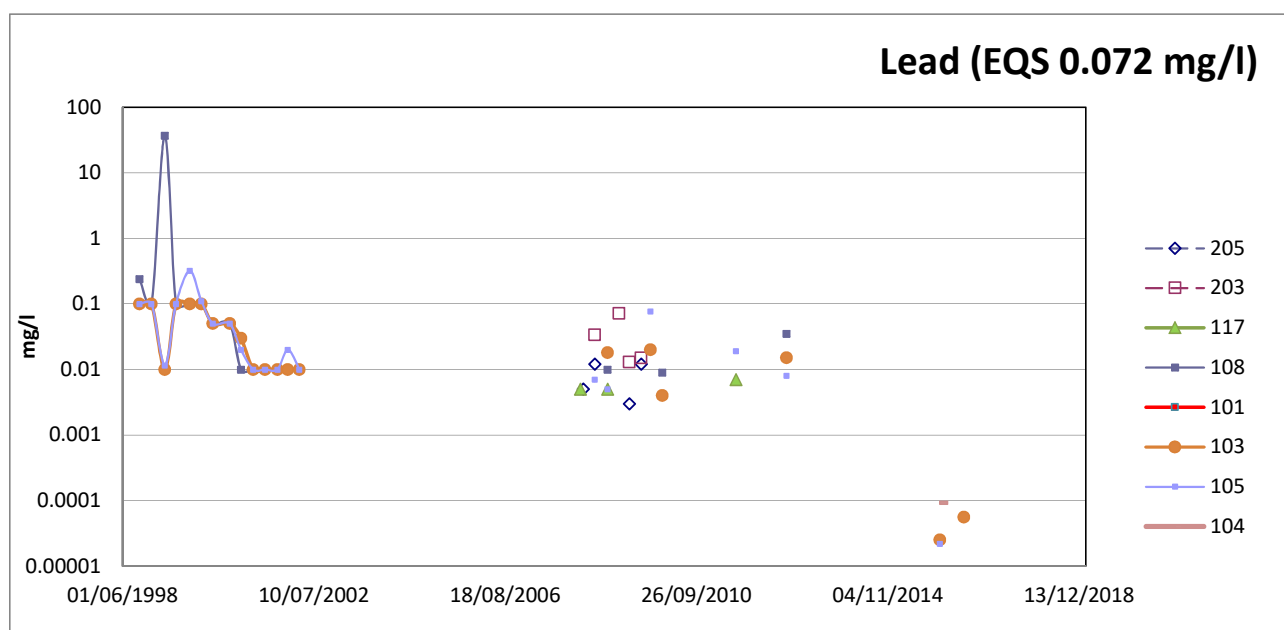
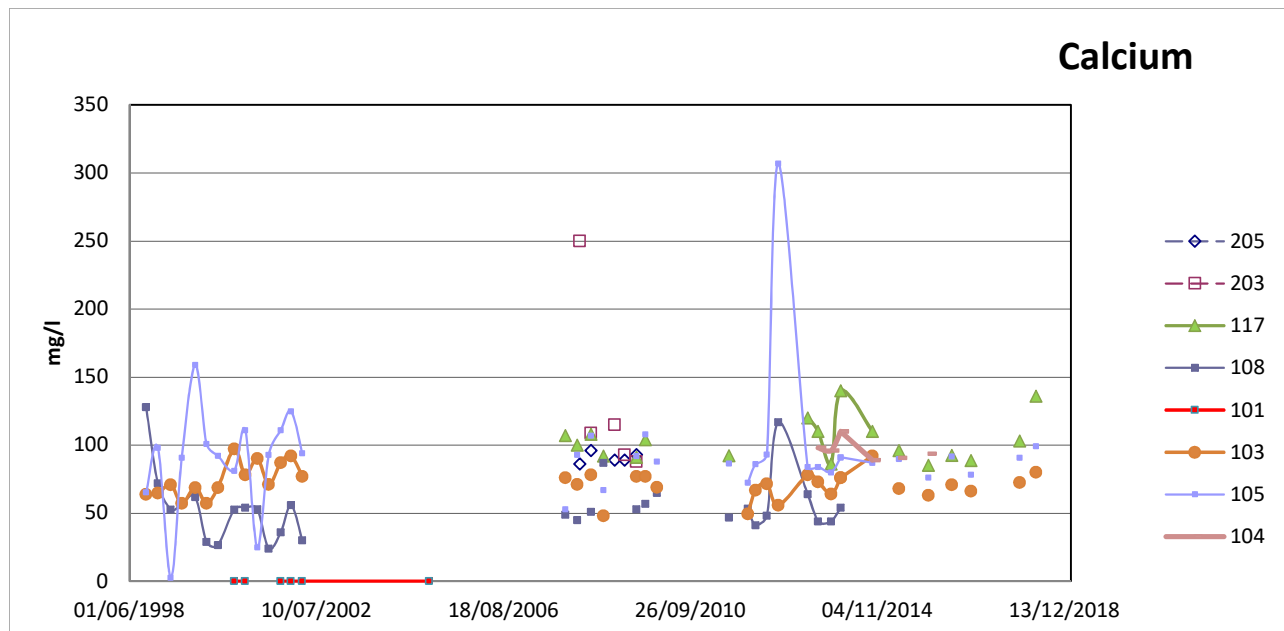
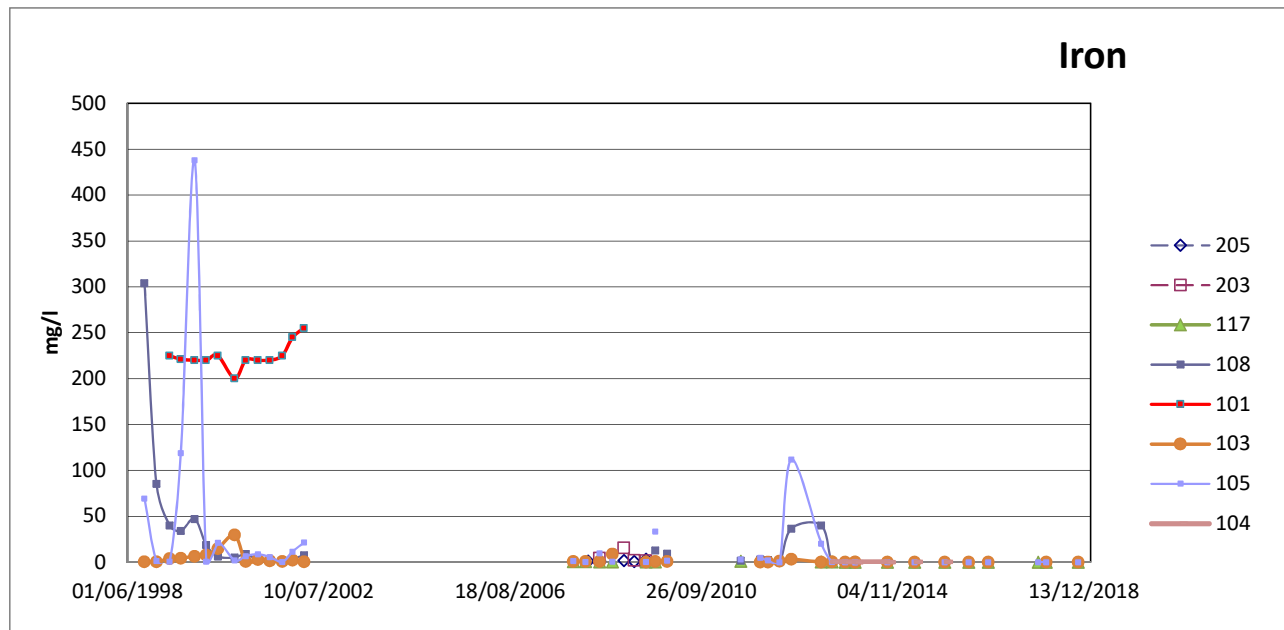
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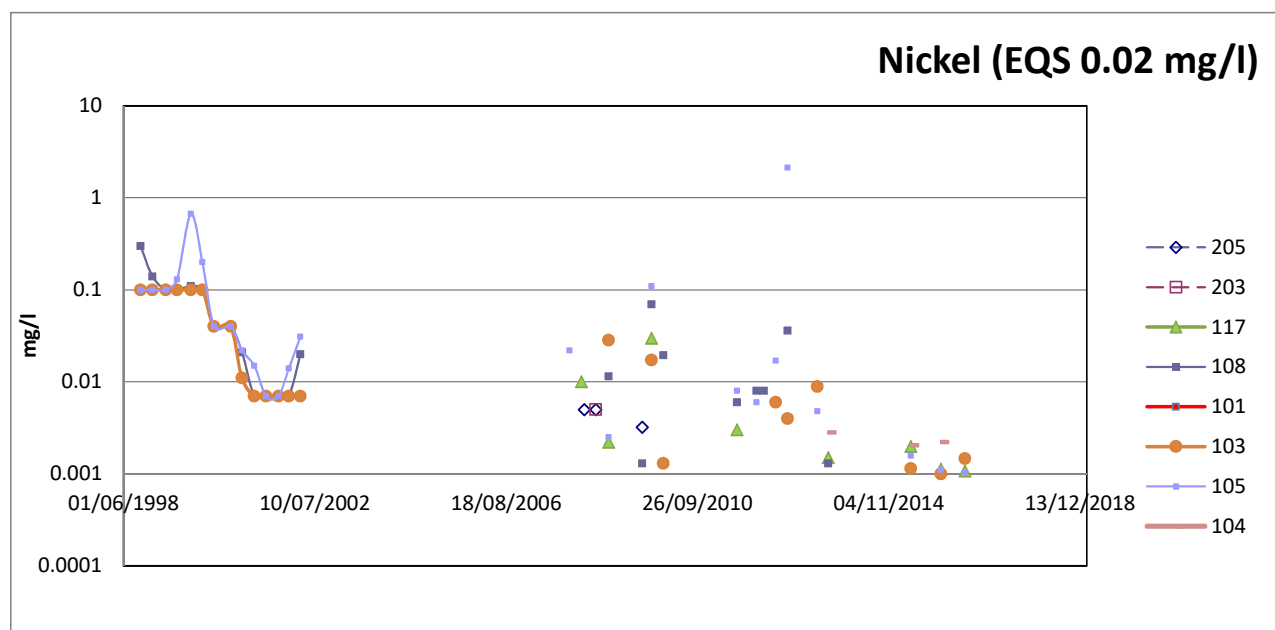
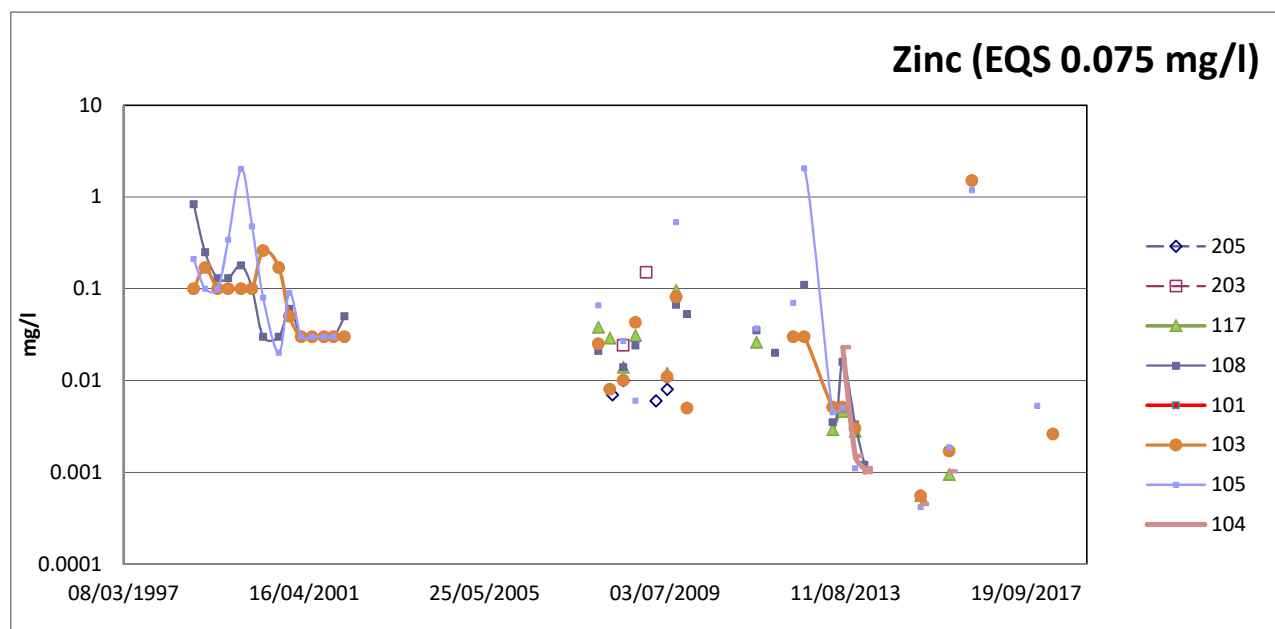
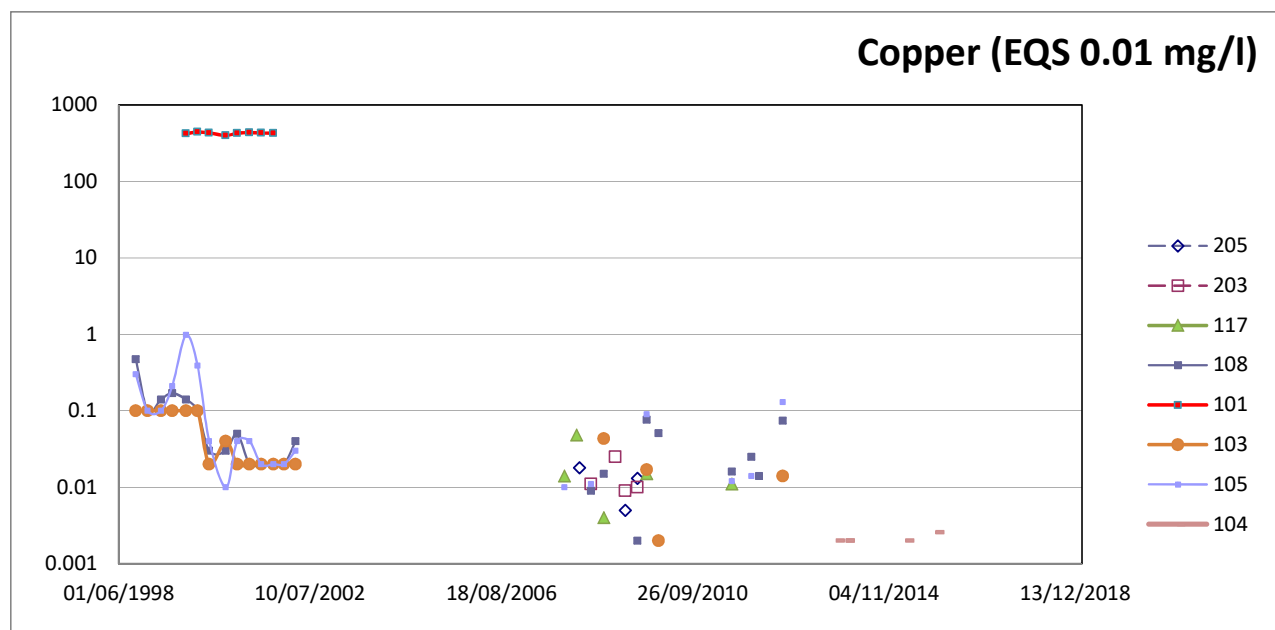
**Appendix 3
Groundwater
Chemistry**

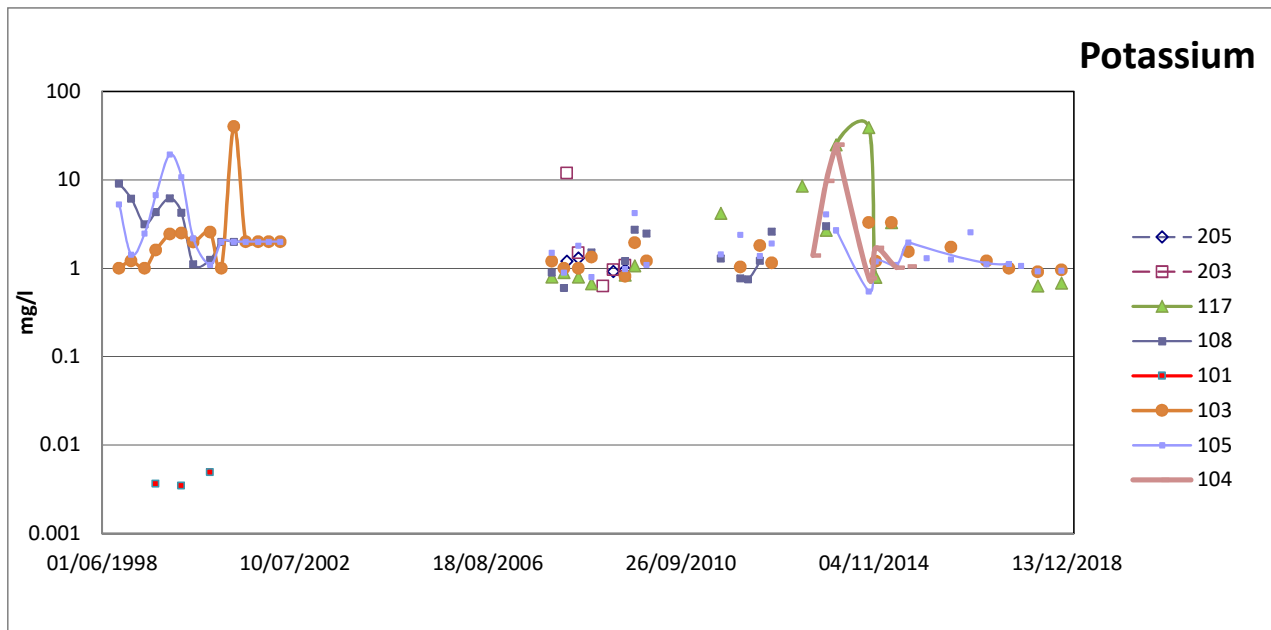
Report Number 1926r1v1d0419

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









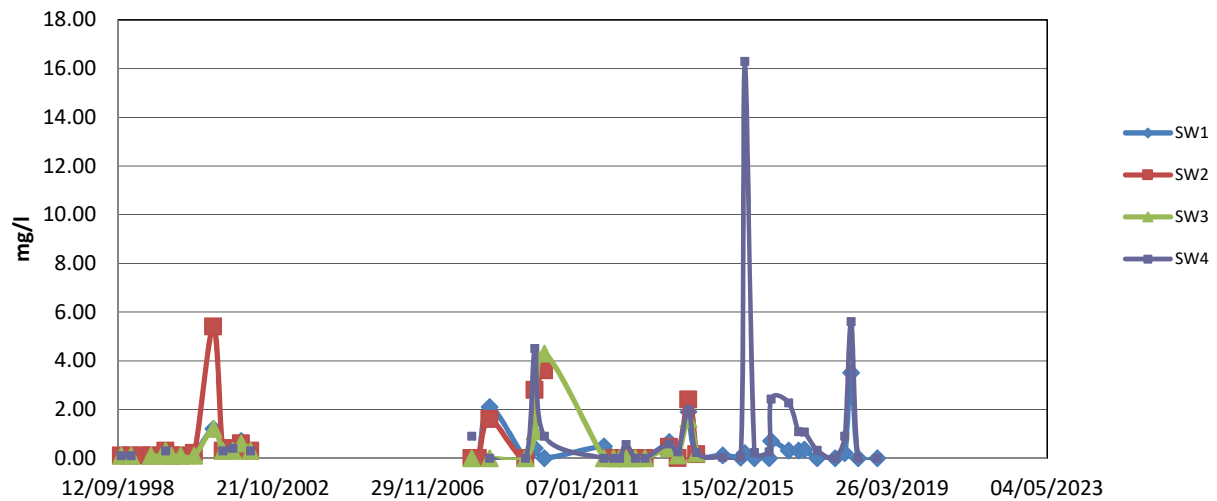
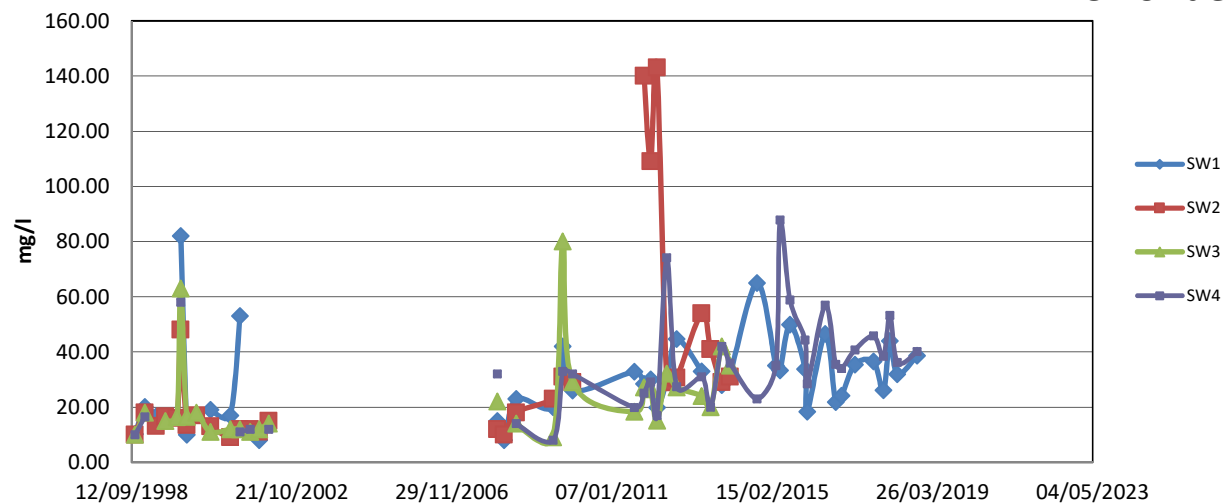
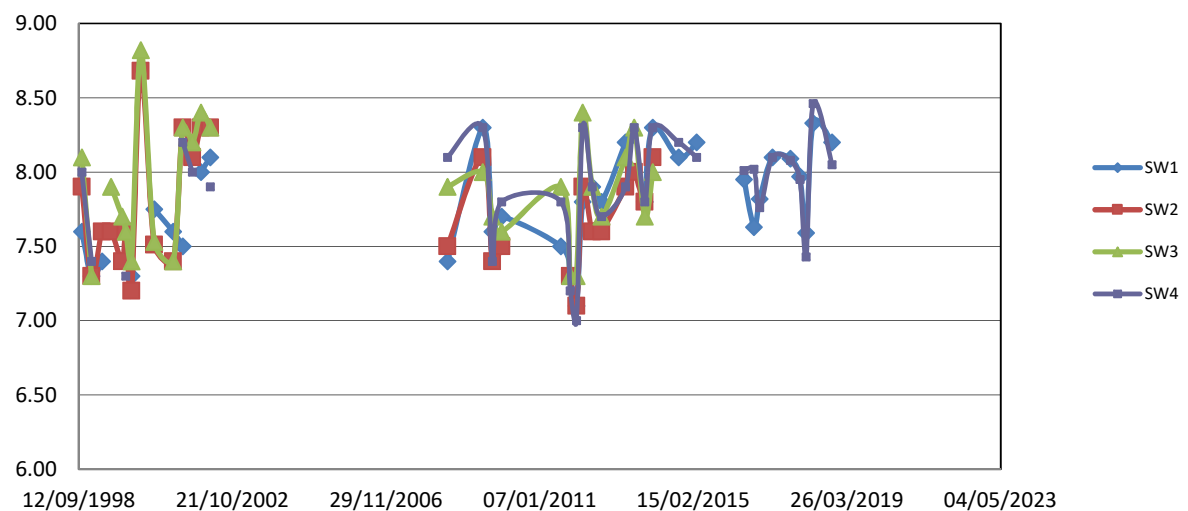
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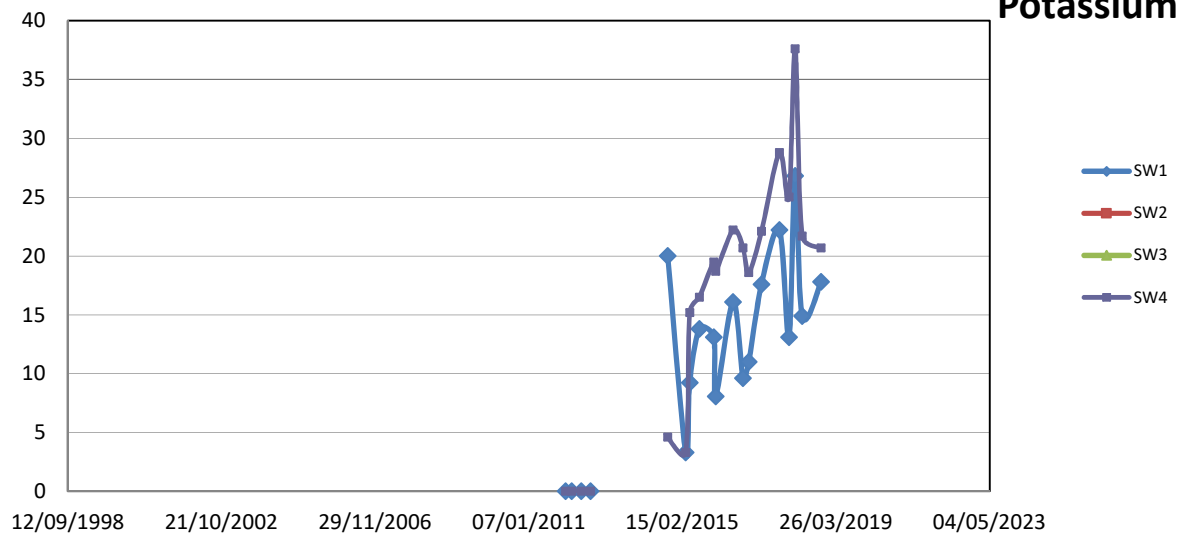
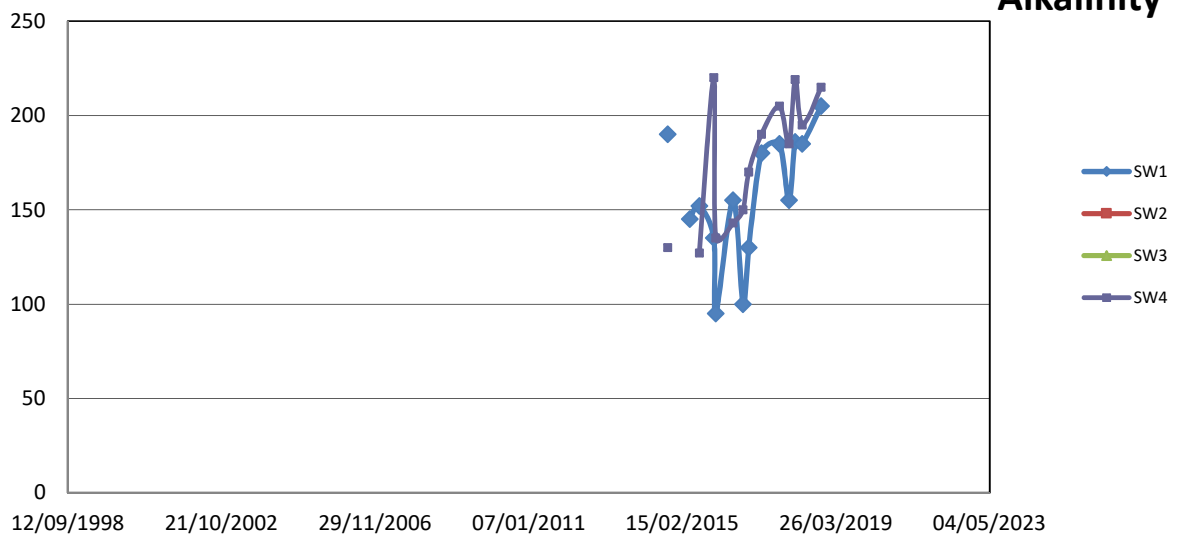
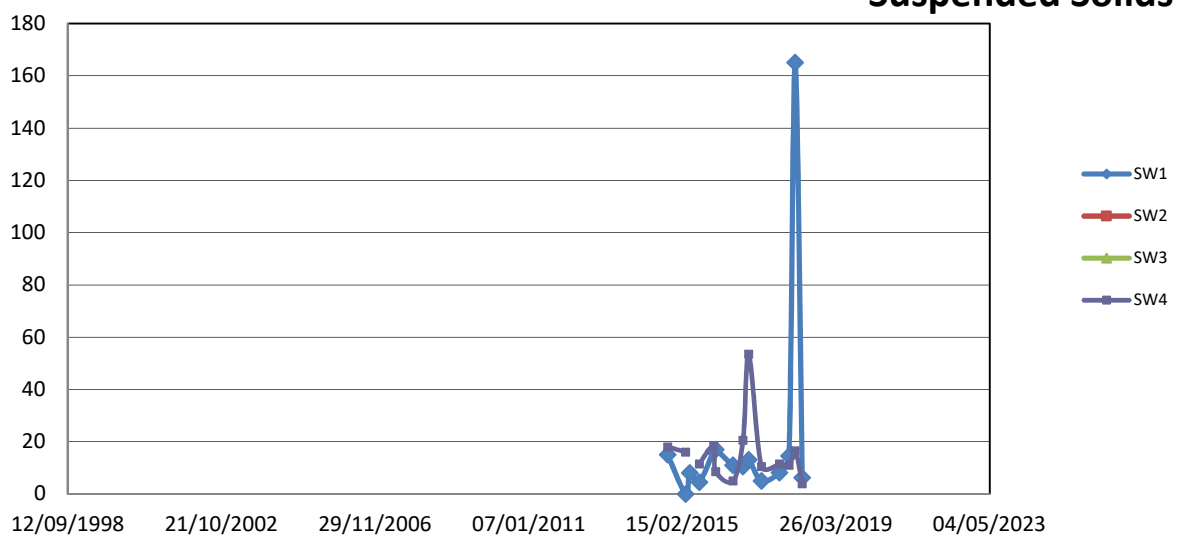
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**Appendix 4
Surface Water
Chemistry**

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Ammonia**Chloride****pH**

Potassium**Alkalinity****Suspended Solids**



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