

**PALLEG LANDFILL
LOWER CWMTWRCH**

PERMIT BT19081X

**Review of 2018
Landfill Monitoring**

Report Number 1783r1v1d0318

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MARCH 2019

Table of Contents

1	INTRODUCTION	1
1.1	Reporting	1
2	SITE LOCATION	3
2.1	Environmental Setting	3
2.2	Geology	3
2.3	Groundwater	4
2.4	Surface Water	5
2.5	Meteorology	5
3	OVERVIEW OF SITE ACTIVITIES	6
3.1	PNHL Operation	6
3.1.1	Cell Construction	6
3.1.2	Waste Deposition	7
3.1.3	Leachate Management	8
3.1.4	Cell Construction	8
4	REGULATORY FRAMEWORK	9
4.1	Emissions to Air	9
4.2	Leachate Control Levels	9
4.3	Groundwater Trigger Levels	9
4.4	Surface Water Emission Limits	10
4.5	Perimeter Gas Compliance Levels	11
4.6	Identification and Management of Permit Breaches	11
4.7	Hydrogeological Risk Assessment Review	11
5	MONITORING ACTIVITIES	13
5.1	Available Monitoring Network	13
5.2	Monitoring Responsibilities	13
5.3	Monitoring Network Integrity	13
5.4	Sample Analysis and Measurement	14
5.5	Action required	14
6	ANNUAL TOPOGRAPHIC SURVEY	15
6.1	Waste Settlement	15
6.2	Remaining Landfill Volume	15
7	LEACHATE AND IN-WASTE GAS EVALUATION	16
7.1	Leachate Level	16
7.2	Leachate Chemistry	16
7.3	Comparison with HRA Leachate Inventory	20
7.4	In-waste gas Chemistry	20
8	GROUNDWATER EVALUATION	22
8.1	Groundwater Level	22
8.2	Groundwater Quality	22
8.3	Assessment against Permit Trigger Level	24

9	SURFACE WATER EVALUATION	26
9.1	Sampling Points	26
9.2	Water Quality	26
9.3	Other Inputs to Surface Water	28
10	PERIMETER GAS EVALUATION	29
10.1	In-waste Gas Monitoring	29
10.2	Perimeter Gas Monitoring	29
11	ODOUR	31
12	SUMMARY AND RECOMMENDATIONS	32
12.1	Review of Performance	32
12.2	Actions	32

List of Tables

Table 3-1	Landfill Cell Construction and Operation Timeline	7
Table 4-1	Particulate matter emission limits into air	9
Table 4-2	Leachate Control Levels	9
Table 4-3	Trigger Levels for Emissions into Groundwater	10
Table 4-4	Trigger level for phenols (mg/l)	10
Table 4-5	Surface Water Monitoring Control Levels	10
Table 4-6	Surface Water Monitoring Control Levels in Permit Variation	11
Table 4-7	Previous Landfill Gas Limits for External Gas Wells	11
Table 4-8	Peripheral Gas Assessment and Emission Limits	11
Table 4-9	Summary of 2015 HRA leachate inventory (mg/l)	12
Table 7-1	Summary of Inorganic Parameters Detected in Leachate	17
Table 7-2	Organic compounds detected in Leachate (L1) in 2017 and 2018	19
Table 7-3	Comparison of Leachate Chemistry to Landsim Model Inputs	20
Table 8-1	Comparison of Groundwater Data with Trigger Levels	24
Table 9-1	Comparison of Surface Water Quality from SW1 with Control Levels	27
Table 10-1	Comparison of perimeter gas chemistry with assessment levels	30

List of Figures

1. Site Location Plan
2. Detailed Site Plan
3. Proposed Monitoring Network
4. Current Monitoring Network
5. Topographic Survey of Landfill January 2018
6. Topographic Survey of Landfill January 2019

List of Appendices

1. List of Reports
2. Digital Laboratory Certificates
3. Summary of Leachate Levels and Chemistry
4. Summary of Groundwater Monitoring Data
5. Summary of Surface Water Monitoring Data
6. Summary of Gas Monitoring Data

1 INTRODUCTION

JLA Disposal (JLA) operates the Palleg Landfill Phase II Non-Hazardous Landfill (PNHL). The site started to accept wastes on 1 November 2008 and now comprises five sub-cells draining to a single common leachate collection infrastructure. The site is situated at Palleg Road, Cwmtwrch at OS Grid Reference SN 7739 1136 (see Figure 1). The active site is situated immediately adjacent to an existing landfill known as Palleg Phase I as well as a closed local authority landfill known as Tir Canol.

The active site occupies an area of approximately 2.73 hectares and is situated in a remote setting on the watershed between the Tawe and Gwys valleys to the north of Swansea, South Wales. In accordance with the Landfill Regulations, the site is regulated through an Environmental Permit issued by Natural Resources Wales (NRW). The applicable Permit number is BT19081X which was issued on 26 July 2005. The Permit has undergone three variations, two during 2007 (XP3230MQ and DP3039XM) and more recently on 21 February 2013 (EPR/BT19081X/V004).

In accordance with Permit condition 4.2.1 a summary review of all monitoring data is required on an annual basis. This report covers the period ending December 2018 and has been independently compiled by Geotechnology Limited (Geotechnology).

1.1 Reporting

Previous annual review reports have also been prepared by Geotechnology and are referenced as follows:

- *2007 Annual Monitoring Review (Geotechnology report reference 518.1/0/1207)*
- *2008 Annual Monitoring Review (Geotechnology report reference 644r1v1d0109)*
- *2009 Annual Monitoring Review (Geotechnology report reference 786r1v1d0310)*
- *2010 Annual Monitoring Review (Geotechnology report reference 941r1d1d0111)*
- *2011 Annual Monitoring Review (Geotechnology report reference 1071r1v1d0212)*
- *2012 Annual Monitoring Review (Geotechnology report reference 1164r1v1d0313)*
- *2013 Annual Monitoring Review (Geotechnology report reference 1213r1v1d0114)*
- *2014 Annual Monitoring Review (Geotechnology report reference 1344r1v1d0115)*
- *2015 Annual Monitoring Review (Geotechnology report reference 1429r1v1d0116)*
- *2016 Annual Monitoring Review (Geotechnology report reference 1553r1v1d0117)*
- *2017 Annual Monitoring Review (Geotechnology report reference 1694r1v1d0318)*

A series of Construction Quality Assurance (CQA) documents have also been prepared by Geotechnology to document the construction of each cell. Separate technical reports have also been prepared by Geotechnology at the request of JLA to address specific site development aspects. All of these reports are listed in Appendix 1. Geotechnology understands that sub-cell 6, the last planned cell, is likely to become operational during 2019.

At this stage, key aspects of site development include the proposed construction of a new surface water management scheme including a new sedimentation and balancing lagoon (Geotechnology report 1141r2v1d1211), valley Infilling Proposals and SRA review (report 1141r4v1d1211 SRA Review) and a capping and restoration plan for the site (Geotechnology report no. 1176r1v1d0312 Capping and Restoration CQA Plan). JLA has started to

implement both schemes although revisions to the surface water management techniques are being considered by JLA. A review of the remaining landfill capacity, taking into consideration the current reprofiling requirements is currently being undertaken and Geotechnology understand that the final level and shape of the final landform is also being discussed with the local planning authority.

Despite the landfill only accepting waste since November 2008, 2009 was the four-year anniversary of the Permit. As a consequence, the four year review of the original HRA was submitted to the Agency on 4 February 2009 and accepted by the Agency on 13 November 2009 (see NRW CAR 02977). More recently, the six year review of the HRA was completed in 2015 (see Geotechnology report 1458r1v1d0515). The next HRA review is therefore scheduled for 2021.

2 SITE LOCATION

2.1 Environmental Setting

The landfill is located at National Grid Reference SN773 114, as shown on Figures 1 and 2. Land to the immediate north of the landfill is occupied by a former coal processing plant and also an unclassified road that leads from Cwmtwrch Isaf to opencast coal workings and forestry. The unclassified road also forms the eastern boundary of the site. The southern boundary to the proposed landfill is a surface water drain and a stock proof fence which encloses the adjacent field which is used for sheep grazing. Beyond this field to the south is Palleg Minor Golf Club.

The site occupies an area of 2.734 hectares comprising grade three agricultural land. The site is generally flat although the southwestern area falls from east to west, dropping from 180m to 172m AOD.

Prior to landfill development, the site had no previous development history, but is adjacent to land developed for mineral processing and waste disposal. Shot blasting activities occur ~1km to the east.

The site was traversed by two water mains; a 50mm diameter alcathehene pipe and a 150mm cast iron main. These were diverted around the perimeter of the site prior to the construction of Sub-cell 4. An 11kV overhead electricity line traverses the eastern perimeter, though this will not be affected by the proposed operations. No other services are known to cross the site.

The landfill is situated on high ground between the Tawe Valley and the Gwys valley. As the watershed between the valleys is situated only 30m to the east of the landfill the site does not lie in proximity to any significant watercourses. The terrain in the vicinity slopes gently westward to a very shallow valley occupied by an unnamed tributary of Afon Twrch. Land on the opposite side of the shallow valley rises only 3m over a distance of 150m before dropping sharply into the steep valley of Nant Gwys.

NRW undertakes routine monitoring of several water quality indicators downstream of the landfill in Nant Gwys close to its confluence with Afon Twrch. Both chemical and biological indicators are used to classify the quality of the river water and Geotechnology understands that the water course is currently classified as Grade B. NRW also monitors surface water quality closer to the site in a small stream that passes through the golf course.

2.2 Geology

As part of the original Permit application, 119 boreholes and trial pits were drilled and excavated in the immediate vicinity of the proposed development (see Geotechnology report 249.1 August 2003). Combined with information reviewed as part of a desk study, it was determined that PNHL would be located in an area underlain by a thick sequence of Glacial Till which is in turn underlain by mudstones and thin coal seams belonging to the Coal Measures. Sandstone has not been found beneath the site, and available geological information suggests it is likely to be present at significant depth.

At the time, information collated from desk study and site investigation showed that the Glacial Till thickness varied from 12m to 18m. As part of the expansion of the groundwater

and gas monitoring network in 2008, Geotechnology noted that the glacial till was found to be significantly thicker than previously encountered (see Geotechnology report 650.1/0/0308). During the installation of GW2 and GW7, 23m of glacial till was encountered before coal measures bedrock was encountered. This indicates that the till is of variable thickness across the site and thicker, in parts, than originally observed. This variation in thickness was also confirmed during the installation of GW8 in late 2011 (see Geotechnology report 1149r2v1d0312).

Development of the landfill sub-cells to date has required excavation of four metres to the Glacial Till. This has enabled the base of the landfill to be in stiff grey un-weathered clays rather than the overlying weathered brown clays. This is entirely consistent with adjacent Phase 1 closed landfill, where the side slopes were excavated into weathered brown till (ablation till). The floor of Phase 1 comprised a stiff grey clay (lodgement till) which was used to construct the mineral lining system. However, the excavation undertaken in Sub-cell 1 of Phase 2 PNHL revealed that the interface between the ablation till and the lodgement till was not as uniform as was the case in Phase 1. Rather, rapid changes in this interface elevation of 1m or so were found. This is not inconsistent with the earlier site investigation findings, as similar changes were observed in the interface elevation between adjacent trial pits. Current evidence suggests that the thickness of the ablation till is thicker than the maximum encountered in the investigation.

2.3 Groundwater

Groundwater beneath the site occurs principally in the Coal Measures bedrock, which is classified as a minor aquifer. Groundwater does not lie within a source protection zone. NRW has previously recognised, as part of their review of HRAs, that the site is not in a particularly sensitive location from a groundwater perspective.

In-situ permeability tests conducted as part of the original Permit application revealed a fracture flow (secondary) permeability of typically $1 \times 10^{-7} \text{ms}^{-1}$ in the mudstone bedrock. The stiff grey lodgment till comprises much lower permeability and does not transmit water as an aquifer. The overlying weathered ablation till is also of low permeability, though several localized lenses have been identified where the sandy clay grades into a clayey sand. A small amount of perched water has also been encountered in these sandy lenses, sitting directly above the underlying clay. Recent construction of the landfill cells under CQA supervision has included nine laboratory measurements of the hydraulic conductivity of the placed mineral liner. As the mineral liner comprises the same grey clay that underlies the landfill, the mineral liner laboratory test data provides a useful indication of the likely in-situ permeability of the clay layer below the landfill. This approach is considered to be justified because the in-situ glacial material will have been over-consolidated and therefore at least equivalent to the laboratory achieved density. This analysis has revealed the hydraulic conductivity to have a minimum value of $2.6\text{e-}^{11} \text{m/s}$, most likely value of $3.4\text{e-}^{10} \text{m/s}$ and maximum value of $1.7\text{e-}^{08} \text{m/s}$. This latter value was previously measured by an in-situ rising head test whilst the minimum and most likely values are based on the measurement of the mineral liner. During the extensive site investigations completed to date, fissures in the glacial deposits have not been observed

The many trial pits and boreholes drilled at the site have not intersected a static groundwater surface at shallow or moderate depth, with only localised seepages from shallow sandy lenses reported. On every occasion that the Glacial Till has been pierced by a borehole, groundwater has flowed slowly in and reached a standing level within ~2 metres of the ground surface. The underlying Coal Measures aquifer is therefore confined by the

overlying low permeability clay. This means that groundwaters are sub-artesian which is likely to limit advective contaminant transport.

Groundwater quality has been monitored at the site for many years. Since January 2007 routine monitoring has been undertaken in accordance with the Permit. Groundwater flow and quality is discussed further in Section 4.

2.4 Surface Water

The only surface water feature of note within immediate vicinity of the site is a small unnamed stream that intermittently flows westwards along the southern boundary of the landfill. The stream receives surface run-off from the site, the adjacent field used for grazing and the adjacent Phase 1 landfill. The stream flows through a series of lagoons and then towards Palleg Golf Club, some 200m west and ultimately drains to the Afon Twrch.

2.5 Meteorology

The prevailing weather direction is from the southwest and the hills, which the landfill is situated on, are the first areas of high ground that weather systems meet as they pass up the Swansea Valley. Accordingly, the site experiences high rainfall, typically in excess of 1220mm of rainfall per annum. Evapo-transpiration reduces the effective rainfall to an annual average of 940mm per annum. Wind direction is predominantly dominated by southwesterly and westerly weather systems.

3 OVERVIEW OF SITE ACTIVITIES

Before describing the monitoring completed and reviewing the available results, this section provides a brief overview of the activities that have occurred since the start of the monitoring programme in January 2007.

3.1 PNHL Operation

3.1.1 Cell Construction

PNHL is designed upon the containment principle. Pollutants are kept within the wastes by surrounding the wastes with barriers that are virtually impermeable to water, liquids and gases.

The landfill is being constructed as a series of cells. The design presented in the original Permit application (Geotechnology report 249) was based upon achieving containment through the use of a 1m thick clay monoliner comprising recompacted site won grey clay. However, during initial earthworks it was noted that the grey clay which was proposed to be used as a mineral monoliner at the site was more undulating than anticipated. The undulating nature of the clay resulted in the grey clay being at variable depths below ground surface across the site. As a consequence, additional excavation of over 1m would be required, which in turn would lead to a considerably greater thickness of re-compacted material being placed in lieu.

In response, Geotechnology reviewed the design with JLA and determined that the original 1m thick clay monoliner could be replaced with a composite Engineered Barrier System (EBS). The composite EBS would comprise a 250mm clay substrate overlain by 2mm HDPE geomembrane liner. The 250mm clay substrate would be constructed to meet the same design specifications as the original monoliner. The composite EBS would replace the re-compacted clay monoliner as the artificial sealing layer for the landfill. Additionally, in order to promote recycled material usage and to offset the increased construction costs, it was proposed to construct the drainage blanket from shredded tyres rather than stone. These design modifications were presented by Geotechnology in April 2007 (see Geotechnology report 560) and subsequently accepted by the Environment Agency.

In August 2007, attempts were made to initiate lining in the void created in 2006. This work was abandoned during October 2007. Consequently, there was no waste deposited in 2007. Construction of Cell 1 re-commenced in 2008 and was completed to the satisfaction of the Environment Agency by 22 September 2008. Construction of the cell comprised excavation of the void space (primarily completed during the Autumn 2007) followed by the installation of a lining system under CQA supervision (see Geotechnology report 671). The cell lining system installed comprised the following top down sequence:

- Thermally bonded non-woven polypropylene -polyethylene geotextile separator manufactured from virgin materials.
- Shredded tyre drainage layer in excess of 725mm thick.
- Leachate drainage blinding aggregate comprising a free draining gritstone gravel which was placed in a single layer to a thickness of at least 100mm.
- Non-woven polypropylene needle punched geotextile protector layer.
- High Density Polyethylene (HDPE) 2mm thick geomembrane on the base and flanks of the cell.

- Mineral liner comprising re-compacted site won clay from the lower grey clay placed over the low permeability natural geological barrier present across the site.

Construction of Sub-cell 2 during September 2010 followed the same design used for the construction of Sub-cell 1 apart from the drainage layer. Instead of using shredded tyres in the drainage layer a proprietary limestone 20/40mm aggregate was used, again with a 100mm blinding limestone aggregate. All sub-cells are therefore connected by a continuous leachate drainage system with the landfill base lying at an elevation of circa. 168–170m AOD. This drainage blanket configuration has been extended into Sub-cell 3 and Sub-cell 4 and most recently Sub-cell 5. The construction of these latter cells is documented in separate CQA Validation reports.

Key dates relating to cell construction and operation are summarised in Table 3-1.

Table 3-1 Landfill Cell Construction and Operation Timeline

Date	Activity
2007	In August 2007, attempts were made to initiate lining of Cell 1 in the void created in 2006. This work was abandoned during October 2007 due to poor weather. Consequently, there was no waste deposited in 2007.
2008	Construction of Cell 1 recommenced in 2008 and was completed to the satisfaction of the Agency by October 2008.
2009	No cell construction activities
2010	Cell 1 ceased operation in September. Cell 2 construction commenced in August with the sub-cell operational on 23 October 2010
2012	Part of Sub-cell 3 opened in May 2012.
2013	Sub-cell 3 completed. Initial vegetation strip for Cell 4 commenced
2014	Sub-cell 4 constructed
2015	Sub-cell 4 operational after CQA approval by NRW
2016	Sub-cell 5 constructed at end of year
2017	Sub-cell 5 became operational Re-profiling and establishment of surface water management system ongoing.
2019	Sub-cell 6 likely to become operational

As part of the landfill earthworks completed to date, a roadway has been built from loose tipped material to enable access to each operational cell.

3.1.2 Waste Deposition

Waste deposition commenced on 1 November 2008 in Cell 1. Until 2012, all of the waste deposited was classified as non-hazardous waste from the mechanical treatment of wastes (EWC code 19 12 12) and soil and stone waste from gardens and parks (EWC 20 02 02). During the first two quarters of 2012, some 1500 tonnes of street cleaning residues (EWC code 20 03 03) were also deposited. During 2014, 2980 tonnes of 19 12 12 waste was landfilled and 2816 tonnes in 2015. In 2017, 1933.46 tonnes of 19 12 12 was landfilled and 1571.16 tonnes in 2018.

Visual inspection of the waste in the active cell reveals that it is dominated by hard and soft plastic (thermosetting and thermoplastic plastic) in various sizes and forms. This is set in a matrix which typically comprises plastic packaging, various grades of rubber, foam, textiles and small fragments of glass and wood, paper and cardboard. During 2012, JLA started to use a shredder that shreds the waste into small particles so that when the waste surface is rolled with a compactor, a greater volume reduction is achieved. Following rolling, the waste is covered with a range of cover materials. Cover materials have included soil and stone, dried street cleaning residues, fines from the processing of building materials and insulation.

3.1.3 Leachate Management

Within the drainage layer a leachate extraction system has been installed. This comprises two 315mm external diameter HDPE upslope risers, one of which acts as a failsafe should the first become blocked, connected to a network of HDPE pipework installed within the drainage stone and connected to the rock fill leachate sump. One of the risers is fitted with a 150mm diameter G-clamp suction hose, which is used for extraction purposes.

The monitoring of leachate levels is the responsibility of JLA. Leachate levels are monitored and reported directly to NRW by JLA.

Maintaining the leachate level below the Permit level is critical for several reasons. This is because the depth of leachate influences the environmental protection offered by the leachate drainage and lining system. Based on site observations, JLA personnel also recognise that odour associated with the landfill is less detectable when leachate levels are maintained at very low levels.

Recently, the leachate extraction pipes have been extended as part of valley infilling works.

3.1.4 Cell Construction

When disposal activities are complete, the entire site will be restored to agricultural use. The landfill cap will comprise a low permeability cover subsoil overlain by topsoil which will be seeded. The cap is aimed at ensuring that long-term volumes of leachate will be small and easily dealt with. A gas extraction pipework system will be incorporated into the cap. The cap will also incorporate a drainage system to ensure long-term rapid surface water dispersion, preventing ponding on the clay cap.

Although Cells 1 and 2 no longer receive waste, they are not yet permanently capped as re-profiling of side slopes and removal of over-tipped waste is ongoing.

4 REGULATORY FRAMEWORK

The Permit defines the regulatory emission limits and control and trigger levels for PNHL. Each of the relevant criteria is reproduced in this section.

4.1 Emissions to Air

The limits for emission to air provided in the Permit are reproduced in Table 4-1.

Table 4-1 Particulate matter emission limits into air

Emission point Ref. & Location	Parameter	Source	Limit (including unit)	Reference Period	Monitoring Frequency	Monitoring Standard or Method
Flare	Nitrogen Oxides (Nox)	Landfill waste mass	150mg/m ³	Hourly mean	Annually	ISO10849
Flare	Carbon Monoxide (CO)	Landfill waste mass	50mg/m ³	Hourly mean	Annually	ISO12039
Flare	Total Volatile Organic Compounds (VOCs)	Landfill waste mass	10mg/m ³	Hourly mean	Annually	BS EN 13526
Flare	Non methane volatile organic compounds (SVOCs)	Landfill waste mass	5mg/m ³	Hourly mean	Annually	BS EN 13649:2002

These limits will apply when gas collection commences.

4.2 Leachate Control Levels

Leachate level limits are summarised in Table 4-2.

Table 4-2 Leachate Control Levels

Monitoring point reference/Description	Limit	Monitoring frequency
L1	1.5 meters above the base of the abstraction sump	Monthly
L2 to L6	1 meter above the basal lining	Monthly

4.3 Groundwater Trigger Levels

Improvement Condition 4 of the Permit required JLA to establish location specific trigger levels for groundwater. As part of the 2008 annual monitoring report this condition was reviewed. At the time it was determined that the site-wide trigger levels specified in the Permit would not be modified apart from the trigger level for phenols. This was because of similarities in the groundwater hydrochemistry at each point, except for the occurrence of phenols in upgradient groundwater which needed to be accounted for.

Current groundwater trigger levels are summarised in Table 4-3.

Table 4-3 Trigger Levels for Emissions into Groundwater

Monitoring point reference	Parameter	Limit (including unit)	Reference Period
Downstream Monitoring Points GW2, GW4 and GW8*	Ammoniacal Nitrogen	2.5mg/l	Spot Sample
	Chloride	200 mg/l	Spot Sample
	Zinc	0.1mg/l	Spot Sample
	Cadmium	0.005mg/l	Spot Sample
	Mercury	0.001mg/l	Spot Sample
	Mecoprop	0.0004mg/l	Spot Sample
	Toluene	0.004mg/l	Spot Sample
*Permit variation EPR/BT1908IX/V004 states that Trigger levels apply at GW2 to GW5 and GW8. However, GW3 and GW5 are hydraulically upgradient of the landfill.			

The original Permit also specified a trigger level for Phenols of 0.0005mg/l applicable at the same positions identified in Table 4-3. However, groundwater monitoring completed during 2007/2008 revealed the presence of phenols within background groundwater. Consequently, a new site specific trigger level was established for phenols as part of the 2008 annual monitoring review as summarised in Table 4-4 (see Geotechnology report *644r1v1d0109* for full details).

Table 4-4 Trigger level for phenols (mg/l)

Level	Concentration
Control Level 1	0.00913
Control Level 2	0.00996
Trigger Level	0.01079

As “phenols” is a collective term for several compounds, Geotechnology recommends prudence is taken in applying these control and trigger levels and that the speciated compounds may need to be evaluated individually where necessary.

4.4 Surface Water Emission Limits

Surface water emission limits provided in the Permit prior to Permit Variation EPR/BT1908IX/V004 are summarised in Table 4-5. In the new Permit Variation (EPR/BT1908IX/V004) these emission limits are no longer referenced and are superseded by those in Table 4-6.

Table 4-5 Surface Water Monitoring Control Levels

Emission point	Parameter	Source	Limit (incl. unit)	Reference Period
S1, S2, S3, and S4	Suspended Solids	Surface water drainage from the installation	75mg/l	Spot Sample
S1, S2, S3, and S4	Ph	Surface water drainage from the installation	5.5 to 9.5	Spot Sample
S1, S2, S3, and S4	Electrical Conductivity	Surface water drainage from the installation	800 uS/cm	Spot Sample
S1, S2, S3, and S4	COD	Surface water drainage from the installation	600 mg/l	Spot Sample
S1, S2, S3, and S4	Ammoniacal Nitrogen	Surface water drainage from the installation	0.75mg/l	Spot Sample
S1, S2, S3, and S4	Chloride	Surface water drainage from the installation	100mg/l	Spot Sample

The new emission level only applies to surface water monitoring location S5, as shown on Figure 3. However, as the new surface water management infrastructure is not yet fully constructed, this discharge location is not yet fully operational.

Table 4-6 Surface Water Monitoring Control Levels in Permit Variation

Emission point	Parameter	Source	Limit (incl. unit)	Reference Period
S5	Suspended Solids	Surface water drainage from the installation	50mg/l	Spot Sample
S5	pH	Surface water drainage from the installation	5.5 to 9.5	Spot Sample
S5	Visible oil	Surface water drainage from the installation	None visible to sampler	Spot Sample
S5	COD	Surface water drainage from the installation	600 mg/l	Spot Sample
S5	Ammoniacal Nitrogen	Surface water drainage from the installation	0.75mg/l	Spot Sample
S5	Chloride	Surface water drainage from the installation	200mg/l	Spot Sample

4.5 Perimeter Gas Compliance Levels

In the original Permit the landfill gas trigger levels for external gas monitoring wells were those summarised in Table 4-7.

Table 4-7 Previous Landfill Gas Limits for External Gas Wells

Monitoring point Ref./description	Parameter	Limit (including units)*	Monitoring frequency
Peripheral landfill gas monitoring boreholes GA7 to GA10	Carbon dioxide	1.5% Vol in air *	Monthly
Peripheral landfill gas monitoring boreholes GA7 to GA10	Methane	1.0% Vol in air *	Monthly

* NB. The limits specified may need to be altered to take account of the background concentrations.

In the 2011 annual review report, Geotechnology derived new assessment and compliance levels for carbon dioxide and methane based on current industry guidance. The new levels are summarised in Table 4-8.

In Permit Variation EPR/BT1908IX/V004 the peripheral methane emission limit is 1% and no limit is specified for Carbon dioxide. The carbon dioxide assessment levels in Table 4-8 are for internal use by JLA and provide a framework against which to evaluate peripheral gas measurements.

Table 4-8 Peripheral Gas Assessment and Emission Limits

Perimeter gas position	Carbon Dioxide Assessment Level	Methane Emission Limit
GA7	4.6% v/v	1% v/v
GA8	4.8% v/v	1% v/v
GA9	4.7% v/v	1% v/v

4.6 Identification and Management of Permit Breaches

JLA continually review all data gathered to ensure Permit compliance. Any breaches identified are documented, reported and contingency actions taken where necessary. Where necessary, Geotechnology is requested to undertake additional monitoring.

4.7 Hydrogeological Risk Assessment Review

The 2015 HRA review established new leachate inventory in the Landsim computer simulations. Comparison of the latest leachate monitoring data to the inventory, summarised in Table 4-9, provides a useful and rapid means for assessing the potential risk leachate potentially poses to the environment.

Table 4-9 Summary of 2015 HRA leachate inventory (mg/l)

		Cadmium	Ammonia	Chloride	Chromium	Phenols
2015 HRA Inputs	Minimum	0.0002	0.2	17	0.002	0.001
	Most Likely	0.0003	430	490	0.12	0.6
	Maximum	0.0005	2600	1120	0.25	6.4
Note Statistical summary used to derive values ignored measurements where analytical detection limit was not breached.						

The next review of the HRA is scheduled for 2021.

5 MONITORING ACTIVITIES

To demonstrate that the site is functioning as designed, a rigorous monitoring strategy is being actioned. Geotechnology is commissioned by JLA to undertake parts of the monitoring programme. The monitoring programme covers ground and surface water monitoring, leachate monitoring, dust and noise emission and landfill gas production.

5.1 Available Monitoring Network

In March 2008, a series of groundwater wells (GW2, GW4 and GW7) and a single gas monitoring well (GA7) were installed at the site. Due to access difficulties, two further gas wells (GA8 and GA9) were not installed until 11 September 2008. All installations have been previously reported as part of the Construction Quality Assurance demanded by the Permit (see Geotechnology reports 650).

During 2011, the headworks of groundwater monitoring position GW7 was accidentally damaged by a leachate tanker. Inspections undertaken by JLA revealed that the piezometer pipe had been bent as a result of the collision and surface run-off appeared to have entered the damaged well head. In response to the damage of the well head and the potential compromise of the seals, JLA arranged for the monitoring well to be decommissioned and a new well (GW8) installed. This work was completed in November 2011, a new dedicated sampling pump was purchased and the well subsequently purged prior to the first round of sampling. All of the groundwater wells and leachate sump are provided with dedicated Waterra pumps to avoid cross contamination during sampling.

As part of the landfill construction leachate monitoring and in-waste gas monitoring points have been installed.

A plan of the currently available monitoring network is provided in Figure 4.

5.2 Monitoring Responsibilities

Geotechnology is commissioned by JLA to undertake groundwater, surface water, gas and leachate sample collection. JLA undertakes all other aspects of the monitoring programme including dust, odour and leachate level measurement.

5.3 Monitoring Network Integrity

The integrity of the monitoring network is inspected on each sampling occasion.

Due to measures aimed at controlling the release of odour from leachate, in-waste leachate monitoring location L1 is not always readily directly accessible. As a consequence, leachate samples are recovered from the spare upslope leachate riser. This situation provides an alternate mechanism for recovering leachate but JLA need to ensure that these upslope risers cannot become blocked.

The groundwater, surface water and external gas monitoring network is generally in good condition. The headworks at GW2 and GA7 do, however, require better protection as mud from the adjacent access track does sometimes cover the headworks making access difficult. There is also a possibility of the headworks at GA7 becoming flooded at times. A

groundwater sample could not be recovered from GW4, despite numerous attempts, in the latter part of 2018. The pump was operational but groundwater could not be lifted. This may be because the depth to groundwater has risen as ground levels have risen as part of the valley infilling works. Although the existing pump has a suitable head rating for the depth to groundwater a new pump has been ordered and will be immediately installed.

In addition to maintaining and replacing (as necessary) groundwater pumps, JLA should continue to inspect each position to ensure the headworks are protected from damage and run-off and that vegetation is periodically cleared. JLA has installed dedicated pumps into each groundwater well and positioned signs adjacent to each surface water sample point. This minimises the opportunity for cross contamination and ensures samples are collected from the same position.

As part of the valley infilling works, the headworks at GW4 and GW8 are being progressively raised with concrete rings. As the ground level is raised so the plain piezometer pipe is raised.

5.4 Sample Analysis and Measurement

During 2007 and 2008, AlcontrolGeochem based in Chester was the laboratory used for the analysis of all water samples. At the start of 2009, JLA changed laboratories and started to use Scientifics (formerly TES Bretby) based in Burton-on-Trent. At the start of 2011, JLA changed to use ACS Testing. From April 2015, Alcontrol Laboratories (now known as ALS Environmental) has been commissioned by JLA to undertake the analyses.

All laboratories used are registered under the UKAS and MCERTS accreditation schemes where applicable. Sample bottles and dedicated cooler boxes are provided by the laboratory directly to the JLA office. Following sample collection by Geotechnology, the samples are despatched to the laboratory in labelled cooler boxes within 24 hours. Digital laboratory data certificates for the latest monitoring period are provided in Appendix 2.

5.5 Action required

All in-waste monitoring positions need to be carefully protected to avoid damage.

As vegetation starts to grow, JLA should undertake routine ground clearance, particularly within the vicinity of GW3 and GW5.

JLA should ensure that the headworks at all positions are protected from damage and that surface run-off cannot directly enter the wells, particularly at GW2 and GA7.

New pump needs to be installed into GW4 and tested immediately.

6 ANNUAL TOPOGRAPHIC SURVEY

6.1 Waste Settlement

Topographic surveys are completed each year. The most recent topographic surveys of the landfill were completed in February 2018 and 14 January 2019 by Geotechnology. The topographic plans of the site constructed using the survey information are presented in Figures 5 and 6.

Once cells are permanently capped, settlement markers will be installed and these will then form the basis for measuring settlement in combination with visual observation.

The 2018 survey has once again made use of an Unmanned Aerial Vehicle (UAV). The UAV captured images have been used along with ground control points to create a highly accurate digital terrain model. This method of surveying collects data points at smaller intervals than the ground based methods previously used. The smaller intervals between data points results in a much more detailed digital terrain model, including topographic features which may be missed by a surveyor on foot.

Since the 2017 volume survey and report, construction of Sub-Cell 6 has been completed and waste material deposited. The as built survey of sub-cell 6 has now been incorporated into the base model for the calculation of waste volume.

6.2 Remaining Landfill Volume

By subtracting the digital terrain model of the leachate drainage layer from the digital terrain model of the landfill surface, the amount of waste deposited can be calculated. Subtracting this from the total landfill capacity then allows the remaining capacity to be estimated. The results of this calculation are awaiting finalisation as Geotechnology understand that JLA is discussing the final level and shape of the landform with the LPA. It is understood that Carmarthenshire County Council have approved the plans but Powys is yet to issue formal approval.

7 LEACHATE AND IN-WASTE GAS EVALUATION

7.1 Leachate Level

The monitoring of leachate levels is the responsibility of JLA. Leachate levels are monitored and reported directly to NRW by JLA and reproduced in Appendix 3.

Maintaining the leachate level below the Permit level is critical. This is because the depth of leachate significantly influences the environmental protection offered by the landfill drainage and lining system. The depth of leachate is also likely to affect the leachate and gas chemistry and also the generation of odorous compounds.

7.2 Leachate Chemistry

Waste deposition commenced in November 2008. Since this time leachate chemistry has shown a wide range of short-term variations, most probably as a result of leachate extraction and dilution by infiltration (see Appendix 3).

Monitoring of leachate quality has revealed 'cyclical' trends in the overall mineralisation; from a low point at the start of the year (when there is probably most dilution) to a peak (when there is lower dilution and greater evaporation) before returning to lower levels. These trends are most clearly seen in the major ion chemistry (Ca, Mg, Na, alkalinity, sulphate and K). Bicarbonate alkalinity is the dominant ion in solution, most likely as a consequence of bacterial activity releasing carbon dioxide. Such trends were less distinct in the most recent 12 months with the EC more stable and the leachate more dilute than in recent years.

Most non-hazardous trace metals remained at low levels during 2018 with Boron the most notable exception (~4000 – 12000 microg/l detected). Neither cadmium or mercury were detected. Collectively, this data suggests that the waste is not a significant source of many trace metals, most likely because they are being bound into the waste through adsorption and secondary precipitation i.e. the landfill is a 'sink' for the metals. If such precipitates are sulphides, which would appear reasonable given the detection of elevated sulphide and reducing conditions, this mechanism would also provide an explanation for the low sulphate levels observed (typically <500 mg/l). A summary of the inorganic parameters detected in leachate to date is provided in Table 7-1 alongside Environmental Assessment Levels (EAL's) for freshwater quality. Time series plots of key parameters is provided in Appendix 3.

By comparing the leachate quality against EAL's, Contaminants of Potential Concern (COPC) can be more easily identified as the EAL's help place the leachate quality within a regulatory framework. Key COPC are highlighted in Table 7-1.

Table 7-1 Summary of Inorganic Parameters Detected in Leachate

		Maximum concentrations					EAL
		2014	2015	2016	2017	2018	
Chloride	mg/l	687	462	281	250	523	250
Sulphate (soluble)	mg/l	126	189	273	481	462	400
Total Alkalinity as CaCO ₃	mg/l	5300	3200	1790	4750	3460	
Potassium Dissolved	mg/l	207	158	131	225	186	
Sodium Dissolved	mg/l	503	504	326	591	507	170
Calcium Dissolved	mg/l	253	231	177	323	242	
Magnesium Dissolved	mg/l	89.3	66.2	77.4	84.3	70.3	
BOD	mg/l	203	161	26.7	<100	0	
COD	mg/l	2000	910	499	3070	1160	
Total Organic Carbon	mg/l	710	327	159	825	348	
Total Oxidised Nitrogen as N	mg/l	67.8	0	<0.1	<0.5	0	
Ammoniacal Nitrogen as N	mg/l	900	531	274	910	693	<2.5
Nitrate as NO ₃	mg/l	300	0.362	<0.3	<1.5	0.44	
Nitrite as NO ₂	mg/l	0.15	0	<0.05	<0.05	0	
Arsenic Dissolved	ug/l	358	512	197	276	77.2	50
Boron Dissolved	ug/l	11400	10100	6500	12700	10700	2000
Cadmium Dissolved	ug/l	0	0	0.201	0	0	<0.25
Chromium Dissolved	ug/l	421	110	76.4	297	142	4.7
Copper Dissolved	ug/l	13	2.37	1.21	0	0	1 (bio)
Iron Dissolved	ug/l	2650	0.136	0.398	0.148	868	1000
Lead Dissolved	ug/l	42	0.611	0.822	0	0	7.2
Manganese Dissolved	ug/l	454	361	93.8	608	380	123
Nickel Dissolved	ug/l	237	51.4	26.7	68.8	50.9	20
Zinc Dissolved	ug/l	61	10.8	3.95	8.24	5.58	10.9 (bio)
Mercury Dissolved	ug/l	0	0	<0.01	0.0721	0	0.05

In recent years, the BOD/COD ratio has remained below 0.1 suggesting that the leachate contains a small component of active biodegradable matter. Ammonia detected in 2017 and 2018 was consistent with levels detected recently with levels between 300 and 1000 mg/l. Nitrate was detected at 300mg/l in April 2014, but in the last two years has been detected at less than 1 mg/l. At the pH and alkalinity of the leachate, ammonia will likely be present in its most toxic form as un-ionised ammonia and sulphide is likely to be dominated by the ionised anion HS⁻. However, Geotechnology suspects there are micro-environments within the landfill where pH is less than 7, as hydrogen sulphide gas is being produced and released.

Recent screening of the leachate for organic compounds has typically revealed a wide range of compounds at low levels, although the number of compounds detected in 2017 and 2018 is lower than that found in 2016. A summary of the compounds detected in the last two years is provided in Table 7-2. Phenol and mecoprop are considered the principle organic COPC as they have been detected in leachate at concentrations higher than average EAL's and/or Groundwater Trigger Levels, where present. The most recent data indicates the

occurrence of more hydrocarbons at higher concentrations. Some of the concentrations are potentially indicative of free phase globules.

Several of the compounds detected are likely to be present as a result of leaching and degradation of the synthetic materials (plastic and rubber) within the waste. Low levels of phenoxy herbicide mecoprop continue to be detected (<0.028 mg/l in 2017 ad 2018).

Table 7-2 Organic compounds detected in Leachate (L1) in 2017 and 2018

		30/06/2017	21/12/2017	27/06/2018	12/12/2018
EPH Range >C6 - C10	ug/l			133	<100
EPH Range >C10 - C40	ug/l	1490	12900	184000	300000
Total EPH (C6-C40)	ug/l			184000	300000
Mineral oil >C10 C40	ug/l	213	9650	130000	220000
GRO (C4-C10)	ug/l	107	810	249	127
Benzene	ug/l	<7	45	3.56	2.18
Toluene	ug/l	1.59	8.49	28.8	4.5
Ethylbenzene	ug/l	<1	5.86	2.91	<1
m,p-Xylene	µg/l	<1	2.81	2.39	1.08
o-Xylene	ug/l	1.08	2.07	1.61	1.61
Acenaphthene	µg/l	0.0276	<0.05	<0.5	0.199
Acenaphthylene	ug/l	0.0128	<0.05	<0.5	0.0958
Anthracene	ug/l			<0.5	0.23
Phenanthrene	ug/l	0.0492	0.194	0.923	0.95
Benzo(a)anthracene	ug/l	0.0215	<0.05		
Benzo(a)pyrene	ug/l	0.0123	<0.02		
Benzo(g,h,i)perylene	ug/l	0.0183	0.0737		
Indeno(1,2,3-cd)pyrene (aq)	µg/l	<0.014	0.075		
Fluorene	ug/l	0.0292	0.0766	<0.5	0.374
Fluoranthene (aq)	ug/l	0.0219	0.176	<0.5	0.302
Naphthalene	ug/l	0.196	0.336	<1	0.36
Pyrene	ug/l	0.0429	0.404	2.29	1.51
MCCP	ug/l	15.7	28.1	28	12.8
Methyl tertiary butyl ether (MTBE)	µg/l	<1	3.31	1.3	<1
mixed hydrocarbons	µg/l	413	-		
Phenol SVOCS mg/l	mg/l	0.24	2.32	0.02	0.19
Phenol	ug/l	<10	712		
Triisopropylphosphate	µg/l	481	-		
trimethylhexanoic acid	µg/l	134	-		
Xylenols & Ethyl Phenols	mg/l	<0.008	<0.08	0.07	<0.008
4-Methylphenol	ug/l	<10	798		
bis(2-Ethylhexyl)phthalate	ug/l			779	<2
Carbon Disulphide	ug/l	20.1	2.68	7	1.7
Cresols	mg/l	0.24	1.31	0.07	0.01
Dichloromethane	ug/l	<3	<3		
Benzothiazolone	µg/l	427	-		
Phenols (monohydric)	mg/l			0.16	0.2

7.3 Comparison with HRA Leachate Inventory

As Landsim is used to help design the landfill and then evaluate the potential risks the landfill may pose to the hydrosphere, a comparison of current leachate chemistry with the HRA model input parameters provides a simple framework for understanding the risks the landfill may be posing. Such a comparison is provided in Table 7-3. This reveals that the concentration of the selected parameters modelled using Landsim falls within or below the Probability Density Function used to describe and simulate the leachate inventory. This indicates that the predictions made in the modelling are still valid.

Table 7-3 Comparison of Leachate Chemistry to Landsim Model Inputs

	Ammoniacal Nitrogen as N	Chloride	Cadmium (diss.filt)	Chromium (diss.filt)	Phenols, Total Detected monohydric
	mg/l	mg/l	mg/l	mg/l	mg/l
Minimum	0.2	17	0.2	2	0.001
Most Likely	430	490	0.3	120	0.6
Maximum	2600	1120	0.5	250	6.4
Leachate concentration					
22/04/2015	531	428	<0.0001	0.1	0.04
16/12/2015	365	462	<0.0001	0.087	0.68
27/06/2016	274	281	0.000201	0.0764	0.17
30/6/2017	294	338	<0.00008	0.0525	0.24
21/12/2017	910	1100	<0.0008	0.297	2.32
27/6/2018	693	523	<0.00008	0.142	0.16
13/12/2018	267	225	<0.00008	0.0571	0.2

In the next HRA, consideration should be given to the occurrence of organic compounds in leachate and potentially Boron.

7.4 In-waste gas Chemistry

In-waste gas monitoring has been undertaken since December 2008. Since this time the gas chemistry has become increasingly anaerobic, with negligible oxygen detected since mid-2009. The gas is currently consistently dominated by methane (50-60%), carbon dioxide (40-45%), hydrogen sulphide (>200 ppm) and carbon monoxide. These results are obtained from the gas wells either after they have been prevented from gassing to the environment or after several hours of passive venting. Walkover surveys previously completed over the landfill using the GA2000, indicate the air 1m above the waste to be aerated with low/undetectable levels of H₂S.

The gas chemistry has evolved since mid-2011. The ratio between methane and carbon dioxide has increased during this period due to increased methane and lower carbon dioxide. The average concentration of hydrogen sulphide has also fallen in recent years.

The dominance of methane suggests that there are regions of the landfill that are strongly anaerobic. The whole waste mass is not, however, going to be homogeneous, due to many variables including the different ages of the waste, the size and type of the waste fragments,

proximity to waste surface, degree of saturation and extent of compaction. The occurrence of variable anaerobic conditions is supported by the detection of hydrogen sulphide alongside methane and also low levels of carbon monoxide.

Historical experience from the adjacent Phase 1 landfill and the larger Ty Canol landfill has shown that such small sites, with limited putrescible input, are not capable of sustaining a flare unless fuelled (i.e. incineration rather than flaring). At PNHL, JLA has trialled the use of a flarestack at GA1. JLA found that a flame could not be sustained for more than a few seconds due to very low rates of gas flow. The very low rates of gassing have been confirmed by measurement using two techniques. JLA purchased a Testo 405-V1 Velocity Stick which is a thermal anemometer designed to measure air velocity, volume flow and temperature. Despite attempting to measure the flow rate on several occasions, the minimum detection limit was never exceeded. Geotechnology also measures gas flow rate at the time of sampling with the gas analyser. This has recorded a range of readings (some negative due to atmospheric conditions) with a maximum flow rate of approximately 1.2 l/hr (0.0012m³/hr) through the sampling gas tap fitted to GA1. Measurements of landfill gas flow rate show little difference upon immediately opening the gas tap and after several hours of passive venting.

8 GROUNDWATER EVALUATION

Laboratory certificates are provided in Appendix 2.

8.1 Groundwater Level

Sub-artesian groundwater is found below the site. Based on an analysis of piezometric surface elevation the following borehole groupings are used for hydrochemical discussions:

- GW3 and GW5 – Up-hydraulic gradient of PNHL.
- GW2, GW4 and GW7 (now GW8) – Located down hydraulic gradient of PNHL.

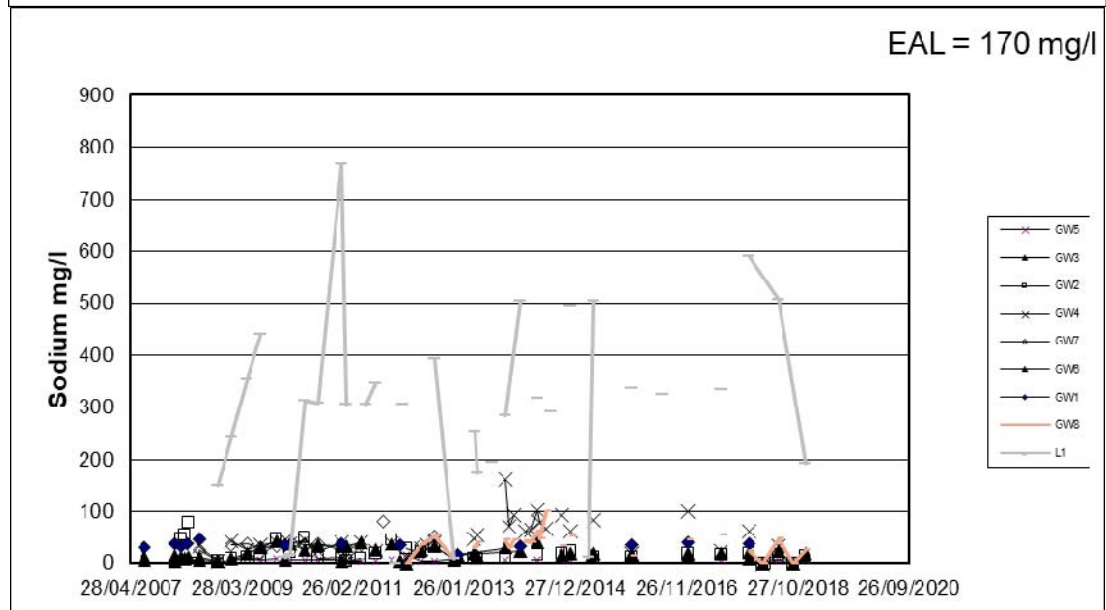
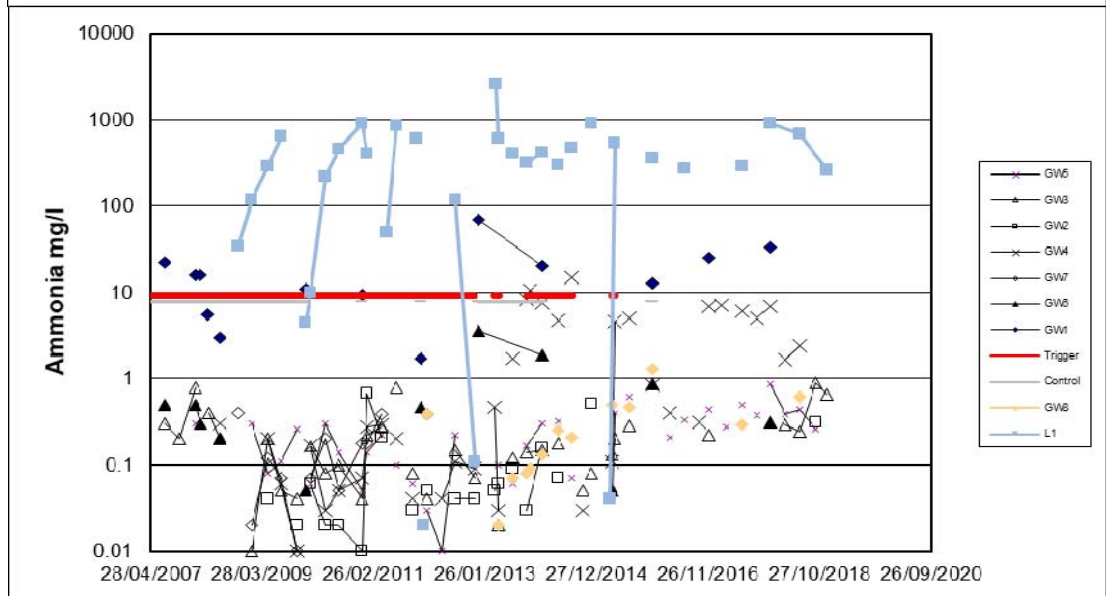
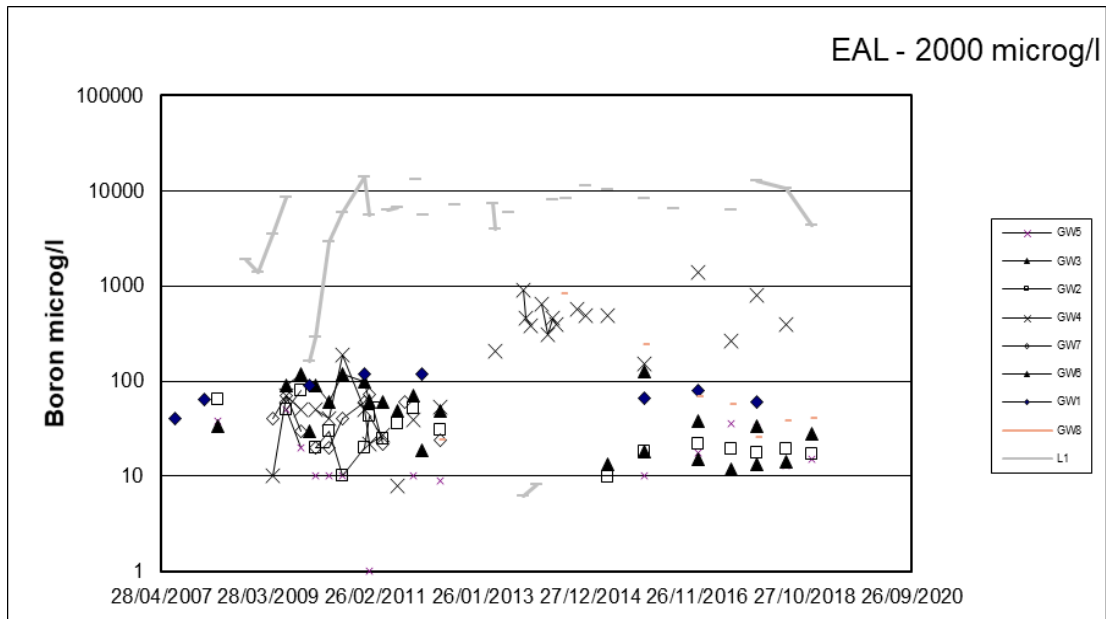
At this stage of landfill development, GW2 is not yet located hydraulically downgradient of PNHL.

8.2 Groundwater Quality

Groundwater within the vicinity of PNHL is circumneutral and of variable mineralisation. Prior to landfilling, mineralisation increased down the catchment with the wells located downgradient of the landfill revealing higher EC than those upgradient. At other times, this pattern was reversed. Most previous changes observed in the groundwater mineralisation are due to changes in the concentration of alkalinity, calcium and sulphate. Much of the variation observed to date has been suspected to be due to the earthworks required as part of the landfill construction. This has locally altered recharge patterns and exposed new areas to infiltration, oxidation and flushing.

Increases in mineralisation noted at upgradient monitoring positions complicates the interpretation of downgradient groundwater chemistry, as increased concentrations downgradient of the landfill may not be indicative of leakage or spillage from the landfill. This has been noted previously, particularly for calcium, alkalinity and sulphate. Some of these variations are potentially seasonal. Similarly, COPC contaminants of concern such as ammonia, mecoprop and phenols have been detected in upgradient groundwater.

Between 2013 and 2017 several parameters were detected at increased concentration downgradient of the landfill but this pattern is less distinct in 2018 and concentrations have fallen. The most notable trends are at GW4 with parameters such as mecoprop, chloride, boron, potassium, ammonia and sodium, as shown in time series graphs overleaf. In 2018, some of the concentrations downgradient of the landfill are comparable with or lower than those observed downgradient. Groundwater at GW4 and GW8, downgradient of the landfill, has become less mineralised.



8.3 Assessment against Permit Trigger Level

The only position where the inorganic trigger levels have been exceeded since 2014 is at GW4. During 2017, ammonia has been persistently elevated and higher than detected upgradient of the landfill. In 2018, the concentration of ammonia was below the trigger level. The trigger levels for zinc, cadmium and mercury have not been breached in any of the downgradient wells since 2014.

Table 8-1 Comparison of Groundwater Data with Trigger Levels

	Date	Chloride	Ammoniacal Nitrogen as N	Cadmium	Zinc	Mercury	Toluene	Mecoprop	Phenol
		mg/l	mg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
	Trigger Levels	200	2.5	5	100	1	4	0.4	91.3–107.9
GW2	29/03/2016	23.3	<0.2	-	2.93	-	-	-	-
GW2	27/06/2016	22.9	<0.2	-	1.11	-	-	-	-
GW2	27/09/2016	13.8	<0.2	-	<1.3	-	<1	-	<2
GW2	02/12/2016	21.3	<0.2	<0.08	<1.3	<0.01	-	<0.04	-
GW2	15/02/2017	23.4	<0.2	-	<1.3	-			
GW2	30/06/2017	25.1	<0.2	<0.08	<1	<0.01	<4		<2
GW2	27/09/2017	25.5	<0.2	-	3.24	-			
GW2	21/12/2017	21.8	<0.2	<0.08	<1	<0.01	<4	<0.02	<2
GW2	21/03/2018	26.1			<1				
GW2	06/04/2018	27.2	<0.1	<0.08	5.42	<0.01			
GW2	27/06/2018	25.1	-		3.55				
GW2	01/10/2018	27.2	<0.1	<0.08	3.17	<0.01	<1	<0.02	
GW4	16/12/2015	22.7	0.838	<0.1	2	<0.01	-	0.098	-
GW4	29/03/2016	45.2	0.405	-	1.82	-	<1	-	<2
GW4	27/09/2016	5.6	0.31	-	1.97	-	-	-	-
GW4	02/12/2016	106	6.79	<0.08	2.04	<0.01	-	0.765	-
GW4	15/02/2017	38.6	7.2	-	<1.3	-			
GW4	30/06/2017	22.7	6.15	<0.08	<1	<0.01	<4	0.232	<2
GW4	27/09/2017	38.6	5	-	1.28	-			
GW4	21/12/2017	60.7	6.88	<0.08	2.02	<0.01	<4	0.61	<2
GW4	21/03/2018	15	1.67		7.39				
GW4	27/06/2018	23.1	2.41	<0.08	2.34	<0.01	<1	<0.02	
GW8	29/03/2016	20.5	<0.2	-	151	-	-	-	-
GW8	27/09/2016	12.9	<0.2	-	<1.3	-	-	-	-
GW8	02/12/2016	11.1	<0.2	<0.08	3.3	<0.01	-	0.091	-
GW8	15/02/2017	10.6	<0.2	-	<1.3	-			
GW8	30/06/2017	13.1	0.297	<0.08	<1	<0.01	<4		<2
GW8	27/09/2017	8.1	<0.2	-	<1	-			
GW8	21/12/2017	14.4	<0.2	<0.08	2.55	<0.01	<4	<0.02	<2
GW8	21/03/2018	6.7	<0.2		<1		<4	<0.02	<1
GW8	27/06/2018	6.4	0.612	<0.08	1.58	<0.01			
GW8	01/10/2018	6	<0.2		1.12				

A similar pattern is also evident when the organic trigger levels for mecoprop, toluene and phenols are considered. No breaches have been noted for toluene or phenols at any position but at GW4, mecoprop has been detected above the very low trigger level (0.4 microg/l) on several occasions over recent years (see Table 8-1). At GW8, 1 microg/l of mecoprop was detected in June 2014, 0.05 microg/l in December 2015, 0.091 microg/l in 2016 but in 2017 and 2018 mecoprop was not found above laboratory detection limit.

9 SURFACE WATER EVALUATION

The surface water sample points are to be modified once the new surface water management systems is fully implemented. Once the system is fully operational the surface water quality will be compared against the current Permit requirements.

9.1 Sampling Points

Surface water infrequently flows in the ditch to the south of the landfill. As a consequence, small stagnant pools of surface water are often found which are subsequently flushed when sufficient run-off occurs. These stagnant pools are not sampled. During the hot and dry summer months of 2018 no running water was encountered for several months when sampling.

Sample points SW3 and SW4 shown on Figure 3 were, until 2011, typically solely fed by undeveloped areas of the landfill and surface run-off from the adjacent livestock field which is used for sheep grazing. However, during 2011 this situation changed with JLA adopting a different surface water management strategy. The new strategy involves passing surface run-off through a series of retention ponds before the decant water over-flows to the stream at SW5 just upstream of current sample point SW4.

Moving downgradient, the stream is overgrown with vegetation and is not easily accessible. Directly below SW3 a small ditch enters from the north. This drainage ditch previously contained several ponds excavated to allow suspended solids to settle. These ponds were backfilled during 2011 although surface run-off over the bare fill still sometimes occurs. Immediately upstream of the confluence with the small drainage ditch is sample point SW3 and immediately downstream is sample point SW2. This latter sample point is typically dominated by flow from upgradient SW3. Moving further downstream towards SW1, the stream remains overgrown with vegetation and difficult to access until sample point SW1. Along its whole length, the stream receives lateral overland flow from the adjacent livestock field.

9.2 Water Quality

As sampling is aimed at characterising flowing surface water rather than the small stagnant pools, the surface water encountered to date is oxygenated. During 2009, surface water pH started to progressively become slightly more acidic. Since then, this trend stabilised and reversed with all values above 7.5 since 2015. At the same time, EC has been more variable with a spikey time series graph. The EC tends to be higher in surface water further down the catchment at SW1 (as shown in Appendix 5), although this is not always the case. The EC levels observed in 2017 and 2018 are comparable to those observed in recent years. The major ions contributing to the main hydrochemical characteristics are calcium and alkalinity at all sample points but other parameters also show upward trends, albeit for sometimes short periods.

A wide range of non-hazardous and hazardous pollutants have been historically detected in surface water. Parameters detected include As, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Zn and ammonia. Some of these parameters have been present at concentrations that exceed the freshwater EQS.

Hazardous substances Cd and Hg have been rarely detected. In 2018, 0.0009 mg/l cadmium was detected at SW1 in December but below the analytical detection limit at all other times it was analysed. In 2017, cadmium was detected on three occasions (Feb, July and August) at up to 0.0000116 mg/l. The cause of these variations is unclear.

When selected surface chemistry is compared with the relevant control levels it is evident that surface water has been dilute, clear and of good quality as it has left the immediate catchment. The number of breaches has declined in recent years as surface water management has improved.

Table 9-1 Comparison of Surface Water Quality from SW1 with Control Levels

Date	Suspended Solids	Chloride	Ammoniacal Nitrogen as N
	mg/l	mg/l	mg/l
Assessment Level	50	200	0.75
26/10/2015	360	11.9	<0.2
19/01/2016	5.5	31.7	5.34
19/02/2016	3.5	27.6	2.53
29/03/2016	207	15.1	0.547
23/05/2016	573	11.9	0.817
27/06/2016	2	12.8	<0.2
28/07/2016	26.5	13	<0.2
30/08/2016	7	11.7	<0.2
27/09/2016	6840	11.8	0.542
13/10/2016	15.5	17.1	<0.2
23/11/2016	7.5	12.6	<0.2
02/12/2016	5.5	15.1	<0.2
26/01/2017	<2	15.6	<0.2
15/02/2017	4	16.5	<0.2
15/03/2017	3.5	13.5	<0.2
30/06/2017	<2	23.2	<0.2
31/07/2017	9	19.2	1.43
22/08/2017	2.5	19.1	<0.2
27/09/2017	<2	17	<0.2
19/10/2017	<2	18.5	<0.2
06/11/2017	26.6	19.1	<0.2
21/12/2017	8.3	12.8	0.748
23/02/2018	<2	15.4	<0.2
09/04/2018	<9	9.7	<0.2
24/10/2018	<2	30	<0.2
20/11/2018	4	24.6	<0.2
13/12/2018	3.05	34.4	2.07
14/01/2019	<4	21.8	<0.2

9.3 Other Inputs to Surface Water

Further downstream of SW1 there are other inputs that are influencing surface water quality. These include run-off from farmland and the adjacent closed landfills.

Monitoring of surface water by NRW at the Golf Club, some 200m downgradient, has revealed elevated ammonia (>10 mg/l) on many occasions over recent years. Clearly, surface run-off from PNHL is not the source of this ammonia.

10 PERIMETER GAS EVALUATION

All of the gas data is presented in Appendix 6.

10.1 In-waste Gas Monitoring

In-waste gas monitoring has been undertaken since December 2008. Since this time the gas chemistry has become increasingly anaerobic with negligible oxygen detected since mid-2009. The gas is currently consistently dominated by methane (50-60%) and carbon dioxide (40-45%). Since 2010, the concentration of hydrogen sulphide has declined and during 2017 was less than 216 ppm. In 2018, higher values have been detected (upto 1618 ppm) but these are not persistent. Carbon monoxide has remained below 10 ppm.

10.2 Perimeter Gas Monitoring

Perimeter gas monitoring at Palleg commenced on 29 May 2008 at GA7 and 29 October 2008 at GA8 and GA9. Waste started to be placed into Cell 1 on 24 September 2008 after the liner was installed in August 2008. Methanogenesis in Cell 1 appears to have started by June 2009.

The results from the perimeter gas wells are variable but have historically been characterised by carbon dioxide between 0% - 4% v/v and methane 0% - 0.4% v/v. At GA8 however, gas concentration and flow imperisistently increased from 2013 to 2017 with 60% methane and 30% carbon dioxide detected. During 2018, such levels were not observed as summarised in Table 10-1. At all positions there were short-term breaches of the assessment levels (See Table 10-1 and Appendix 6).

Table 10-1 Comparison of perimeter gas chemistry with assessment levels

Date	Oxygen	Carbon Dioxide	Methane	Hydrogen Sulphide	Carbon Monoxide	Constant Flow	Barometric Pressure
	O2	CO2	CH4	H2S	CO		
	%	%	%	ppm	ppm	l/hr	mB
GA7		4.6	1				
15/03/2017	15.7	2.1	0.1	0	0	0	1020
30/06/2017	14.3	2.8	0.3	0	0	0	991
27/09/2017	14.8	2.3	0.2	0	0	0	998
21/12/2017	15	2	0.1	0	0	0	
21/03/2018	16.6	4.3	8.1	1	0	0.3	1015
27/06/2018	19.3	0.6	0.1	0	0	0.1	1010
01/10/2018	16.5	6.1	0.4	0	0	0	1014
GA8		4.8	1				
15/03/2017	19.6	2.1	0.7	2	0	0.1	1020
30/06/2017	21.1	0.6	0	0	0	0.1	992
27/09/2017	7	22	39.2	0	0	0	999
27/09/2017	7.9	20.9	36.7	0	0	0	999
21/12/2017	5	3.2	2	0	0	0	
21/03/2018	20.4	0.5	0	1	0	0	1015
27/06/2018	18.3	1.8	0	0	1	0.1	1009
01/10/2018	8.8	11.5	0.7	0	0	0.1	1015
13/12/2018	18	4.7	0.1	0	0	0.1	997
GA9		4.7	1				
15/03/2017	12	9.5	9.1	8	0	0.1	1020
30/06/2017	18.4	5.7	6.7	0	0	0.1	992
21/12/2017	17	1	0	0	0	0	
27/06/2018	19.7	0.1	0	0	0	0.2	1009
01/10/2018	19.9	0.1	0.4	0	0	0.1	1014
13/12/2018	4	21.4	11.4	0	0	0.2	997

The adjacent lined landfill is not considered a plausible source of the variations observed at GA8 or GA9 as the landfill is free to vent to the atmosphere. At this stage, more localised sources appear to offer a more plausible explanation than landfill gas migrating from a freely venting landfill through low permeability glacial deposits. The most obvious cause appears to be related to earthworks around the site which started during 2013. Soil and stone material was placed close to the monitoring points, particularly GA8, following excavation for Cell 4 and construction of surface water management system. It therefore appears that the placement of this material has resulted in strong anaerobic conditions developing in the underlying peat. This could occur where the material has covered vegetation or made ground and/or altered drainage patterns.

11 ODOUR

There is a long list of trace gases associated with landfills which can give rise to odour complaints. According to EA guidance LFTGN03, landfill gas emissions can, under certain meteorological conditions, give rise to odours extending over several kilometres. The emissions of landfill gas may need to be diluted several million times in order to render its odour undetectable. Still, calm conditions, during cold periods are more likely to give rise to poor dilution. Such conditions generally prevail for about 9.4 percent of each year in the UK.

During the latter part of 2009, Geotechnology understands that JLA started to receive complaints from a number of residents within several kilometres regarding suspected malodours from the landfill. In accordance with the Permit, JLA managed and recorded these complaints in accordance with the existing contingency action plans. Since this time, the level of odour and complaints has reduced. Complaints received during 2017 were investigated and NRW was also informed.

Following receipt of a complaint, JLA adopts a proactive approach to try and identify and reduce the odours considered to be associated with the landfill.

12 SUMMARY AND RECOMMENDATIONS

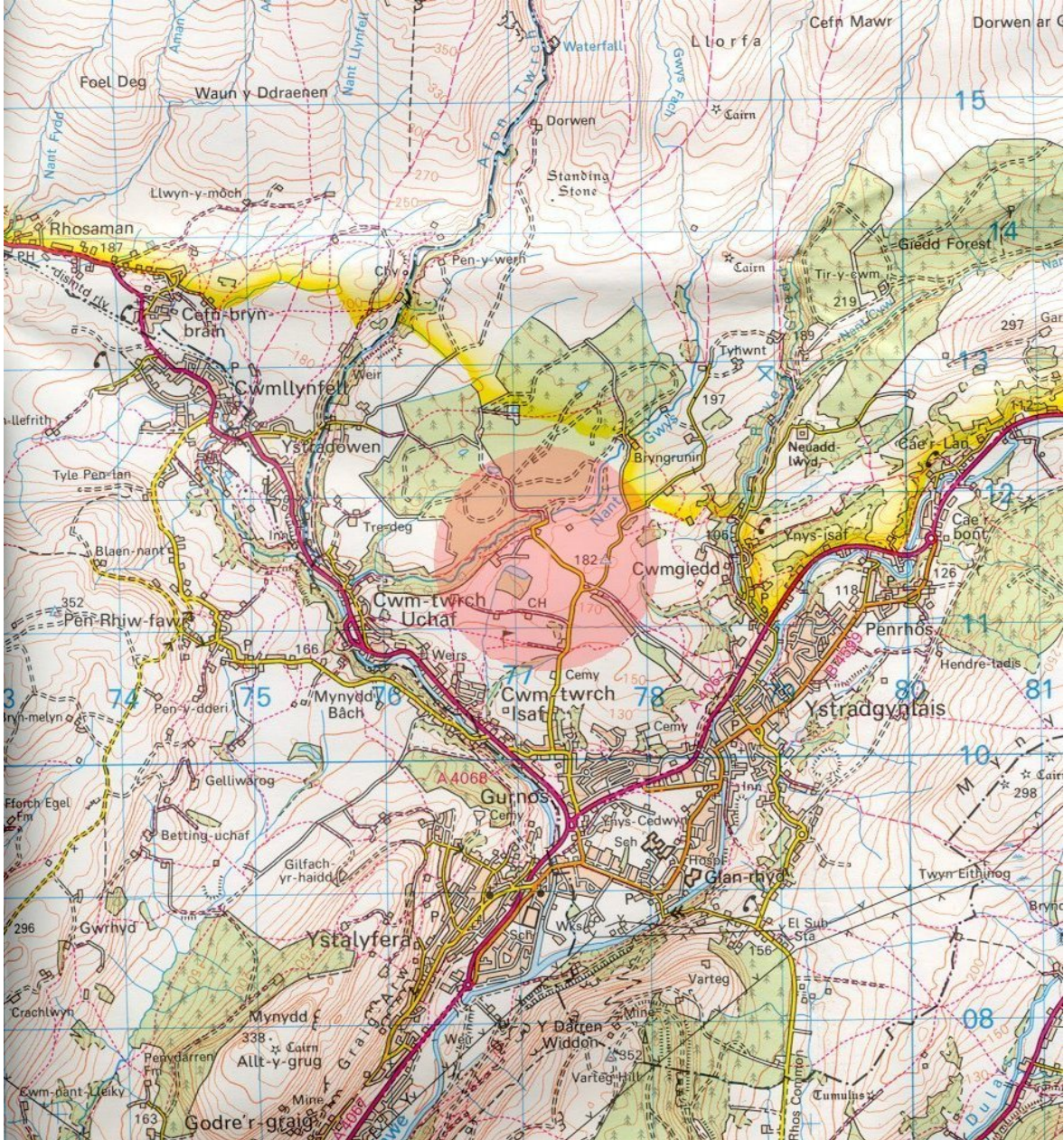
12.1 Review of Performance

When the changes in groundwater quality at GW4 were previously compared to upgradient groundwater quality it was concluded that groundwater chemistry was changing as it moves through the catchment beneath the landfill. The parameters affected were also found in leachate. The most recent data reveals that groundwater downgradient of the landfill is less mineralised than last year and several parameters in groundwater downgradient of the landfill are found at comparable concentrations upgradient.

12.2 Actions

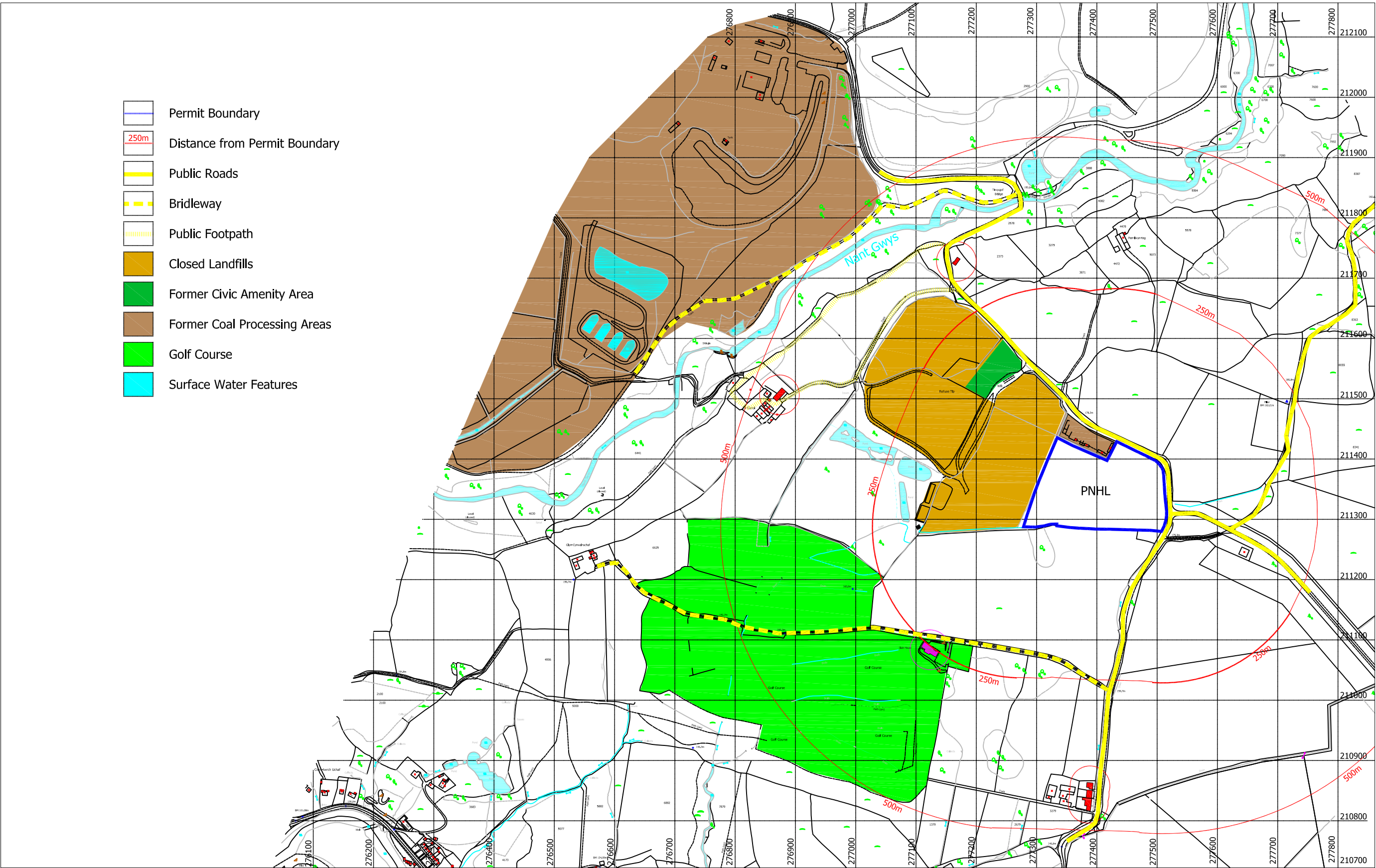
- At this stage, the cause of the changes observed at GW4 is unclear. As this monitoring position is downgradient of the landfill and leachate apron, JLA should regularly inspect the headworks at GW4 and GW8 and prevent surface run-off moving towards either position. JLA should also ensure that any perched leachate observed in the waste is able to infiltrate back into the leachate collection system.
- JLA should continue to routinely inspect the leachate monitoring and recovery infrastructure.
- JLA should continue to implement a proactive maintenance programme to ensure the monitoring network is secure and accessible.
- JLA should evaluate leachate levels within the landfill and the adjacent closed landfill and ensure they are being monitored in accordance with current guidance.

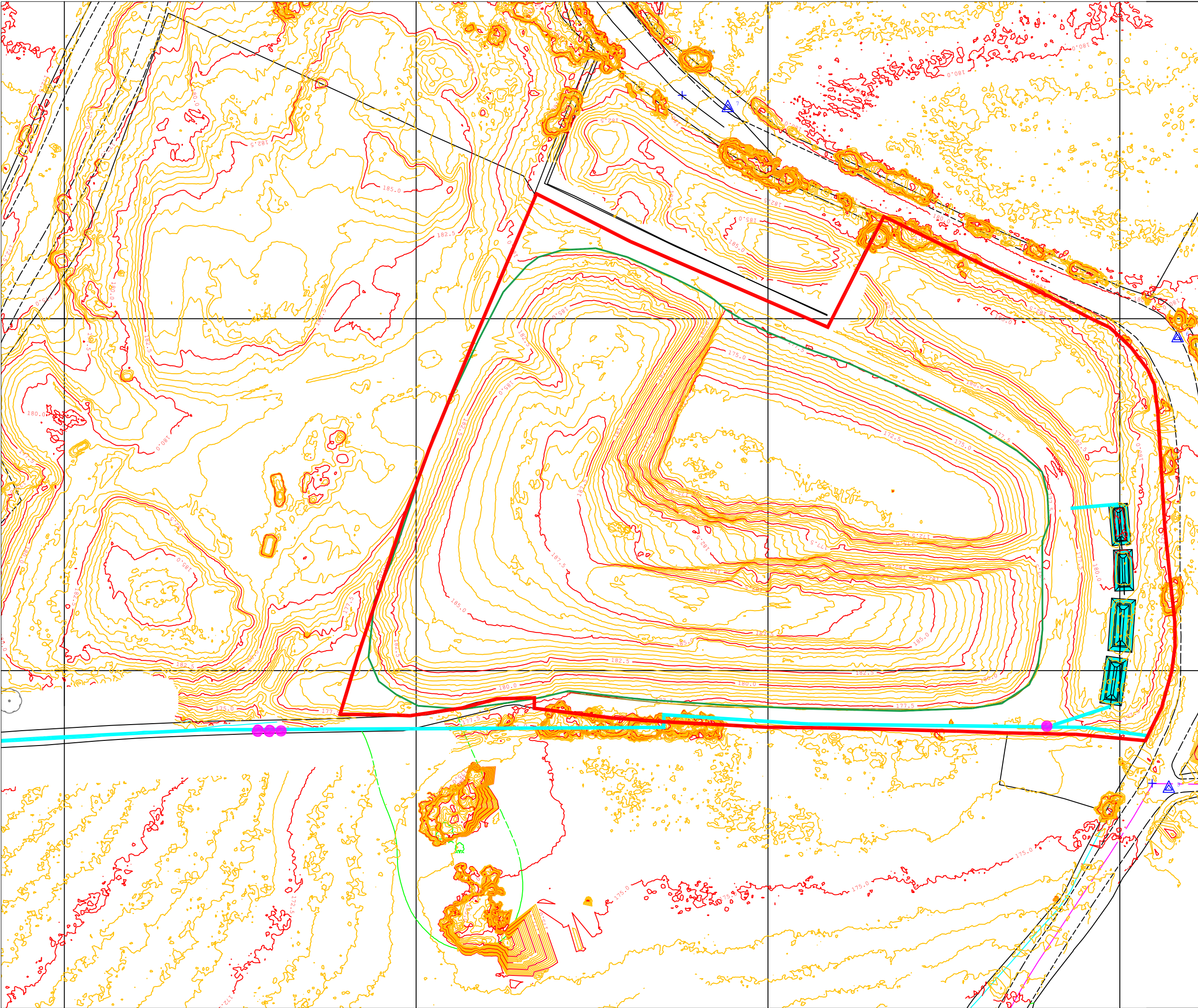
Figure 1 Site Location Plan



Reproduced from the Ordnance Survey Land Ranger Map
with the permission of The Controller of Her Majesty's Stationery Office
© Crown Copyright. Geotechnology SA10 8HE Licence No 100018015

Figure 2 Detailed Site Plan





Drawing Number 1783/3

Legend

Normal Contour (0.5m)

Prominent Contour (2.5m)

Palleg Landfill Extent

Proposed Surface Water Treatment Areas

Field cut-off ditch / clean run-off

Collection Ditch - dirty run-off

Pumped water - arrow indicating direction

Surface Water Monitoring Point

Notes

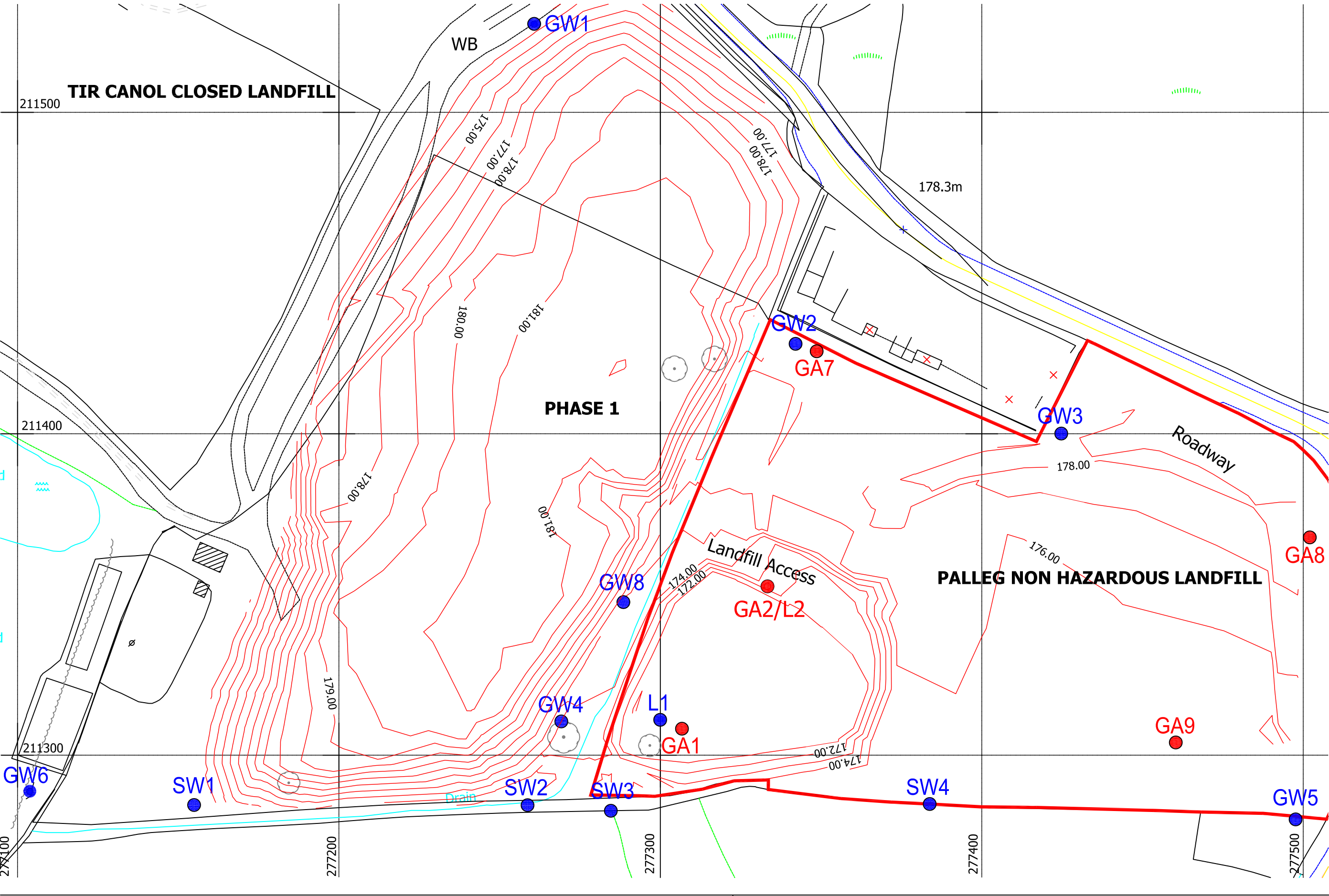
Digital survey model generated using Pix4D image processing software.

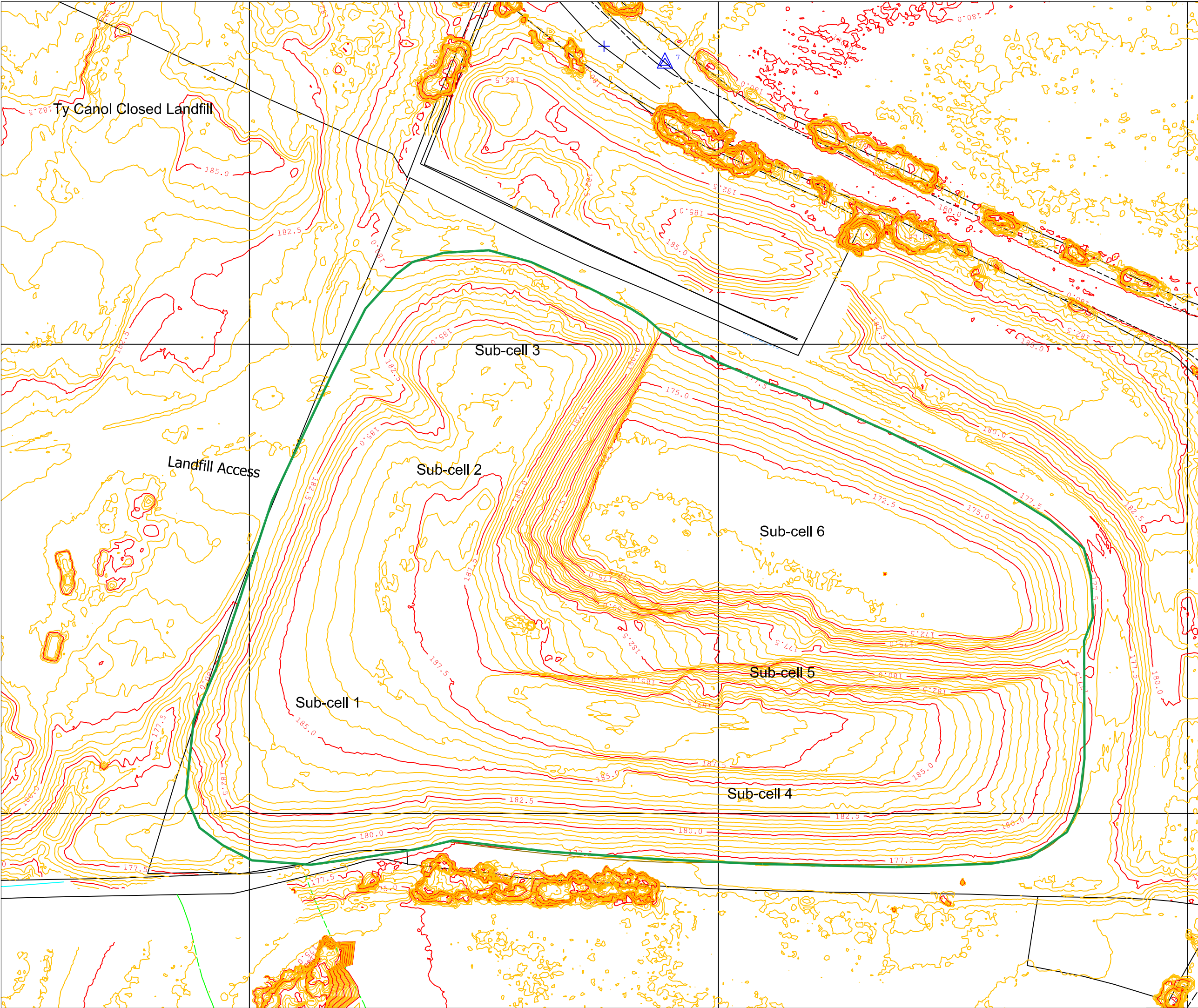
Imagery acquired by DJI Phantom 4 pro photogrammetry survey on 14 January 2019.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

Rev	Date	Status/Ammendments
CLIENT		
JLA Recycling Ltd		
PROJECT		
Review of 2018 Landfill Monitoring		
TITLE		
Proposed Monitoring Network		
DRAWING NUMBER		REVISION
1783/3		0
DATE	DRAWN	CHECKED
03.19	KJT	
GEO TECHNOLOGY		

Figure 4 Current Monitoring Network





Drawing Number 1783/5

Legend

Normal Contour (0.5m)

Prominent Contour (2.5m)

Palleg Landfill Extent

Notes

Digital survey model generated using Pix4D image processing software.

Imagery acquired by DJI Phantom 4 pro photogrammetry survey on 14 January 2019.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

Rev	Date	Status/Ammendments

CLIENT

JLA Recycling Ltd

PROJECT

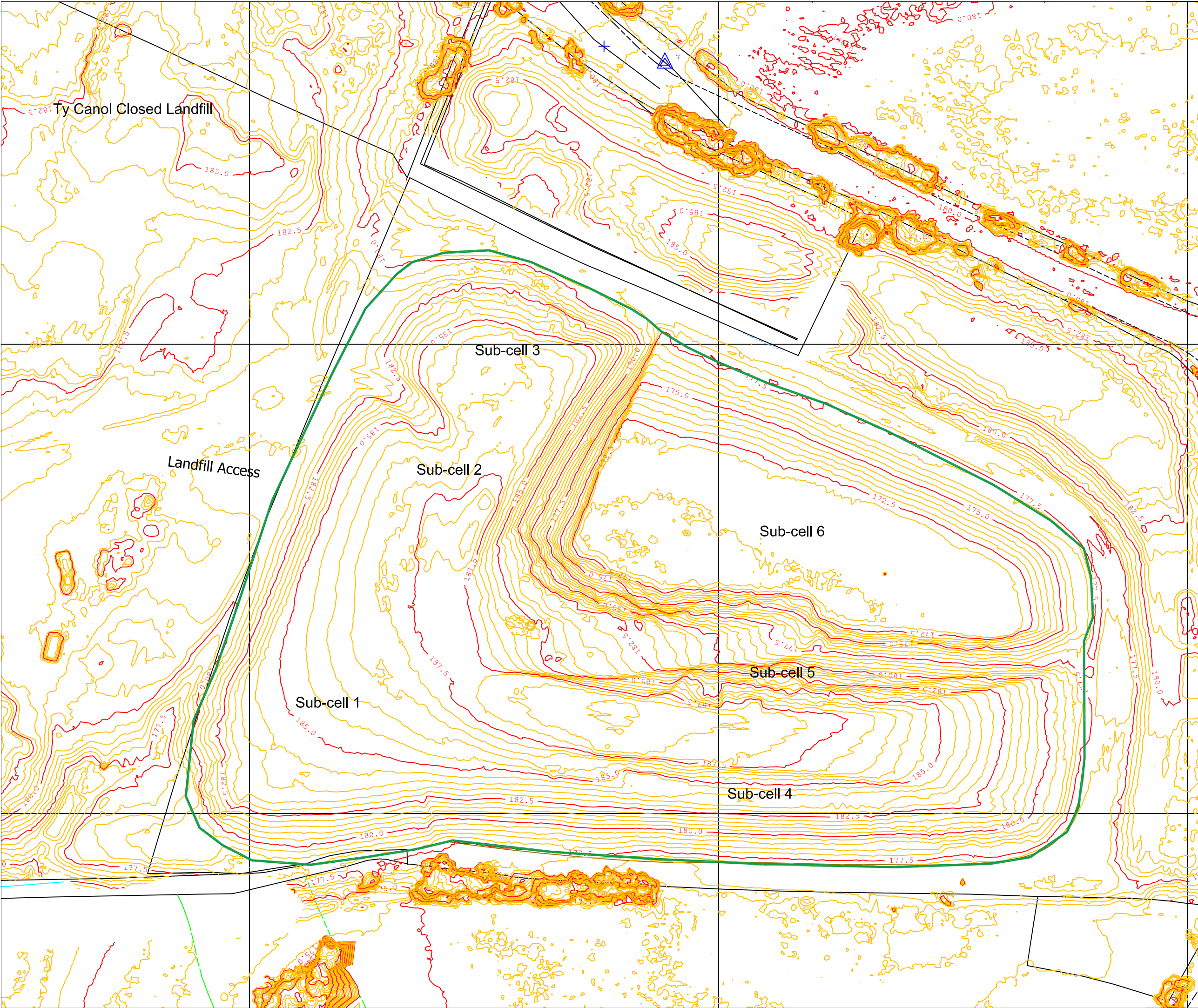
Review of 2018 Landfill Monitoring

TITLE

Topographic Survey of Landfill
January 2018

DRAWING NUMBER		REVISION	
1783/5		0	
DATE	DRAWN	CHECKED	SCALE AT A3
03.19	KJT		1:750

Geotechnology Limited
Ty Coed, Cefn-yr-Allt,
Aberdulais, Neath
SA10 8HE
01639 775293
www.geotechnology.net



Drawing Number 1783/6

Legend

Normal Contour (0.5m)

Prominent Contour (2.5m)

Palleg Landfill Extent

Notes

Digital survey model generated using Pix4D image processing software.

Imagery acquired by DJI Phantom 4 pro photogrammetry survey on 14 January 2019.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

Rev	Date	Status/Ammendments

CLIENT

JLA Recycling Ltd

PROJECT

Review of 2018 Landfill Monitoring

TITLE

Topographic Survey of Landfill
January 2019

DRAWING NUMBER		REVISION	
1783/6		0	
DATE	DRAWN	CHECKED	SCALE AT A3
03.19	KJT		1:750

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**PALLEG LANDFILL
LOWER CWMTWRCH**

PERMIT BT19081X

**Review of 2018
Landfill Monitoring**

**Appendix 1
List of Reports**

Report Number 1783r1v1d0319

List of Relevant Reports

Report Number	Report Title
Annual Reviews	
518.1/0/1207	2007 Annual Monitoring Review
644r1v1d0109	2008 Annual Monitoring Review
786r1v1d0310	2009 Annual Monitoring Review
941r1d1d0111	2010 Annual Monitoring Review
1127r1v1d0911	2011 Annual Monitoring Review
1164r1v1d0313	2012 Annual Monitoring Review
1213r1v1d0114	2013 Annual Monitoring Review
1344r1v1d0115	2014 Annual Monitoring Review
1429r1v1d0116	2015 Annual Monitoring Review
1553r1v1d0117	Review of 2016 Landfill Monitoring
Landfill Construction /CQA	
249.1 Issue 0 Aug 2003	Palleg Landfill Phase 2 PPC Permit Application
402.1 Issue 3 June 2006	Palleg Landfill Phase 2 CQA Plan
402/Spec/Rev.2 June 2006	Palleg Landfill Phase 2 Design and Specification
453	Closure Report
483	CQA Supervision
650.2/0/1107	Additional Groundwater and Gas Well Installation
671.3/0/0708	Construction Specification for Cell 1
974r1v2d0710	Non-Hazardous Waste Cell 2 Design and Spec
974r2v2d0710	Phase 2 Construction Quality Assurance Plan
974r3v1d0910	Phase 2 Construction Quality Assurance Validation Report
1176r1v1d0312	Capping and Restoration Design and Specification
1176r2v1d0312	Capping and Restoration CQA Plan
1094r1v2d0611	Construction Specification for Sub-Cell 3
1094r2v1d0611	Construction Quality Assurance Plan for Sub-Cell 3
1094r3v1d0412	Construction Quality Assurance Validation Report for Sub-Cell 3
1141r4v1d1211	Construction Quality Assurance Plan and Specification
1235r1v1d0313	Non-Hazardous Waste Sub-Cell 4 Construction Specification
1235r2v1d0313	Non-Hazardous Waste Sub-Cell 4 Construction Quality Assurance Plan
1235r3v1d1214	Construction Quality Assurance Validation Report sub-cell 4
Other Technical Reports	
1069r1v1d0111	Review of Gas Risk Assessment
1141r1v1d1211	Infilling Proposals
1141r2v1d1211	SRA Review
1141r3v1d1211	Surface Water Management Plan
1141r4v1d1211	CQA Plan and Specification
1149r2v1d0312	Validation Report for Replacement Well
1176r2v1d0312	Capping and Restoration CQA Plan
1253r1v1d0613	Environmental Management and Monitoring Plan Signposting Document
1315 Palleg Volumes 2013	Palleg Volumes

**PALLEG LANDFILL
LOWER CWMWRCH**

PERMIT BT19081X

**Review of 2018
Landfill Monitoring**

**Appendix 2
Digital Laboratory
Certificates**

Report Number 1783r1v1d0319



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

JLA Disposal Ltd
Glyncynwal Uchaf Farm
Lower Cwmtwrch
SA9 2QQ

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 23 January 2018
Customer: H_JLADISP_SWA
Sample Delivery Group (SDG): 171222-11
Your Reference:
Location: Palleg
Report No: 441118

We received 10 samples on Friday December 22, 2017 and 10 of these samples were scheduled for analysis which was completed on Tuesday January 23, 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: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16808040	CANOL LEACHATE			21/12/2017
16808032	GW1			21/12/2017
16808033	GW2			21/12/2017
16808034	GW3			21/12/2017
16808035	GW4			21/12/2017
16808036	GW5			21/12/2017
16808037	GW6			21/12/2017
16808038	GW8			21/12/2017
16808039	L1			21/12/2017
16808041	SW1			21/12/2017

Maximum Sample/Coolbox Temperature (°C) :

11.2

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: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container										Sample Type
				Vial (ALE297)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	250ml BOD (ALE212)	1plastic (ALE221)	1000ml glass bottle (ALE220)	H2SO4 (ALE244)	250ml BOD (ALE212)	1plastic (ALE221)	1000ml glass bottle (ALE220)	
16808040	CANOL LEACHATE			LE	LE	LE	GW	GW	GW	GW	GW	GW	GW	LE
16808032	GW1			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
16808033	GW2			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
16808034	GW3			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Acid Herbicides (Suite 3) (W)*	All	NDPs: 0 Tests: 7						X					X	
		NDPs: 1 Tests: 0	N											
Alkalinity as CaCO3	All	NDPs: 0 Tests: 7						X					X	
		NDPs: 0 Tests: 2		X										
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												
Anions by Kone (w)	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												
BOD True Total	All	NDPs: 0 Tests: 7												
		NDPs: 0 Tests: 2												
COD Unfiltered	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2												
		NDPs: 0 Tests: 7												

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

EPH (DRO) (C10-C40) Aqueous (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

GRO by GC-FID (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Mercury Dissolved

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Mineral Oil C10-40 Aqueous (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Nitrite by Kone (w)

All

NDPs: 0
Tests: 2

X

X

Organotins in Aqueous Samples

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

PAH Spec MS - Aqueous (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Pesticides (Suite I) by GCMS

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Pesticides (Suite II) by GCMS

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Pesticides (Suite III) by GCMS

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

pH Value

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 2

X

NDPs: 0
Tests: 7

X

X

X

Sulphide

All

NDPs: 0
Tests: 2

X

Suspended Solids

All

NDPs: 0
Tests: 5

X

X

SVOC MS (W) - Aqueous

All

NDPs: 0
Tests: 2

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

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

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

SVOC MS (W) - Aqueous

All

NDPs: 0
Tests: 7

Total EPH (aq)

All

NDPs: 0
Tests: 2

Total Organic and Inorganic Carbon

All

NDPs: 0
Tests: 2

VOC MS (W)

All

NDPs: 0
Tests: 2

16808040

CANOL LEACHATE

16808032

GW1

16808033

GW2

16808034

GW3

1000ml glass bottle (ALE220)

H2SO4 (ALE244)

250ml BOD (ALE212)

1plastic (ALE221)

250ml BOD (ALE212)

1plastic (ALE221)

H2SO4 (ALE244)

1000ml glass bottle (ALE220)

HNO3 Filtered (ALE204)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

1000ml glass bottle (ALE220)

1plastic (ALE221)

250ml BOD (ALE212)

H2SO4 (ALE244)

Vial (ALE297)

LE

LE

LE

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

GW

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GW

GW

GW

GW

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

16808039

16808041

L1

SW1

1000ml glass bottle (ALE220)	1l plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
LE	LE	LE	LE	LE	LE	LE	SW	SW	SW	SW

Acid Herbicides (W)

All

NDPs: 0
Tests: 1

X

Alkalinity as CaCO3

All

NDPs: 0
Tests: 1

X

Alkalinity Filtered as CaCO3

All

NDPs: 0
Tests: 2

X

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X

BOD True Total

All

NDPs: 0
Tests: 1

X

X

COD Unfiltered

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 2

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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

Lab Sample No(s)

16808039

16808041

Customer
Sample Reference

L1

SW1

AGS Reference

Depth (m)

Container

1000ml glass bottle (ALE220)	1l plastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vai (ALE297)	ZnAc (ALE246)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
LE	LE	LE	LE	LE	LE	LE	SW	SW	SW	SW

Sample Type

Phenols by HPLC (W)

All

NDPs: 0
Tests: 2

X

Sulphide

All

NDPs: 0
Tests: 2

X

Suspended Solids

All

NDPs: 0
Tests: 1

X

SVOC MS (W) - Aqueous

All

NDPs: 0
Tests: 2

X

Total EPH (aq)

All

NDPs: 0
Tests: 2

X

Total Organic and Inorganic Carbon

All

NDPs: 0
Tests: 1

X

NDPs: 0
Tests: 2

X

VOC MS (W)

All

NDPs: 0
Tests: 2

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.		Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
tot.unfilt	Total / unfiltered sample.		21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
*	Subcontracted test.		22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017
**	% 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		171222-11	171222-11	171222-11	171222-11	171222-11	171222-11
(F)	Trigger breach confirmed		16808040	16808032	16808033	16808034	16808035	16808036
1-5&5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
2,3,6-TBA (2,3,6-trichlorobenzoic acid)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
2,4,5-T (2,4,5-trichlorophenoxy acetic acid)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
2,4,5-TP (fenoprop)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
2,4-D (2,4-dichlorophenoxyacetic acid)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
2,4-DB (4-(2,4-dichlorophenoxy)butyric	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
2,4-DP (dichlorprop)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Bentazone*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Benazolin*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Bromoxynil*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Dicamba*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	0.03	<0.02
Fluroxypyr*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Ioxynil*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
MCPA*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
MCPB*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
MCP (mecoprop)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	0.61	0.02
Pentachlorophenol (PCP)*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Triclopyr*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Clopyralid*	<0.02 µg/l	SUB		<0.02	<0.02	<0.02	<0.02	<0.02
Suspended solids, Total	<2 mg/l	TM022			174	143	379	173
					#	#	#	#
Alkalinity, Total as CaCO3	<2 mg/l	TM043		540	415	460	505	265
				#	#	#	#	#
Alkalinity, Total as CaCO3 (diss.filt)	<2 mg/l	TM043	1200					
BOD, unfiltered	<1 mg/l	TM045		10.7	<1	<1	2.35	2.77
				#	#	#	#	#
Organic Carbon, Total	<3 mg/l	TM090	44	3.38	<3	<6	11.9	15.9
				#	#	#	#	#
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	76.2	33.1	<0.2	<0.2	6.88	0.874
				#	#	#	#	#
Sulphide	<0.01 mg/l	TM101	<0.01					
COD, unfiltered	<7 mg/l	TM107	121	402	96.4	79.6	138	107
			#	#	#	#	#	#
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	2.18	0.808	0.914	0.917	1.06	0.479
			#	#	#	#	#	#
Arsenic (diss.filt)	<0.5 µg/l	TM152	2.58	2.07	<0.5	5.34	1.9	6.1
			#	#	#	#	#	#
Boron (diss.filt)	<5 µg/l	TM152	1390	59.4	17.4	13.4	803	32.3
			#	#	#	#	#	#
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
			#	#	#	#	#	#
Chromium (diss.filt)	<1 µg/l	TM152	4.11	<1	<1	<1	<1	<1
			#	#	#	#	#	#
Copper (diss.filt)	<0.3 µg/l	TM152	0.33	<0.3	<0.3	<0.3	<0.3	1.32
			#	#	#	#	#	#
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	0.719	<0.2	<0.2	<0.2	0.439
			#	#	#	#	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
M	mCERTS accredited.		21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
aq	Aqueous / settled sample.		22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017
diss.filt	Dissolved / filtered sample.		171222-11	171222-11	171222-11	171222-11	171222-11	171222-11
tot.unfilt	Total / unfiltered sample.		16808040	16808032	16808033	16808034	16808035	16808036
*	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						
Manganese (diss.filt)	<1 µg/l	TM152	1720	452	1.32	4230	1840	253
Nickel (diss.filt)	<0.4 µg/l	TM152	5.69	0.545	<0.4	1.35	1.39	3.55
Zinc (diss.filt)	<1 µg/l	TM152	38.9	3.08	<1	4.41	2.02	15.6
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	204	978	<100	<100	<100	<100
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	<200	381	<100	<100	<100	<100
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	204	978	<100	<100	<100	<100
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01	0.0333	<0.01	<0.01
Nitrite as NO2	<0.05 mg/l	TM184	0.113	<0.05				
Sulphate	<2 mg/l	TM184	13.6	15.5	154	66.4	44	18.5
Chloride	<2 mg/l	TM184	112	13.3	21.8	40.8	60.7	12.1
Nitrate as NO3	<0.3 mg/l	TM184	4.98	<0.3				
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	1.16	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide, Total	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide, Free	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium (diss.filt)	<0.012 mg/l	TM228	228	93.1	203	236	155	101
Sodium (diss.filt)	<0.076 mg/l	TM228	111	37.6	17.5	20.2	62.3	6.8
Magnesium (diss.filt)	<0.036 mg/l	TM228	35.8	14	12.4	13.5	17.6	5.93
Potassium (diss.filt)	<1 mg/l	TM228	45.8	13.9	2.92	1.79	10.3	1.52
Iron (diss.filt)	<0.019 mg/l	TM228	0.0791	0.193	<0.019	4.69	1.69	1.86
pH	<1 pH Units	TM256	7.32	7.32	6.99	7.02	7.15	6.7
Phenol	<0.002 mg/l	TM259	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cresols	<0.006 mg/l	TM259	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Xylenols	<0.008 mg/l	TM259	0.01	<0.008	<0.008	<0.008	<0.008	<0.008
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Dibutyl tin	<5 ng/l	TM328	<15	<7.5	<5	<6	<8.57	<8.57
Tributyl tin	<1 ng/l	TM328	<3	8.78	<1	<1.2	<1.71	<1.71
Tetrabutyl tin	<2 ng/l	TM328	<6	<3	<2	<2.4	<3.43	<3.43
Triphenyl tin	<1 ng/l	TM328	<3	<1.5	<1	<1.2	<1.71	<1.71
Surrogate	%	TM328	91	87.4	98.2	102	79.3	103
Trifluralin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-HCH	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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						
Heptachlor	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
beta-HCH	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Isodrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-DDE	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan I	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
cis-Chlordane	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDE	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p'-DDT	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan II	<0.02 µg/l	TM343	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
p,p'-DDT	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Permethrin I	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Permethrin II	<0.01 µg/l	TM343	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tecnazene	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Triallate	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Propetamphos	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos-methyl	<0.01 µg/l	TM344	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	GW6	GW8	L1	SW1		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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						
2,3,6-TBA (2,3,6-trichlorobenzoic acid)*	<0.02 µg/l	SUB	<0.02	<0.02				
2,4,5-T (2,4,5-trichlorophenoxy acetic acid)*	<0.02 µg/l	SUB	<0.02	<0.02				
2,4,5-TP (fenoprop)*	<0.02 µg/l	SUB	<0.02	<0.02				
2,4-D (2,4-dichlorophenoxyacetic acid)*	<0.02 µg/l	SUB	<0.02	<0.02				
2,4-DB (4-(2,4-dichlorophenoxy)butyric	<0.02 µg/l	SUB	<0.02	<0.02				
2,4-DP (dichloroprop)*	<0.02 µg/l	SUB	<0.02	<0.02				
Bentazone*	<0.02 µg/l	SUB	<0.02	<0.02				
Benazolin*	<0.02 µg/l	SUB	<0.02	<0.02				
Bromoxynil*	<0.02 µg/l	SUB	<0.02	<0.02				
Dicamba*	<0.02 µg/l	SUB	<0.02	<0.02				
Fluroxypyr*	<0.02 µg/l	SUB	<0.02	<0.02				
Ioxynil*	<0.02 µg/l	SUB	<0.02	<0.02				
MCPA*	<0.02 µg/l	SUB	<0.02	<0.02				
MCPB*	<0.02 µg/l	SUB	<0.02	<0.02				
MCP (mecoprop)*	<0.02 µg/l	SUB	<0.02	<0.02				
Pentachlorophenol (PCP)*	<0.02 µg/l	SUB	<0.02	<0.02				
Triclopyr*	<0.02 µg/l	SUB	<0.02	<0.02				
Clopyralid*	<0.02 µg/l	SUB	<0.02	<0.02				
Suspended solids, Total	<2 mg/l	TM022		16.4		8.3		
				#		#		
Alkalinity, Total as CaCO3	<2 mg/l	TM043	165	270		110		
			#	#		#		
Alkalinity, Total as CaCO3 (diss.filt)	<2 mg/l	TM043			4750			
BOD, unfiltered	<1 mg/l	TM045	<1.67	<10	<1500	2.01		
			#	#	#	#		
Organic Carbon, Total	<3 mg/l	TM090	6.72	<3	825	6.82		
			#	#		#		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.311	<0.2	910	0.748		
			#	#		#		
Sulphide	<0.01 mg/l	TM101			<0.01			
COD, unfiltered	<7 mg/l	TM107	48	8.84	3070	24.8		
			#	#	#	#		
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.346	0.552	9.16	0.327		
			#	#	#	#		
Arsenic (diss.filt)	<0.5 µg/l	TM152	1.53	0.858	276	1.23		
			#	#				
Boron (diss.filt)	<5 µg/l	TM152	33.8	25.6	12700	153		
			#	#				
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.8	<0.08		
			#	#				
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	297	<1		
			#	#				
Copper (diss.filt)	<0.3 µg/l	TM152	1.75	<0.3	<3	2.38		
			#	#				
Lead (diss.filt)	<0.2 µg/l	TM152	0.534	0.647	<2	<0.2		
			#	#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	GW6	GW8	L1	SW1		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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						
Manganese (diss.filt)	<1 µg/l	TM152	494	1030	253	182		
			#	#				
Nickel (diss.filt)	<0.4 µg/l	TM152	4.4	<0.4	68.8	1.94		
			#	#				
Zinc (diss.filt)	<1 µg/l	TM152	1.75	2.55	<10	3.71		
			#	#				
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	<100	<100	12900			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	<100	<100	9650			
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	<100	<100	13200			
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	0.0721	<0.01		
			♦ #	♦ #	♦ #	♦		
Nitrite as NO2	<0.05 mg/l	TM184	<0.05		<0.05			
			2 #		2			
Sulphate	<2 mg/l	TM184	13.8	50.1	243	41.7		
			#	#		#		
Chloride	<2 mg/l	TM184	18.4	14.4	1100	12.8		
			#	#		#		
Nitrate as NO3	<0.3 mg/l	TM184	<0.3		<1.5			
			♦					
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	<0.1	<0.5	2.45		
			#	#		#		
Cyanide, Total	<0.05 mg/l	TM227	<0.05	<0.05	<0.05			
			#	#	#			
Cyanide, Free	<0.05 mg/l	TM227	<0.05	<0.05	<0.05			
			#	#	#			
Calcium (diss.filt)	<0.012 mg/l	TM228	63.9	47.8	309	56.1		
						#		
Sodium (diss.filt)	<0.076 mg/l	TM228	9.67	23.6	591	11.3		
						#		
Magnesium (diss.filt)	<0.036 mg/l	TM228	3.79	9.27	84.3	4.26		
						#		
Potassium (diss.filt)	<1 mg/l	TM228	1.75	1.54	225	3.51		
						#		
Iron (diss.filt)	<0.019 mg/l	TM228	0.488	0.101	<0.19	0.126		
						#		
pH	<1 pH Units	TM256	7.22	7.49	7.5	7.61		
			#	#	#	#		
Phenol	<0.002 mg/l	TM259	<0.002	<0.002	1.01			
			#	#	#			
Cresols	<0.006 mg/l	TM259	<0.006	0.02	1.31			
			#	#	#			
Xylenols	<0.008 mg/l	TM259	<0.008	<0.008	<0.08			
			#	#	#			
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016	0.02	2.32			
			#	#	#			
Dibutyl tin	<5 ng/l	TM328	<6	<5	<15			
Tributyl tin	<1 ng/l	TM328	<1.2	<1	<3			
Tetrabutyl tin	<2 ng/l	TM328	<2.4	<2	<6			
Triphenyl tin	<1 ng/l	TM328	<1.2	<1	<3			
Surrogate	%	TM328	99.4	98.7	65.7			
Trifluralin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
					♦			
alpha-HCH	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
					♦			
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
					♦			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Results Legend		Customer Sample Ref.	GW6	GW8	L1	SW1		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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						
Heptachlor	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Aldrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
beta-HCH	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Isodrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Heptachlor epoxide	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
o,p'-DDE	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Endosulphan I	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
trans-Chlordane	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
cis-Chlordane	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
p,p'-DDE	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Dieldrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Endrin	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
o,p'-DDT	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Endosulphan II	<0.02 µg/l	TM343	<0.02	<0.02	<0.02			
p,p'-DDT	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.02	<0.02	<0.02			
Permethrin I	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Permethrin II	<0.01 µg/l	TM343	<0.01	<0.01	<0.01			
Dichlorvos	<0.01 µg/l	TM344	<0.01	<0.01	<0.4			
Mevinphos	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Tecnazene	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Hexachlorobenzene	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Diazinon	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Triallate	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Atrazine	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Simazine	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Disulfoton	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Propetamphos	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			
Chlorpyrifos-methyl	<0.01 µg/l	TM344	<0.01	<0.01	<0.1			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.							
M	mCERTS accredited.	Depth (m)	Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Sample Type	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
tot.unfilt	Total / unfiltered sample.	Date Sampled	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017
*	Subcontracted test.	Sample Time	171222-11	171222-11	171222-11	171222-11	171222-11	171222-11
**	% 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	Date Received	16808040	16808032	16808033	16808034	16808035	16808036
(F)	Trigger breach confirmed	SDG Ref						
1-5&+5@	Sample deviation (see appendix)	Lab Sample No.(s)						
AGS Reference								
Component	LOD/Units	Method						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Chloronaphthalene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Chlorophenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Methylnaphthalene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Methylphenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Nitroaniline (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
2-Nitrophenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
3-Nitroaniline (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Methylphenol (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Nitroaniline (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1
Azobenzene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
Acenaphthylene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
Acenaphthene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
Anthracene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #
Benzo(a)anthracene (aq)	<1 µg/l	TM176	◆	◆ #	◆ #	◆ #	◆ #	◆ #



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref.		CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
M	mCERTS accredited.				21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
aq	Aqueous / settled sample.									
diss.filt	Dissolved / filtered sample.				22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017
tot.unfilt	Total / unfiltered sample.				171222-11 16808040	171222-11 16808032	171222-11 16808033	171222-11 16808034	171222-11 16808035	171222-11 16808036
* 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								
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Benzo(a)pyrene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Carbazole (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Chrysene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Dibenzofuran (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
n-Dibutyl phthalate (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Diethyl phthalate (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Dimethyl phthalate (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
n-Dioctyl phthalate (aq)	<5 µg/l	TM176			<5	<5	<5	<5	<5	<5
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Fluoranthene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Fluorene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Hexachlorobenzene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Hexachlorobutadiene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Pentachlorophenol (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
Phenol (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Hexachloroethane (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Nitrobenzene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Naphthalene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Isophorone (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
Phenanthrene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #
Pyrene (aq)	<1 µg/l	TM176			<1	<1	<1	<1	<1	<1
					◆	◆ #	◆ #	◆ #	◆ #	◆ #



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	GW6	GW8	L1			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Chlorophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
2-Nitrophenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
3-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
4-Chloroaniline (aq)	<1 µg/l	TM176	<1	<1	<8			
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
4-Methylphenol (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	798 ♦			
4-Nitroaniline (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
4-Nitrophenol (aq)	<1 µg/l	TM176	<1	<1	<8			
Azobenzene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
Acenaphthylene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
Acenaphthene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
Anthracene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2 ♦ #	<2 ♦ #	<16 ♦			
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<1 ♦ #	<1 ♦ #	<8 ♦			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref. Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	GW6	GW8	L1			
#	ISO17025 accredited.			Ground Water (GW) 21/12/2017	Ground Water (GW) 21/12/2017	Land Leachate (LE) 21/12/2017			
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							
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Benzo(a)pyrene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Carbazole (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Chrysene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Dibenzofuran (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Diethyl phthalate (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Dimethyl phthalate (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<5 ◆ #	<5 ◆ #	<40 ◆				
Fluoranthene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Fluorene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Hexachlorobenzene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Pentachlorophenol (aq)	<1 µg/l	TM176	<1	<1	<8				
Phenol (aq)	<1 µg/l	TM176	<1	<1	712				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Hexachloroethane (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Nitrobenzene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Naphthalene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Isophorone (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<1	<1	<8				
Phenanthrene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				
Pyrene (aq)	<1 µg/l	TM176	<1 ◆ #	<1 ◆ #	<8 ◆				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
M	mCERTS accredited.		21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
aq	Aqueous / settled sample.		22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017	22/12/2017
diss.filt	Dissolved / filtered sample.		171222-11	171222-11	171222-11	171222-11	171222-11	171222-11
tot.unfilt	Total / unfiltered sample.		16808040	16808032	16808033	16808034	16808035	16808036
*	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	112	104	112	110	112	110
			1	1				
Toluene-d8**	%	TM208	99.1	96.5	98	98.2	97.8	98.9
			1	1				
4-Bromofluorobenzene**	%	TM208	93.6	88.8	94.8	93.1	95	96.3
			1	1				
Dichlorodifluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Chloromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Vinyl chloride	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Bromomethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Chloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Trichlorofluoromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,1-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Carbon disulphide	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Dichloromethane	<3 µg/l	TM208	6.06	<3	<3	<3	<3	<3
			1 #	1 #	#	#	#	#
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,1-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1	1				
Bromochloromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Chloroform	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,1-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Carbontetrachloride	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,2-Dichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Benzene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Trichloroethene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,2-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Dibromomethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Bromodichloromethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
Toluene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#
1,3-Dichloropropane	<1 µg/l	TM208	<1	<1	<1	<1	<1	<1
			1 #	1 #	#	#	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

VOC MS (W)

Results Legend			Customer Sample Ref.		CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		Land Leachate (LE)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
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	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Dibromochloromethane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2-Dibromoethane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Chlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Ethylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
m,p-Xylene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
o-Xylene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Styrene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Bromoform	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Isopropylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2,3-Trichloropropane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Bromobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Propylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
2-Chlorotoluene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,3,5-Trimethylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
4-Chlorotoluene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
tert-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2,4-Trimethylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
sec-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
4-iso-Propyltoluene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,3-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,4-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
n-Butylbenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2-Dichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1	1				
1,2,4-Trichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Hexachlorobutadiene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
Naphthalene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#
1,2,3-Trichlorobenzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	<1
					1 #	1 #	#	#	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	GW6	GW8	L1			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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	110 1	111	102			
Toluene-d8**	%	TM208	97.9 1	98.8	97.9			
4-Bromofluorobenzene**	%	TM208	91.8 1	97.1	92.7			
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 #	2.68 #			
Dichloromethane	<3 µg/l	TM208	<3 1 #	<3 #	<3 #			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 1 #	<1 #	3.31 #			
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 #	5.92 #			
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 #	8.49 #			
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: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	GW6	GW8	L1			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
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 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 #	5.86 #			
m,p-Xylene	<1 µg/l	TM208	<1 1 #	<1 #	2.81 #			
o-Xylene	<1 µg/l	TM208	<1 1 #	<1 #	2.07 #			
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: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Notification of NDPs (No determination possible)

Date Received : 22/12/2017 08:04:06

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
16808040	CANOL LEACHATE		Acid Herbicides (Suite 3) (W)*	Insufficient Sample



CERTIFICATE OF ANALYSIS

Validated

SDG: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

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
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and 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
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
TM245	By GC-FID	Determination of GRO by Headspace 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
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM328		
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM345	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite III) by GCMS

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: 171222-11
Location: Palleg

Client Reference:
Order Number: 12936

Report Number: 441118
Superseded Report:

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	16808040	16808032	16808033	16808034	16808035	16808036	16808037	16808038	16808039	16808041
	CANOL LEACHATE	GW1	GW2	GW3	GW4	GW5	GW6	GW8	L1	SW1
	Land Leachate	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Land Leachate	Surface Water
Acid Herbicides (Suite 3) (W)*		23-Jan-2018	23-Jan-2018	23-Jan-2018	23-Jan-2018	23-Jan-2018	23-Jan-2018	23-Jan-2018		
Acid Herbicides*									09-Jan-2018	
Alkalinity as CaCO3		02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018		03-Jan-2018
Alkalinity Filtered as CaCO3	29-Dec-2017								29-Dec-2017	
Ammoniacal Nitrogen	04-Jan-2018	02-Jan-2018	04-Jan-2018	04-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	03-Jan-2018	02-Jan-2018
Anions by Kone (w)	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018
BOD True Total		27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017	27-Dec-2017
COD Unfiltered	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017	30-Dec-2017
Conductivity (at 20 deg.C)	27-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	27-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate	29-Dec-2017	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	29-Dec-2017	03-Jan-2018	03-Jan-2018	
Dissolved Metals by ICP-MS	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	05-Jan-2018	08-Jan-2018	05-Jan-2018
EPH (DRO) (C10-C40) Aqueous (W)	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	03-Jan-2018	
GRO by GC-FID (W)	03-Jan-2018	02-Jan-2018	29-Dec-2017	29-Dec-2017	29-Dec-2017	29-Dec-2017	03-Jan-2018	29-Dec-2017	29-Dec-2017	
Mercury Dissolved	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018	10-Jan-2018
Metals by iCap-OES Dissolved (W)	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	02-Jan-2018	04-Jan-2018
Mineral Oil C10-40 Aqueous (W)	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	03-Jan-2018	
Nitrite by Kone (w)	04-Jan-2018	04-Jan-2018					04-Jan-2018		04-Jan-2018	
Organotins in Aqueous Samples	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	
PAH Spec MS - Aqueous (W)	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	04-Jan-2018	
Pesticides (Suite I) by GCMS	02-Jan-2018	02-Jan-2018	09-Jan-2018	09-Jan-2018	02-Jan-2018	02-Jan-2018	09-Jan-2018	02-Jan-2018	09-Jan-2018	
Pesticides (Suite II) by GCMS	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	04-Jan-2018	16-Jan-2018	
Pesticides (Suite III) by GCMS	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	19-Jan-2018	
pH Value	02-Jan-2018	29-Dec-2017	29-Dec-2017	29-Dec-2017	29-Dec-2017	29-Dec-2017	29-Dec-2017	02-Jan-2018	02-Jan-2018	02-Jan-2018
Phenols by HPLC (W)	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	
Sulphide	02-Jan-2018								03-Jan-2018	
Suspended Solids			29-Dec-2017	29-Dec-2017	29-Dec-2017	28-Dec-2017		29-Dec-2017		29-Dec-2017
SVOC MS (W) - Aqueous	08-Jan-2018	08-Jan-2018	12-Jan-2018	08-Jan-2018	08-Jan-2018	08-Jan-2018	08-Jan-2018	08-Jan-2018	08-Jan-2018	
Total EPH (aq)	03-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	02-Jan-2018	03-Jan-2018	02-Jan-2018	03-Jan-2018	
Total Organic and Inorganic Carbon	29-Dec-2017	28-Dec-2017	28-Dec-2017	29-Dec-2017	29-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	29-Dec-2017	28-Dec-2017
VOC MS (W)	03-Jan-2018	02-Jan-2018	28-Dec-2017	28-Dec-2017	28-Dec-2017	28-Dec-2017	03-Jan-2018	28-Dec-2017	28-Dec-2017	



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Certificate of Analysis

Report No.: 18-68343-1

Issue No.: 1

Date of Issue 22/01/2018

Customer Details: ALS Life Sciences Limited, Unit7-8, Hawarden Business Park, Manor Road,
Hawarden, Deeside, Flintshire, CH5 3US

Customer Contact: Carrie Foster (2)

Customer Order No.: P59813

Customer Reference: 171222-11

Quotation Reference: 180111/11

Description: 7 water samples

Date Received: 15/01/2018

Date Started: 16/01/2018

Date Completed: 22/01/2018

Test Methods: Details available on request (refer to SOP code against relevant result/s)

Notes: None

Approved By: Matthew Hickson, Laboratory Manager

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service.

Observations and interpretations are outside of the scope of UKAS accreditation.

Results reported herein relate only to the items supplied to the laboratory for testing.



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Results Summary

Report No.: 18-68343-1

Customer Reference: 171222-11

Customer Order No: P59813

Customer Sample No						16860854	16860759	16860847	16860761	16860760	16860763	16860869
Customer Sample ID						GW1	GW2	GW3	GW4	GW5	GW6	GW8
RPS Sample No						351390	351391	351392	351393	351394	351395	351396
Sample Type						WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date						21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017	21/12/2017
Determinand	CAS No	Codes	SOP	Units	RL							
2,3,6-TBA	50-31-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4,5-TP (fenoprop, silvex)	93-72-1	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-DB	94-82-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
dichlorprop (2,4-DP)	120-36-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-D (2,4-dichlorophenoxyacetic acid)	94-75-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
benazolin	3813-05-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
bentazone	25057-89-0	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
bromoxynil	1689-84-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
clopyralid	1702-17-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
dicamba	1918-00-9	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	0.03	< 0.02	< 0.02	< 0.02
fluroxypyr	69377-81-7	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
ioxynil	1689-83-4	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MCPA (4-chloro-o-tolyloxyacetic acid)	94-74-6	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MCPB	94-81-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
mecoprop (MCPP)	93-65-2	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	0.61	0.02	< 0.02	< 0.02
pentachlorophenol (PCP)	87-86-5	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
triclopyr	55335-06-3	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02



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Deviating Samples

Report No.: 18-68343-1

Customer Reference: 171222-11

Customer Order No: P59813

Our policy on Deviating Samples and reference list of Holding Times applied can be supplied on request. These have been implemented in accordance with UKAS Policy on Deviating Samples (TPS63).

RPS is not responsible for the integrity of samples as received, unless RPS personnel performed the sampling, and it is possible that samples submitted may be declared to be deviating.

Where applicable the analysis method remains UKAS accredited, however results reported for a deviating sample may be invalid. The reason for a sample being declared to be deviating is indicated below.

Where no sampling date was supplied, samples have been declared to be deviating. However, if a date of sampling can be supplied, the results may be reissued with the deviating sample status removed.

Where the sample container used was unsuitable, the appropriate Holding Time was exceeded, or the sample is flagged as deviating for some other reason, re-sampling/re-submission may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating Sample	Reason for Sample Deviation
351390	16860854		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351391	16860759		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351392	16860847		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351393	16860761		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351394	16860760		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351395	16860763		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded
351396	16860869		21/12/2017	500ml green glass bottle	Yes	Holding time has been exceeded



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Report Information

Key to Report Codes

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

Sample Retention and Disposal

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

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

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



CERTIFICATE OF ANALYSIS

SDG:	171222-11	Client Reference:		Report Number:	441118
Location:	Palleg	Order Number:	12936	Superseded Report:	

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).

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

Visual Estimation Of Fibre Content

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

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

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



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Website: www.alsenvironmental.co.uk

JLA Recycling
Tir Canol Farm
Palleg Road
Cwmtwrch
SA9 2UT

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 06 February 2018
Customer: H_JLARECYC_CWM
Sample Delivery Group (SDG): 180130-94
Your Reference:
Location: Palleg
Report No: 443226

We received 1 sample on Tuesday January 30, 2018 and 1 of these samples were scheduled for analysis which was completed on Tuesday February 06, 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: 180130-94
Location: Palleg

Client Reference:
Order Number:

Report Number: 443226
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16961960	SW1			29/01/2018

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: 180130-94
Location: Palleg

Client Reference:
Order Number:

Report Number: 443226
Superseded Report:

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

Lab Sample No(s)

16961960

Customer
Sample Reference

SW1

AGS Reference

Depth (m)

Container

500ml Plastic
(ALE208)
H2SO4 (ALE244)

Sample Type

SW

SW

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

BOD True Total

All

NDPs: 0
Tests: 1

X

COD Unfiltered

All

NDPs: 0
Tests: 1

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X

Suspended Solids

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 180130-94
Location: Palleg

Client Reference:
Order Number:

Report Number: 443226
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
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
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
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 Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 180130-94
Location: Palleg

Client Reference:
Order Number:

Report Number: 443226
Superseded Report:

Test Completion Dates

Lab Sample No(s) 16961960
Customer Sample Ref. SW1
AGS Ref.
Depth
Type Surface Water

Ammoniacal Nitrogen	06-Feb-2018
Anions by Kone (w)	03-Feb-2018
BOD True Total	05-Feb-2018
COD Unfiltered	04-Feb-2018
Conductivity (at 20 deg.C)	06-Feb-2018
pH Value	31-Jan-2018
Suspended Solids	05-Feb-2018



CERTIFICATE OF ANALYSIS

SDG: 180130-94
Location: Palleg

Client Reference:
Order Number:

Report Number:
Superseded Report:

443226

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).

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

Visual Estimation Of Fibre Content

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

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

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



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Website: www.alsenvironmental.co.uk

JLA Disposal Ltd
Glyncynwal Uchaf Farm
Lower Cwmtwrch
SA9 2QQ

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 06 March 2018
Customer: H_JLADISP_SWA
Sample Delivery Group (SDG): 180224-20
Your Reference:
Location: Palleg
Report No: 447082

We received 1 sample on Saturday February 24, 2018 and 1 of these samples were scheduled for analysis which was completed on Tuesday March 06, 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: 180224-20
Location: Palleg

Client Reference:
Order Number:

Report Number: 447082
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17113876	S1			23/02/2018

Maximum Sample/Coolbox Temperature (°C) :

6.4

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 180224-20
Location: Palleg

Client Reference:
Order Number:

Report Number: 447082
Superseded Report:

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

Lab Sample No(s)

17113876

Customer
Sample Reference

S1

AGS Reference

Depth (m)

Container

HN03 Filtered
(ALE204)
H2SO4 (ALE244)
250ml BOD
(ALE212)
11plastic (ALE221)

Sample Type

SW
SW
SW
SW

Alkalinity as CaCO3	All	NDPs: 0 Tests: 1	X				
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1			X		
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X				
BOD True Total	All	NDPs: 0 Tests: 1		X			
COD Unfiltered	All	NDPs: 0 Tests: 1		X			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1	X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1				X	
Mercury Dissolved	All	NDPs: 0 Tests: 1				X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 1				X	
pH Value	All	NDPs: 0 Tests: 1	X				
Suspended Solids	All	NDPs: 0 Tests: 1	X				
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 1			X		



CERTIFICATE OF ANALYSIS

Validated

SDG: 180224-20
Location: Palleg

Client Reference:
Order Number:

Report Number: 447082
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
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
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
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
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 180224-20
Location: Palleg

Client Reference:
Order Number:

Report Number: 447082
Superseded Report:

Test Completion Dates

Lab Sample No(s) 17113876
Customer Sample Ref. S1
AGS Ref.
Depth
Type Surface Water

Alkalinity as CaCO3	01-Mar-2018
Ammoniacal Nitrogen	05-Mar-2018
Anions by Kone (w)	06-Mar-2018
BOD True Total	01-Mar-2018
COD Unfiltered	02-Mar-2018
Conductivity (at 20 deg.C)	01-Mar-2018
Dissolved Metals by ICP-MS	05-Mar-2018
Mercury Dissolved	02-Mar-2018
Metals by iCap-OES Dissolved (W)	05-Mar-2018
pH Value	02-Mar-2018
Suspended Solids	04-Mar-2018
Total Organic and Inorganic Carbon	03-Mar-2018



CERTIFICATE OF ANALYSIS

SDG: 180224-20
Location: Palleg

Client Reference:
Order Number:

Report Number:
Superseded Report:

447082

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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Website: www.alsenvironmental.co.uk

JLA Recycling
Tir Canol Farm
Palleg Road
Cwmtwrch
SA9 2UT

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 06 April 2018
Customer: H_JLARECYC_CWM
Sample Delivery Group (SDG): 180322-112
Your Reference:
Location: Palleg
Report No: 450689

We received 5 samples on Thursday March 22, 2018 and 5 of these samples were scheduled for analysis which was completed on Friday April 06, 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: 180322-112
Location: Palleg

Client Reference:
Order Number:

Report Number: 450689
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17252694	GW2			21/03/2018
17252695	GW3			21/03/2018
17252696	GW4			21/03/2018
17252697	GW5			21/03/2018
17252698	GW8			21/03/2018

Maximum Sample/Coolbox Temperature (°C) :

8.0

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: 180322-112
Location: Palleg

Client Reference:
Order Number:

Report Number: 450689
Superseded Report:

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

Ammoniacal Nitrogen

Anions by Kone (w)

Conductivity (at 20 deg.C)

Dissolved Metals by ICP-MS

pH Value

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

17252694

GW2

HNO3 Filtered
(ALE204)

GW

17252695

GW3

HNO3 Filtered
(ALE204)

GW

17252696

GW4

HNO3 Filtered
(ALE204)

GW

17252697

GW5

HNO3 Filtered
(ALE204)

GW

17252698

GW6

HNO3 Filtered
(ALE204)

GW

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 180322-112
Location: Palleg

Client Reference:
Order Number:

Report Number: 450689
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
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: 180322-112
Location: Palleg

Client Reference:
Order Number:

Report Number: 450689
Superseded Report:

Test Completion Dates

Lab Sample No(s)	17252694	17252695	17252696	17252697	17252698
Customer Sample Ref.	GW2	GW3	GW4	GW5	GW8
AGS Ref.					
Depth					
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen		03-Apr-2018	28-Mar-2018	03-Apr-2018	28-Mar-2018
Anions by Kone (w)		03-Apr-2018	03-Apr-2018	03-Apr-2018	03-Apr-2018
Conductivity (at 20 deg.C)		28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018
Dissolved Metals by ICP-MS	06-Apr-2018	06-Apr-2018	06-Apr-2018	06-Apr-2018	03-Apr-2018
pH Value		28-Mar-2018	28-Mar-2018	28-Mar-2018	28-Mar-2018



CERTIFICATE OF ANALYSIS

SDG:	180322-112	Client Reference:	Report Number:	450689
Location:	Palleg	Order Number:	Superseded Report:	

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).

Asteststos 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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email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

JLA Disposal Ltd
Glyncynwal Uchaf Farm
Lower Cwmtwrch
SA9 2QQ

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 16 April 2018
Customer: H_JLADISP_SWA
Sample Delivery Group (SDG): 180407-71
Your Reference:
Location: Palleg
Report No: 451798

We received 1 sample on Saturday April 07, 2018 and 1 of these samples were scheduled for analysis which was completed on Monday April 16, 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: 180407-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 451798
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17328671	GW2	ES		06/04/2018

Maximum Sample/Coolbox Temperature (°C) :

7.6

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: 180407-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 451798
Superseded Report:

Results Legend

- X** Test
N No Determination Possible

Sample Types -

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

Lab Sample No(s)

17328671

Customer Sample Reference

GM2

AGS Reference

ES

Depth (m)

Container

500ml Plastic (ALE208)

H2SO4 (ALE244)

Sample Type

GW

GW

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 180407-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 451798
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
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: 180407-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 451798
Superseded Report:

Test Completion Dates

Lab Sample No(s) 17328671
Customer Sample Ref. GW2

AGS Ref. ES
Depth
Type Ground Water

Ammoniacal Nitrogen	13-Apr-2018
Anions by Kone (w)	14-Apr-2018
Conductivity (at 20 deg.C)	10-Apr-2018
Dissolved Metals by ICP-MS	16-Apr-2018
pH Value	10-Apr-2018



CERTIFICATE OF ANALYSIS

SDG:	180407-71	Client Reference:	Report Number:	451798
Location:	Palleg	Order Number:	Superseded Report:	

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).

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

Visual Estimation Of Fibre Content

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

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

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



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Website: www.alsenvironmental.co.uk

JLA Recycling
Tir Canol Farm
Palleg Road
Cwmtwrch
SA9 2UT

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 17 April 2018
Customer: H_JLARECYC_CWM
Sample Delivery Group (SDG): 180411-71
Your Reference:
Location: Palleg
Report No: 452137

We received 1 sample on Wednesday April 11, 2018 and 1 of these samples were scheduled for analysis which was completed on Tuesday April 17, 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: 180411-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 452137
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17346090	S1			09/04/2018

Maximum Sample/Coolbox Temperature (°C) :

9.4

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 180411-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 452137
Superseded Report:

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

Lab Sample No(s)

17346090

Customer
Sample Reference

S1

AGS Reference

Depth (m)

Container

0.5l glass bottle
(ALE227)
H2SO4 (ALE244)

Sample Type

SW

SW

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

BOD True Total

All

NDPs: 0
Tests: 1

X

COD Unfiltered

All

NDPs: 0
Tests: 1

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X

Suspended Solids

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 180411-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 452137
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
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
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
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: 180411-71
Location: Palleg

Client Reference:
Order Number:

Report Number: 452137
Superseded Report:

Test Completion Dates

Lab Sample No(s) 17346090
Customer Sample Ref. S1
AGS Ref.
Depth
Type Surface Water

Ammoniacal Nitrogen	17-Apr-2018
Anions by Kone (w)	17-Apr-2018
BOD True Total	16-Apr-2018
COD Unfiltered	17-Apr-2018
Conductivity (at 20 deg.C)	16-Apr-2018
pH Value	12-Apr-2018
Suspended Solids	13-Apr-2018



CERTIFICATE OF ANALYSIS

SDG:	180411-71	Client Reference:	Report Number:	452137
Location:	Palleg	Order Number:	Superseded Report:	

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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JLA Recycling
Tir Canol Farm
Palleg Road
Cwmtwrch
SA9 2UT

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 25 July 2018
Customer: H_JLARECYC_CWM
Sample Delivery Group (SDG): 180629-12
Your Reference:
Location: Palleg
Report No: 465729

This report has been revised and directly supersedes 463857 in its entirety.

We received 6 samples on Friday June 29, 2018 and 6 of these samples were scheduled for analysis which was completed on Wednesday July 25, 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: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
17838872	GW2	ES		27/06/2018
17838873	GW3	ES		27/06/2018
17838874	GW4	ES		27/06/2018
17838875	GW5	ES		27/06/2018
17838876	GW8	ES		27/06/2018
17838877	LI	ES		27/06/2018

Maximum Sample/Coolbox Temperature (°C) :

11.6

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: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Results Legend		Customer Sample Ref. Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	GW2	GW3	GW4	GW5	GW8	LI
#	ISO17025 accredited.		Ground Water (GW) 27/06/2018	Ground Water (GW) 27/06/2018	Ground Water (GW) 27/06/2018	Ground Water (GW) 27/06/2018	Ground Water (GW) 27/06/2018	Land Leachate (LE) 27/06/2018
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						
Alkalinity, Total as CaCO3	<2 mg/l	TM043	430	575	326	357	300	
			#	#	#	#	#	
Alkalinity, Total as CaCO3 (diss.filt)	<2 mg/l	TM043						3460
BOD, unfiltered	<1 mg/l	TM045	<1	<1	<1	<1	<1	<100
			#	#	#	#	#	#
Organic Carbon, Total	<3 mg/l	TM090	4.04	4.88	7.86	10.7	<3	348
			#	#	#	#	#	
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2	0.242	2.41	0.434	0.612	693
			#	#	#	#	#	
Sulphide	<0.01 mg/l	TM101						37
COD, unfiltered	<7 mg/l	TM107	76.5	22.8	53.3	187	<7	1160
			#	#	#	#	#	#
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.897	1.1	0.647	0.529	0.517	7.16
			#	#	#	#	#	#
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5	5.01	1.46	11.5	1.28	77.2
			#	#	#	#	#	#
Boron (diss.filt)	<10 µg/l	TM152	19.3	14	389	12.9	38.2	10700
			#	#	#	#	#	#
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
			#	#	#	#	#	#
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	<1	1.1	<1	142
			#	#	#	#	#	#
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
			#	#	#	#	#	#
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	0.217	<0.2	0.909	<0.2	<0.2
			#	#	#	#	#	#
Manganese (diss.filt)	<3 µg/l	TM152	1160	5020	624	1000	651	184
			#	#	#	#	#	#
Nickel (diss.filt)	<0.4 µg/l	TM152	0.826	2.11	1.15	4.51	<0.4	50.9
			#	#	#	#	#	#
Zinc (diss.filt)	<1 µg/l	TM152	5.42	9.16	2.34	49.8	1.58	4.17
			#	#	#	#	#	#
Sodium (Dis.Filt)	<0.076 mg/l	TM152	16.9	23	33.8	6.77	48	507
			#	#	#	#	#	#
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	12.6	18	12.9	6.08	17.1	70.3
			#	#	#	#	#	#
Potassium (Dis.Filt)	<0.2 mg/l	TM152	2.27	2.68	7	1.7	2.43	186
			#	#	#	#	#	#
Calcium (Dis.Filt)	<0.2 mg/l	TM152	226	260	139	105	64.7	197
			#	#	#	#	#	#
Iron (Dis.Filt)	<0.019 mg/l	TM152	<0.019	4.44	1.01	13.3	0.0302	0.179
			#	#	#	#	#	#
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172						184000
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172						130000
Total EPH (C6-C40) (aq)	<100 µg/l	TM172						184000
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
			#	#	#	#	#	#
Nitrite as NO2	<0.05 mg/l	TM184						<0.05
								2
Sulphate	<2 mg/l	TM184	160	87	57.4	9.7	22.3	407
			#	#	#	#	#	
Chloride	<2 mg/l	TM184	27.2	53.8	23.1	10	6.4	523
			#	#	#	#	#	
Nitrate as NO3	<0.3 mg/l	TM184						<1.5
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	<0.1	1.01	<0.1	<0.1	<0.5
			#	#	#	#	#	
Cyanide, Total	<0.05 mg/l	TM227						<0.05
								2 #
Cyanide, Free	<0.05 mg/l	TM227						<0.05
								2 #



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Results Legend			Customer Sample Ref.		GW2	GW3	GW4	GW5	GW8	LI
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference							
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								
pH	<1 pH Units	TM256			7.8	7.66	8.08	8.37	8.36	7.75
					#	#	#	#	#	#
Phenol	<0.002 mg/l	TM259			<0.002	<0.002	<0.002	<0.002	<0.002	0.02
					#	#	#	#	#	#
Cresols	<0.006 mg/l	TM259			<0.006	<0.006	<0.006	<0.006	<0.006	0.07
					#	#	#	#	#	#
Xylenols	<0.008 mg/l	TM259			<0.008	<0.008	<0.008	<0.008	<0.008	0.07
					#	#	#	#	#	#
Phenols, Total Detected monohydric	<0.016 mg/l	TM259			<0.016	<0.016	<0.016	<0.016	<0.016	0.16
					#	#	#	#	#	#
Dibutyl tin	<5 ng/l	TM328								<5
Tributyl tin	<1 ng/l	TM328								<1
Tetrabutyl tin	<2 ng/l	TM328								<2
Triphenyl tin	<1 ng/l	TM328								<1
Surrogate	%	TM328								72.1
Trifluralin	<0.01 µg/l	TM343								<0.4
alpha-HCH	<0.01 µg/l	TM343								<0.4
gamma-HCH (Lindane)	<0.01 µg/l	TM343								<0.4
Heptachlor	<0.01 µg/l	TM343								<0.4
Aldrin	<0.01 µg/l	TM343								<0.4
beta-HCH	<0.01 µg/l	TM343								<0.4
Isodrin	<0.01 µg/l	TM343								<0.4
Heptachlor epoxide	<0.01 µg/l	TM343								<0.4
o,p'-DDE	<0.01 µg/l	TM343								<0.4
Endosulphan I	<0.01 µg/l	TM343								<0.4
trans-Chlordane	<0.01 µg/l	TM343								<0.4
cis-Chlordane	<0.01 µg/l	TM343								<0.4
p,p'-DDE	<0.01 µg/l	TM343								<0.4
Dieldrin	<0.01 µg/l	TM343								<0.4
o,p'-DDD (TDE)	<0.01 µg/l	TM343								<0.4
Endrin	<0.01 µg/l	TM343								<0.4
o,p'-DDT	<0.01 µg/l	TM343								<0.4
p,p'-DDD (TDE)	<0.01 µg/l	TM343								<0.4
Endosulphan II	<0.02 µg/l	TM343								<0.8
p,p'-DDT	<0.01 µg/l	TM343								<0.4
p,p'-Methoxychlor	<0.01 µg/l	TM343								<0.4
Endosulphan Sulphate	<0.02 µg/l	TM343								<0.8



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Results Legend		Customer Sample Ref. Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	GW2	GW3	GW4	GW5	GW8	LI
#	ISO17025 accredited.							
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						
Permethrin I	<0.01 µg/l	TM343						<0.4
Permethrin II	<0.01 µg/l	TM343						<0.4
Dichlorvos	<0.01 µg/l	TM344						<0.01
Mevinphos	<0.01 µg/l	TM344						<0.01
Tecnazene	<0.01 µg/l	TM344						<0.01
Hexachlorobenzene	<0.01 µg/l	TM344						<0.01
Diazinon	<0.01 µg/l	TM344						<0.01
Triallate	<0.01 µg/l	TM344						<0.01
Atrazine	<0.01 µg/l	TM344						<0.01
Simazine	<0.01 µg/l	TM344						<0.01
Disulfoton	<0.01 µg/l	TM344						<0.01
Propetamphos	<0.01 µg/l	TM344						<0.01
Chlorpyriphos-methyl	<0.01 µg/l	TM344						<0.01
Dimethoate	<0.01 µg/l	TM344						<0.01
Pirimiphos-methyl	<0.01 µg/l	TM344						<0.01
Chlorpyriphos	<0.01 µg/l	TM344						<0.01
Methyl Parathion	<0.01 µg/l	TM344						<0.01
Malathion	<0.01 µg/l	TM344						<0.01
Fenthion	<0.01 µg/l	TM344						<0.01
Fenitrothion	<0.01 µg/l	TM344						<0.01
Triadimefon	<0.01 µg/l	TM344						<0.01
Pendimethalin	<0.01 µg/l	TM344						<0.01
Parathion	<0.01 µg/l	TM344						<0.01
Chlorfenvinphos	<0.01 µg/l	TM344						<0.01
Ethion	<0.01 µg/l	TM344						<0.01
Carbophenothion	<0.01 µg/l	TM344						<0.01
Triazophos	<0.01 µg/l	TM344						<0.01
Phosalone	<0.01 µg/l	TM344						<0.01
Azinphos methyl	<0.02 µg/l	TM344						<0.02
Azinphos ethyl	<0.02 µg/l	TM344						<0.02
Quintozene (PCNB)	<0.01 µg/l	TM345						<0.16
Telodrin	<0.01 µg/l	TM345						<0.16



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	LI				
#	ISO17025 accredited.						
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	<8				
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<8				
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<8				
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<8				
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<8				
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<8				
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<8				
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<8				
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<8				
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<8				
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<8				
2-Chlorophenol (aq)	<1 µg/l	TM176	<8				
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<8				
2-Methylphenol (aq)	<1 µg/l	TM176	<8				
2-Nitroaniline (aq)	<1 µg/l	TM176	<8				
2-Nitrophenol (aq)	<1 µg/l	TM176	<8				
3-Nitroaniline (aq)	<1 µg/l	TM176	<8				
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<8				
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<8				
4-Chloroaniline (aq)	<1 µg/l	TM176	<8				
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<8				
4-Methylphenol (aq)	<1 µg/l	TM176	<8				
4-Nitroaniline (aq)	<1 µg/l	TM176	<8				
4-Nitrophenol (aq)	<1 µg/l	TM176	<8				
Azobenzene (aq)	<1 µg/l	TM176	<8				
Acenaphthylene (aq)	<1 µg/l	TM176	<8				
Acenaphthene (aq)	<1 µg/l	TM176	<8				
Anthracene (aq)	<1 µg/l	TM176	<8				
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<8				
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<8				
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	779				
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<8				
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<8				



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	LI				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Land Leachate (LE) 27/06/2018 29/06/2018 180629-12 17838877 ES				
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					
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176	<8				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<8				
Benzo(a)pyrene (aq)	<1 µg/l	TM176	<8				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176	<8				
Carbazole (aq)	<1 µg/l	TM176	<8				
Chrysene (aq)	<1 µg/l	TM176	<8				
Dibenzofuran (aq)	<1 µg/l	TM176	<8				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<8				
Diethyl phthalate (aq)	<1 µg/l	TM176	<8				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176	<8				
Dimethyl phthalate (aq)	<1 µg/l	TM176	<8				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<40				
Fluoranthene (aq)	<1 µg/l	TM176	<8				
Fluorene (aq)	<1 µg/l	TM176	<8				
Hexachlorobenzene (aq)	<1 µg/l	TM176	<8				
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<8				
Pentachlorophenol (aq)	<1 µg/l	TM176	<8				
Phenol (aq)	<1 µg/l	TM176	<8				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<8				
Hexachloroethane (aq)	<1 µg/l	TM176	<8				
Nitrobenzene (aq)	<1 µg/l	TM176	<8				
Naphthalene (aq)	<1 µg/l	TM176	<8				
Isophorone (aq)	<1 µg/l	TM176	<8				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<8				
Phenanthrene (aq)	<1 µg/l	TM176	<8				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<8				
Pyrene (aq)	<1 µg/l	TM176	<8				



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

VOC MS (W)

Results Legend			Customer Sample Ref.		GW2	GW3	GW4	GW5	GW8	LI
#	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)	Land Leachate (LE)
M	mCERTS accredited.				27/06/2018	27/06/2018	27/06/2018	27/06/2018	27/06/2018	27/06/2018
aq	Aqueous / settled sample.									
diss.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.									
*	Subcontracted test.				29/06/2018	29/06/2018	29/06/2018	29/06/2018	29/06/2018	29/06/2018
**	% 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				180629-12	180629-12	180629-12	180629-12	180629-12	180629-12
(F)	Trigger breach confirmed				17838872	17838873	17838874	17838875	17838876	17838877
1-5&*\$@	Sample deviation (see appendix)				ES	ES	ES	ES	ES	ES
Component	LOD/Units	Method								
Dibromofluoromethane**	%	TM208								101
Toluene-d8**	%	TM208			100	96.5	98.4	98.7	96.9	95.1
4-Bromofluorobenzene**	%	TM208					2			86.2
Dichlorodifluoromethane	<1 µg/l	TM208								<1
Chloromethane	<1 µg/l	TM208								#
Vinyl chloride	<1 µg/l	TM208								#
Bromomethane	<1 µg/l	TM208								#
Chloroethane	<1 µg/l	TM208								#
Trichlorofluoromethane	<1 µg/l	TM208								#
1,1-Dichloroethene	<1 µg/l	TM208								#
Carbon disulphide	<1 µg/l	TM208								7
Dichloromethane	<3 µg/l	TM208								#
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208			<1	<1	<1	<1	<1	1.3
trans-1,2-Dichloroethene	<1 µg/l	TM208			#	#	2 #			#
1,1-Dichloroethane	<1 µg/l	TM208								#
cis-1,2-Dichloroethene	<1 µg/l	TM208								#
2,2-Dichloropropane	<1 µg/l	TM208								<1
Bromochloromethane	<1 µg/l	TM208								#
Chloroform	<1 µg/l	TM208								#
1,1,1-Trichloroethane	<1 µg/l	TM208								<1
1,1-Dichloropropene	<1 µg/l	TM208								#
Carbontetrachloride	<1 µg/l	TM208								#
1,2-Dichloroethane	<1 µg/l	TM208								<1
Benzene	<1 µg/l	TM208			<1	<1	<1	<1	<1	3.56
Trichloroethene	<1 µg/l	TM208			#	#	2 #			#
1,2-Dichloropropane	<1 µg/l	TM208								<1
Dibromomethane	<1 µg/l	TM208								#
Bromodichloromethane	<1 µg/l	TM208								#
cis-1,3-Dichloropropene	<1 µg/l	TM208								<1
Toluene	<1 µg/l	TM208			<1	<1	<1	<1	<1	28.8
trans-1,3-Dichloropropene	<1 µg/l	TM208			#	#	2 #			#
1,1,2-Trichloroethane	<1 µg/l	TM208								<1
1,3-Dichloropropane	<1 µg/l	TM208								#



CERTIFICATE OF ANALYSIS

Validated

SDG: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

VOC MS (W)

Results Legend			Customer Sample Ref.		GW2	GW3	GW4	GW5	GW8	LI
#	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)	Land Leachate (LE)
M	mCERTS accredited.				27/06/2018	27/06/2018	27/06/2018	27/06/2018	27/06/2018	27/06/2018
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									
(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 #	<1 #	<1 2 #	<1 #	<1 #	2.91 #		
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 2 #	<1 #	<1 #	2.39 #		
o-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 2 #	<1 #	<1 #	1.61 #		
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: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
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
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and 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
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
TM245	By GC-FID	Determination of GRO by Headspace 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
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM328		
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM345	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite III) by GCMS

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: 180629-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 465729
Superseded Report: 463857

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	17838872	17838873	17838874	17838875	17838876	17838877
	GW2	GW3	GW4	GW5	GW8	LI
	ES	ES	ES	ES	ES	ES
	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Land Leachate
Acid Herbicides*	11-Jul-2018	25-Jul-2018	25-Jul-2018	11-Jul-2018	11-Jul-2018	25-Jul-2018
Alkalinity as CaCO ₃	03-Jul-2018	03-Jul-2018	04-Jul-2018	04-Jul-2018	03-Jul-2018	
Alkalinity Filtered as CaCO ₃						03-Jul-2018
Ammoniacal Nitrogen	05-Jul-2018	05-Jul-2018	05-Jul-2018	05-Jul-2018	05-Jul-2018	06-Jul-2018
Anions by Kone (w)	04-Jul-2018	04-Jul-2018	05-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018
BOD True Total	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018
COD Unfiltered	05-Jul-2018	05-Jul-2018	05-Jul-2018	05-Jul-2018	05-Jul-2018	07-Jul-2018
Conductivity (at 20 deg.C)	03-Jul-2018	03-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018
Cyanide Comp/Free/Total/Thiocyanate						03-Jul-2018
Dissolved Metals by ICP-MS	06-Jul-2018	06-Jul-2018	06-Jul-2018	06-Jul-2018	06-Jul-2018	11-Jul-2018
EPH (DRO) (C10-C40) Aqueous (W)						05-Jul-2018
GRO by GC-FID (W)						04-Jul-2018
Mercury Dissolved	05-Jul-2018	03-Jul-2018	04-Jul-2018	05-Jul-2018	04-Jul-2018	06-Jul-2018
Mineral Oil C10-40 Aqueous (W)						05-Jul-2018
Nitrite by Kone (w)						02-Jul-2018
Organotins in Aqueous Samples						05-Jul-2018
PAH Spec MS - Aqueous (W)						06-Jul-2018
Pesticides (Suite I) by GCMS						09-Jul-2018
Pesticides (Suite II) by GCMS						06-Jul-2018
Pesticides (Suite III) by GCMS						06-Jul-2018
pH Value	04-Jul-2018	04-Jul-2018	03-Jul-2018	04-Jul-2018	03-Jul-2018	03-Jul-2018
Phenols by HPLC (W)	05-Jul-2018	05-Jul-2018	05-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018
Sulphide						06-Jul-2018
SVOC MS (W) - Aqueous						03-Jul-2018
Total EPH (aq)						05-Jul-2018
Total Organic and Inorganic Carbon	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018	04-Jul-2018
VOC MS (W)	03-Jul-2018	03-Jul-2018	04-Jul-2018	10-Jul-2018	03-Jul-2018	03-Jul-2018



2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
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Certificate of Analysis

Report No.: 18-73578-1

Issue No.: 1

Date of Issue 11/07/2018

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.: 23271

Customer Reference: 180629-12

Quotation Reference: 180111/11

Description: 3 water samples

Date Received: 02/07/2018

Date Started: 05/07/2018

Date Completed: 10/07/2018

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.: 18-73578-1

Customer Reference: 180629-12

Customer Order No: 23271

Customer Sample No	17843755	17843746	17843761
Customer Sample ID	GW2	GW5	GW8
RPS Sample No	369160	369161	369162
Sample Type	WATER	WATER	WATER
Sampling Date	27/06/2018	27/06/2018	27/06/2018

Determinand	CAS No	Codes	SOP	Units	RL			
mecoprop (MCP)	93-65-2	N	303	ug/l	0.02	< 0.02	< 0.02	< 0.02



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Report No.: 18-73578-1
Customer Reference: 180629-12
Customer Order No: 23271

Comments

Job	Description	Job Comments
18-73578	3 water samples	Analysis for MCPPE performed by LC-QQQ.



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Deviating Samples

Report No.: 18-73578-1

Customer Reference: 180629-12

Customer Order No: 23271

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
369160	17843755		27/06/2018	500ml green glass bottle	No	
369161	17843746		27/06/2018	500ml green glass bottle	No	
369162	17843761		27/06/2018	500ml green glass bottle	No	



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Report Information

Key to Report Codes

U	UKAS Accredited
F	UKAS Flexible Scope
M	MCERTS Accredited
N	Not accredited
O	Marine Management Organisation (MMO) Validated
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



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Certificate of Analysis

Report No.: 18-73670-1

Issue No.: 1

Date of Issue 25/07/2018

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.: 23276

Customer Reference: 180629-12

Quotation Reference: 180111/11

Description: 3 water samples

Date Received: 04/07/2018

Date Started: 11/07/2018

Date Completed: 23/07/2018

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.: 18-73670-1

Customer Reference: 180629-12

Customer Order No: 23276

Customer Sample No	17845327	17845297	17845319
Customer Sample ID	GW3	GW4	LI
RPS Sample No	369468	369469	369470
Sample Type	WATER	WATER	WATER
Sampling Date	27/06/2018	27/06/2018	27/06/2018

Determinand	CAS No	Codes	SOP	Units	RL			
mecoprop (MCP)	93-65-2	N	303	ug/l	0.02	0.20	< 0.02	28.0



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Report No.: 18-73670-1
Customer Reference: 180629-12
Customer Order No: 23276

Comments

Job	Description	Job Comments
18-73670	3 water samples	Analysis for Mecoprop performed by LC-QQQ.

RPS Sample Number	Customer Number	Sample Comments
369470	17845319	Sample for Mecoprop was diluted (1:10) prior to extraction because of the nature of the sample matrix (dirty sample).



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Deviating Samples

Report No.: 18-73670-1

Customer Reference: 180629-12

Customer Order No: 23276

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
369468	17845327		27/06/2018	500ml green glass bottle	No	
369469	17845297		27/06/2018	500ml green glass bottle	No	
369470	17845319		27/06/2018	500ml green glass bottle	No	



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Report Information

Key to Report Codes

U	UKAS Accredited
F	UKAS Flexible Scope
M	MCERTS Accredited
N	Not accredited
O	Marine Management Organisation (MMO) Validated
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:	180629-12	Client Reference:	Report Number:	465729
Location:	Palleg	Order Number:	Superseded Report:	463857

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%. 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).

Asteststos 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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JLA Disposal Ltd
Glyncynwal Uchaf Farm
Lower Cwmtwrch
SA9 2QQ

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 09 October 2018
Customer: H_JLADISP_SWA
Sample Delivery Group (SDG): 181002-52
Your Reference:
Location: Palleg
Report No: 475935

We received 4 samples on Tuesday October 02, 2018 and 4 of these samples were scheduled for analysis which was completed on Tuesday October 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: 181002-52
Location: Palleg

Client Reference:
Order Number:

Report Number: 475935
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18442592	GW2			01/10/2018
18442593	GW3			01/10/2018
18442594	GW5			01/10/2018
18442595	GW8			01/10/2018

Maximum Sample/Coolbox Temperature (°C) :

12.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 181002-52
Location: Palleg

Client Reference:
Order Number:

Report Number: 475935
Superseded Report:

Results Legend

X Test

N No Determination Possible

Sample Types -

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

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 4

Anions by Kone (w)

All

NDPs: 0
Tests: 4

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 4

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 4

pH Value

All

NDPs: 0
Tests: 4

18442592

GW2

1plastic (ALE221)
HNO3 Filtered (ALE204)
H2SO4 (ALE244)

GW

18442593

GW3

1plastic (ALE221)
HNO3 Filtered (ALE204)
H2SO4 (ALE244)

GW

18442594

GW5

1plastic (ALE221)
HNO3 Filtered (ALE204)
H2SO4 (ALE244)

GW

18442595

GW8

1plastic (ALE221)
HNO3 Filtered (ALE204)
H2SO4 (ALE244)

GW

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 181002-52
Location: Palleg

Client Reference:
Order Number:

Report Number: 475935
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
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: 181002-52
Location: Palleg

Client Reference:
Order Number:

Report Number: 475935
Superseded Report:

Test Completion Dates

Lab Sample No(s)	18442592	18442593	18442594	18442595
Customer Sample Ref.	GW2	GW3	GW5	GW8
AGS Ref.				
Depth				
Type	Ground Water	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen	09-Oct-2018	09-Oct-2018	09-Oct-2018	09-Oct-2018
Anions by Kone (w)	09-Oct-2018	09-Oct-2018	09-Oct-2018	09-Oct-2018
Conductivity (at 20 deg.C)	05-Oct-2018	05-Oct-2018	05-Oct-2018	05-Oct-2018
Dissolved Metals by ICP-MS	09-Oct-2018	09-Oct-2018	09-Oct-2018	09-Oct-2018
pH Value	05-Oct-2018	05-Oct-2018	05-Oct-2018	05-Oct-2018



CERTIFICATE OF ANALYSIS

SDG: 181002-52
Location: Palleg

Client Reference:
Order Number:

Report Number:
Superseded Report:

475935

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%. 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).

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

Visual Estimation Of Fibre Content

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

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

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



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

Attention: Keir Thomas

CERTIFICATE OF ANALYSIS

Date: 01 November 2018
Customer: H_GETCNO_NAH
Sample Delivery Group (SDG): 181025-12
Your Reference:
Location: Palleg
Report No: 479351

We received 1 sample on Thursday October 25, 2018 and 1 of these samples were scheduled for analysis which was completed on Thursday November 01, 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: 181025-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 479351
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18596984	S1			24/10/2018

Maximum Sample/Coolbox Temperature (°C) :

10.2

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: 181025-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 479351
Superseded Report:

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

Lab Sample No(s)

18596984

Customer
Sample Reference

S1

AGS Reference

Depth (m)

Container

H2SO4 (ALE244)
500ml Plastic
(ALE208)
250ml BOD
(ALE212)

Sample Type

SW SW SW

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

BOD True Total

All

NDPs: 0
Tests: 1

X

COD Unfiltered

All

NDPs: 0
Tests: 1

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X

Suspended Solids

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 181025-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 479351
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
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
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
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: 181025-12
Location: Palleg

Client Reference:
Order Number:

Report Number: 479351
Superseded Report:

Test Completion Dates

Lab Sample No(s) 18596984
Customer Sample Ref. S1
AGS Ref.
Depth
Type Surface Water

Ammoniacal Nitrogen	29-Oct-2018
Anions by Kone (w)	01-Nov-2018
BOD True Total	31-Oct-2018
COD Unfiltered	31-Oct-2018
Conductivity (at 20 deg.C)	01-Nov-2018
pH Value	31-Oct-2018
Suspended Solids	31-Oct-2018



CERTIFICATE OF ANALYSIS

SDG:	181025-12	Client Reference:	Report Number:	479351
Location:	Palleg	Order Number:	Superseded Report:	

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%. 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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Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

JLA Disposal Ltd
Glyncynwal Uchaf Farm
Lower Cwmtwrch
SA9 2QQ

Attention: John Adams

CERTIFICATE OF ANALYSIS

Date: 02 December 2018
Customer: H_JLADISP_SWA
Sample Delivery Group (SDG): 181122-39
Your Reference:
Location: Palleg
Report No: 483468

We received 1 sample on Thursday November 22, 2018 and 1 of these samples were scheduled for analysis which was completed on Sunday December 02, 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: 181122-39
Location: Palleg

Client Reference:
Order Number:

Report Number: 483468
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18795376	SW1	ES		20/11/2018

Maximum Sample/Coolbox Temperature (°C) :

8.0

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: 181122-39
Location: Palleg

Client Reference:
Order Number:

Report Number: 483468
Superseded Report:

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

Lab Sample No(s)

18795376

Customer
Sample Reference

SW1

AGS Reference

ES

Depth (m)

Container

H2SO4 (ALE244)
500ml Plastic
(ALE208)
250ml BOD
(ALE212)

Sample Type

SW

SW

SW

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

BOD True Total

All

NDPs: 0
Tests: 1

X

COD Unfiltered

All

NDPs: 0
Tests: 1

X

Conductivity (at 20 deg.C)

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X

Suspended Solids

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 181122-39
Location: Palleg

Client Reference:
Order Number:

Report Number: 483468
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
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
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TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
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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: 181122-39
Location: Palleg

Client Reference:
Order Number:

Report Number: 483468
Superseded Report:

Test Completion Dates

Lab Sample No(s)	18795376
Customer Sample Ref.	SW1
AGS Ref.	ES
Depth	
Type	Surface Water

Ammoniacal Nitrogen	28-Nov-2018
Anions by Kone (w)	02-Dec-2018
BOD True Total	28-Nov-2018
COD Unfiltered	30-Nov-2018
Conductivity (at 20 deg.C)	29-Nov-2018
pH Value	28-Nov-2018
Suspended Solids	27-Nov-2018



CERTIFICATE OF ANALYSIS

SDG: 181122-39
Location: Palleg

Client Reference:
Order Number:

Report Number:
Superseded Report:

483468

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.

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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%. 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).

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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).

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.

**PALLEG LANDFILL
LOWER CWMTWRCH**

PERMIT BT19081X

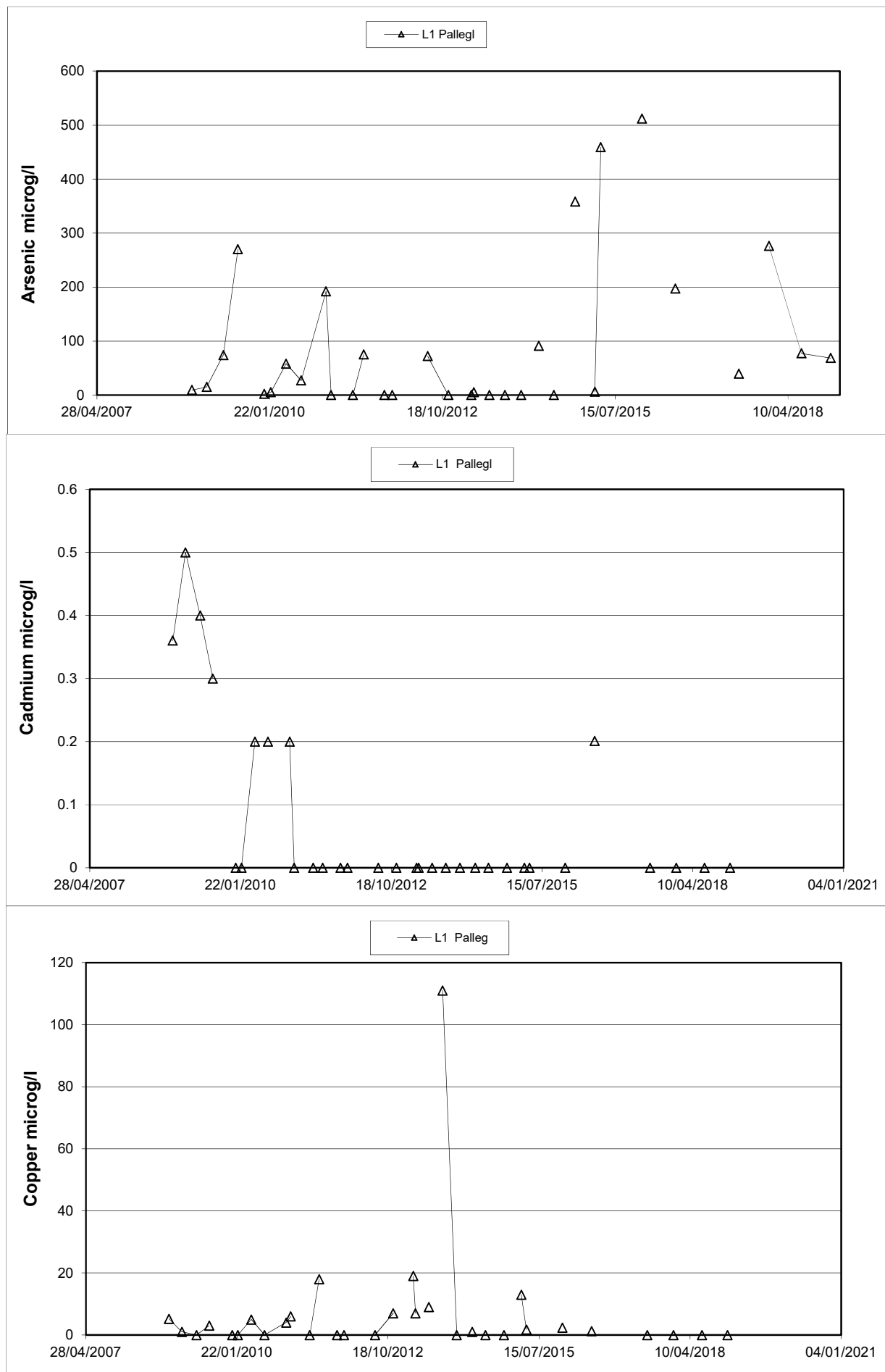
**Review of 2018
Landfill Monitoring**

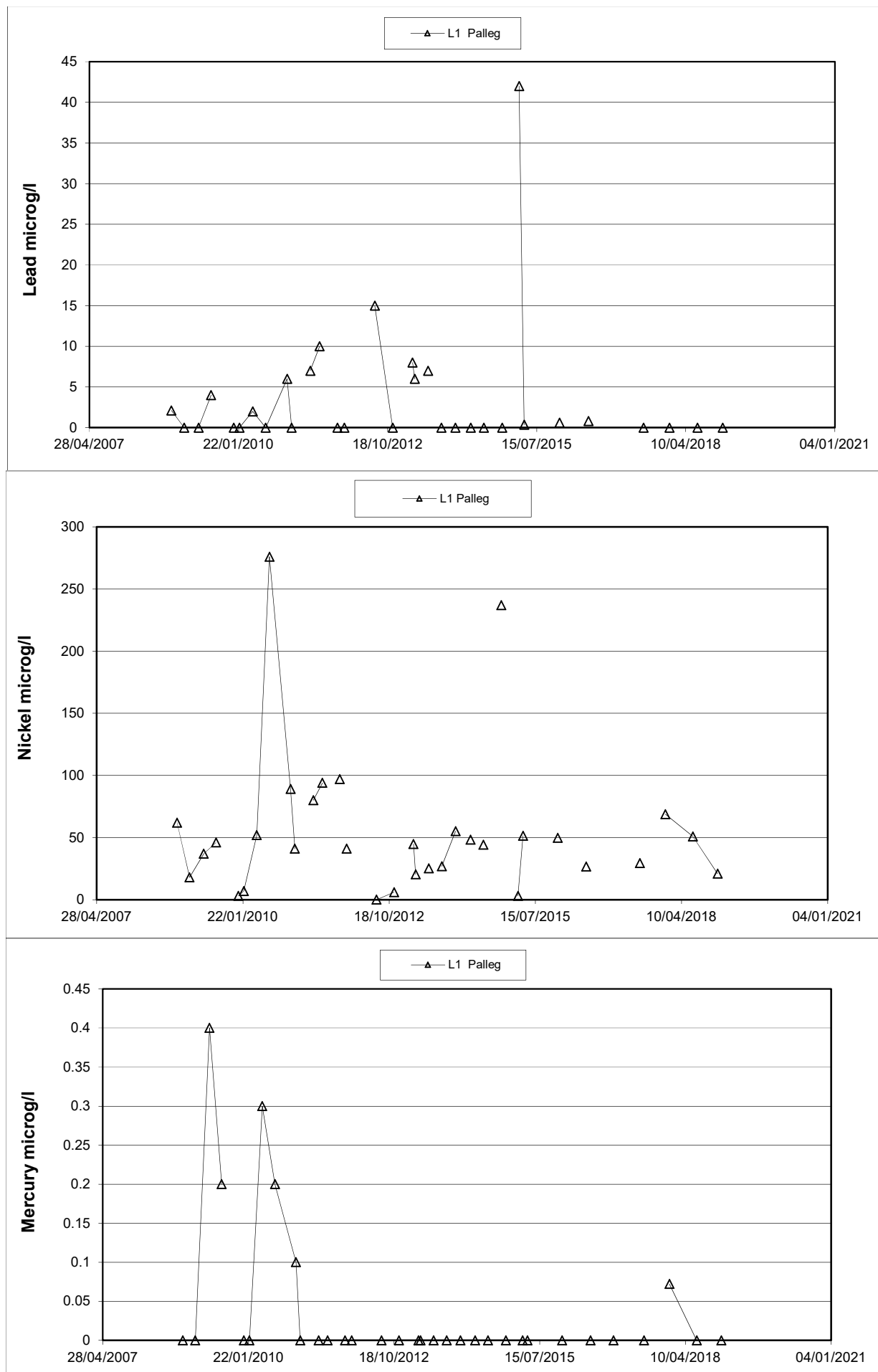
**Appendix 3
Summary of Leachate
Levels and Chemistry**

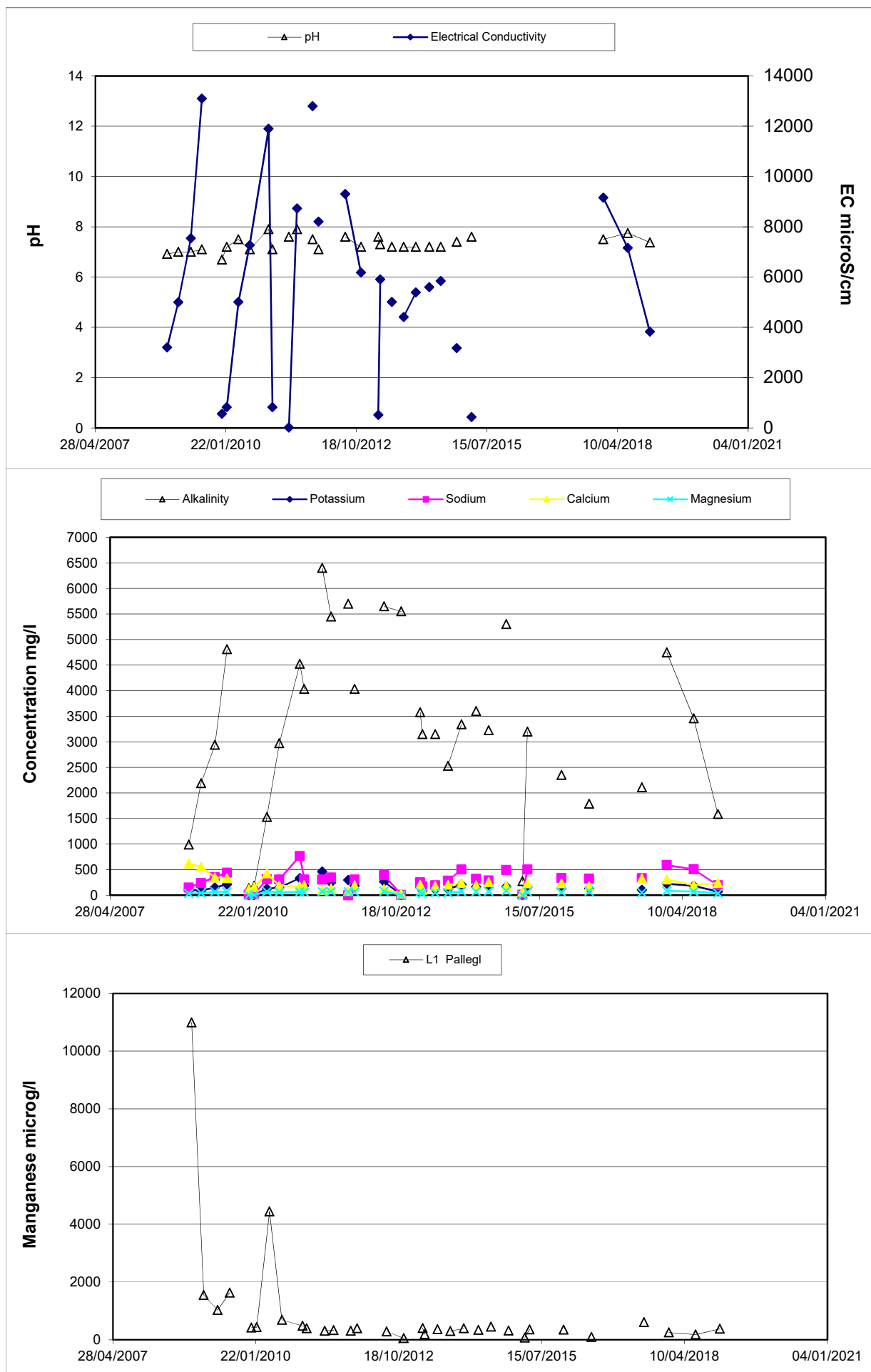
Report Number 1783r1v1d0319

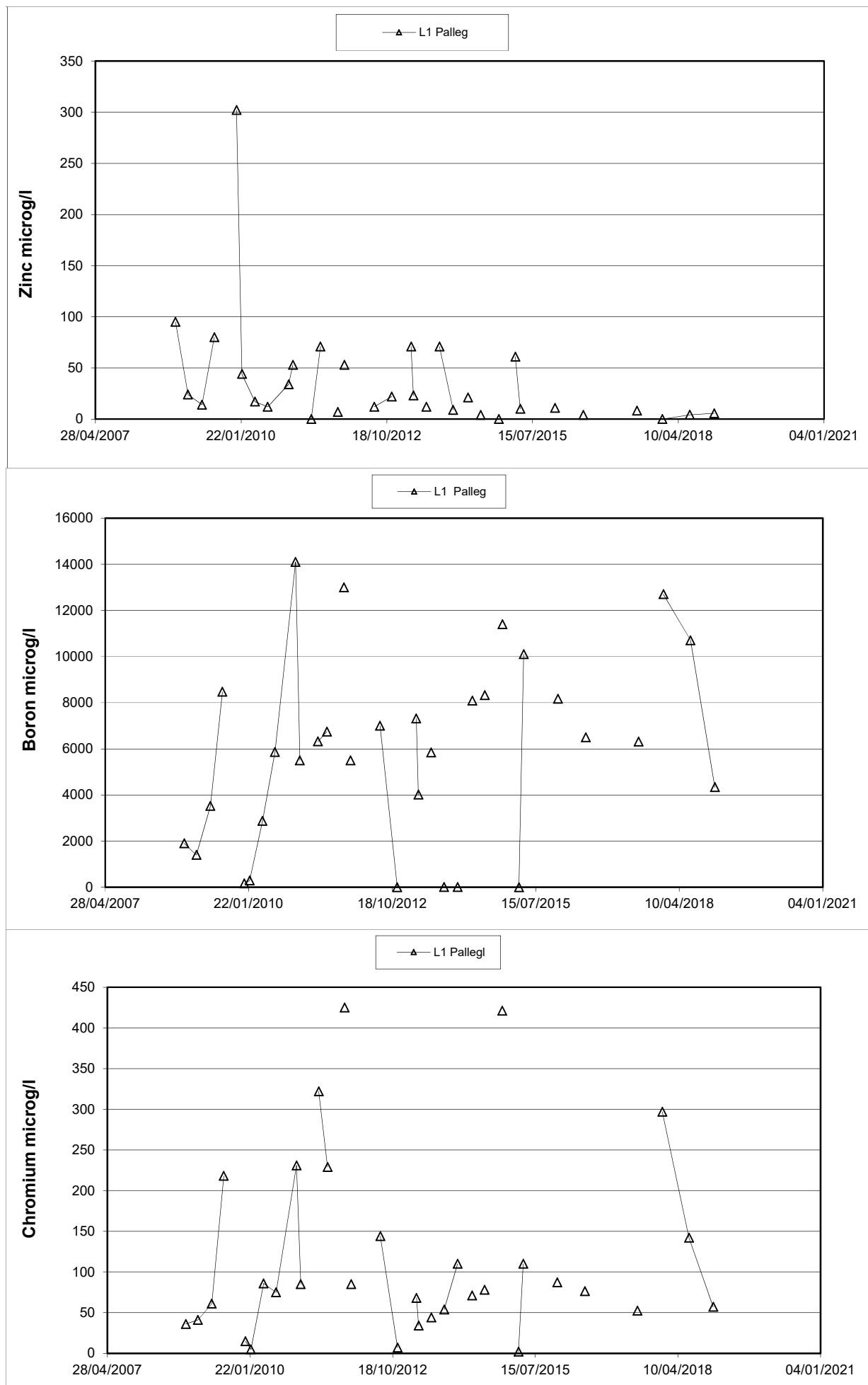
Leachate Levels - Daily Recording Sheet 2018

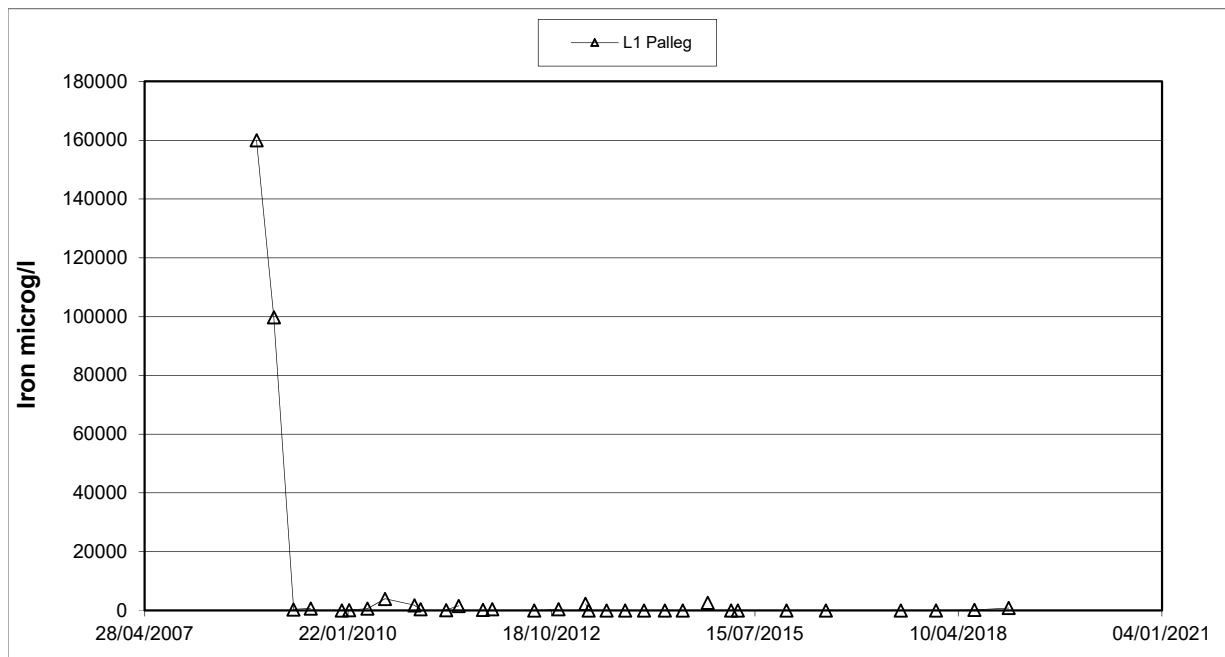
January		February		March		April		May		June		July		August		September		October		November		December	
Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level	Date	Level
1 (Mon)	x	1 (Thurs)	0.2	1 (Thurs)	0.1	1 (Sun)		1 (Tues)	0.4	1 (Fri)	0.1	1 (Sun)		1 (Wed)	0.2	1 (Sat)		1 (Mon)	0.3	1 (Thurs)	0.1	1 (Sat)	
2 (Tues)	0.3	2 (Fri)	0.2	2 (Fri)	0.1	2 (Mon)	X	2 (Wed)	0.1	2 (Sat)		2 (Mon)	0.3	2 (Thurs)	0.2	2 (Sun)		2 (Tues)	0.3	2 (Fri)	0.2	2 (Sun)	
3 (Wed)	0.1	3 (Sat)		3 (Sat)		3 (Tues)	0.3	3 (Thurs)	0.1	3 (Sun)		3 (Tues)	0.3	3 (Fri)	0.2	3 (Mon)	0.3	3 (Wed)	0.1	3 (Sat)		3 (Mon)	0.2
4 (Thurs)	0.1	4 (Sun)		4 (Sun)		4 (Wed)	0.1	4 (Fri)	0.1	4 (Mon)	0.1	4 (Wed)	0.1	4 (Sat)		4 (Tues)	0.3	4 (Thurs)	0.1	4 (Sat)		4 (Tues)	0.2
5 (Fri)	0.2	5 (Mon)	0.3	5 (Mon)	0.2	5 (Thurs)	0.1	5 (Sat)		5 (Tues)	0.4	5 (Thurs)	0.1	5 (Sun)		5 (Wed)	0.1	5 (Fri)	0.1	5 (Mon)	0.3	5 (Wed)	0.1
6 (Sat)		6 (Tues)	0.3	6 (Tues)	0.2	6 (Fri)	0.1	6 (Sun)		6 (Wed)	0.2	6 (Fri)	0.1	6 (Mon)	0.3	6 (Thurs)	0.1	6 (Sat)		6 (Tues)	0.3	6 (Thurs)	0.1
7 (Sun)		7 (Wed)	0.1	7 (Wed)	0.1	7 (Sat)		7 (Mon)	X	7 (Thurs)	0.2	7 (Sat)		7 (Tues)	0.3	7 (Fri)	0.2	7 (Sun)		7 (Wed)	0.3	7 (Fri)	0.1
8 (Mon)	0.2	8 (Thurs)	0.2	8 (Thurs)	0.1	8 (Sun)		8 (Tues)	0.3	8 (Fri)	0.2	8 (Sun)		8 (Wed)	0.3	8 (Sat)		8 (Mon)	0.2	8 (Thurs)	0.3	8 (Sat)	
9 (Tues)	0.3	9 (Fri)	0.2	9 (Fri)	0.2	9 (Mon)	0.2	9 (Wed)	0.1	9 (Sat)		9 (Mon)	0.2	9 (Thurs)	0.3	9 (Sun)		9 (Tues)	0.3	9 (Fri)	0.3	9 (Sun)	
10 (Wed)	0.1	10 (Sat)		10 (Sat)		10 (Tues)	0.3	10 (Thurs)	0.1	10 (Sun)		10 (Tues)	0.3	10 (Fri)	0.3	10 (Mon)	0.3	10 (Wed)	0.1	10 (Sat)		10 (Mon)	0.2
11 (Thurs)	0.1	11 (Sun)		11 (Sun)		11 (Wed)	0.1	11 (Fri)	0.1	11 (Mon)	0.3	11 (Wed)	0.1	11 (Sat)		11 (Tues)	0.3	11 (Thurs)	0.1	11 (Sun)		11 (Tues)	0.2
12 (Fri)	0.1	12 (Mon)	0.3	12 (Mon)	0.2	12 (Thurs)	0.1	12 (Sat)		12 (Tues)	0.3	12 (Thurs)	0.1	12 (Sun)		12 (Wed)	0.1	12 (Fri)	0.1	12 (Mon)	0.3	12 (Wed)	0.2
13 (Sat)		13 (Tues)	0.3	13 (Tues)	0.3	13 (Fri)	0.1	13 (Sun)		13 (Wed)	0.1	13 (Fri)	0.2	13 (Mon)	0.3	13 (Thurs)	0.1	13 (Sat)		13 (Tues)	0.4	13 (Thurs)	0.2
14 (Sun)		14 (Wed)	0.3	14 (Wed)	0.1	14 (Sat)		14 (Mon)	0.2	14 (Thurs)	0.1	14 (Sat)		14 (Tues)	0.4	14 (Fri)	0.2	14 (Sun)		14 (Wed)	0.1	14 (Fri)	0.2
15 (Mon)	0.1	15 (Thurs)	0.3	15 (Thurs)	0.1	15 (Sun)		15 (Tues)	0.4	15 (Fri)	0.2	15 (Sun)		15 (Wed)	0.2	15 (Sat)		15 (Mon)	0.2	15 (Thurs)	0.1	15 (Sat)	
16 (Tues)	0.2	16 (Fri)	0.4	16 (Fri)	0.2	16 (Mon)	0.2	16 (Wed)	0.1	16 (Sat)		16 (Mon)	0.2	16 (Thurs)	0.4	16 (Sun)		16 (Tues)	0.3	16 (Fri)	0.1	16 (Sun)	
17 (Wed)	0.1	17 (Sat)		17 (Sat)		17 (Tues)	0.4	17 (Thurs)	0.2	17 (Sun)		17 (Tues)	0.3	17 (Fri)	0.4	17 (Mon)	0.3	17 (Wed)	0.3	17 (Sat)		17 (Mon)	0.2
18 (Thurs)	0.2	18 (Sun)		18 (Sun)		18 (Wed)	0.1	18 (Fri)	0.2	18 (Mon)	0.2	18 (Wed)	0.1	18 (Sat)		18 (Tues)	0.3	18 (Thurs)	0.3	18 (Sun)		18 (Tues)	0.2
19 (Fri)	0.2	19 (Mon)	0.4	19 (Mon)	0.2	19 (Thurs)	0.1	19 (Sat)		19 (Tues)	0.2	19 (Thurs)	0.1	19 (Sun)		19 (Wed)	0.1	19 (Fri)	0.3	19 (Mon)	0.2	19 (Wed)	0.1
20 (Sat)		20 (Tues)	0.1	20 (Tues)	0.3	20 (Fri)	0.2	20 (Sun)		20 (Wed)	0.1	20 (Fri)	0.1	20 (Mon)	0.4	20 (Thurs)	0.1	20 (Sat)		20 (Tues)	0.2	20 (Thurs)	0.1
21 (Sun)		21 (Wed)	0.1	21 (Wed)	0.1	21 (Sat)		21 (Mon)	0.2	21 (Thurs)	0.2	21 (Sat)		21 (Tues)	0.4	21 (Fri)	0.2	21 (Sun)		21 (Wed)	0.1	21 (Fri)	0.1
22 (Mon)	0.3	22 (Thurs)	0.1	22 (Thurs)	0.1	22 (Sun)		22 (Tues)	0.3	22 (Fri)	0.2	22 (Sun)		22 (Wed)	0.1	22 (Sat)		22 (Mon)	0.4	22 (Thurs)	0.1	22 (Sat)	
23 (Tues)	0.3	23 (Fri)	0.1	23 (Fri)	0.1	23 (Mon)	0.2	23 (Wed)	0.1	23 (Sat)		23 (Mon)	0.2	23 (Thurs)	0.1	23 (Sun)		23 (Tues)	0.4	23 (Fri)	0.2	23 (Sun)	
24 (Wed)	0.1	24 (Sat)		24 (Sat)		24 (Tues)	0.4	24 (Thurs)	0.2	24 (Sun)		24 (Tues)	0.2	24 (Fri)	0.2	24 (Mon)	0.2	24 (Wed)	0.2	24 (Sat)		24 (Mon)	
25 (Thurs)	0.1	25 (Sun)		25 (Sun)		25 (Wed)	0.2	25 (Fri)	0.2	25 (Mon)	0.3	25 (Wed)	0.1	25 (Sat)		25 (Tues)	0.3	25 (Thurs)	0.2	25 (Sun)		25 (Tues)	X
26 (Fri)	0.2	26 (Mon)	0.2	26 (Mon)	0.2	26 (Thurs)	0.2	26 (Sat)		26 (Tues)	0.3	26 (Thurs)	0.1	26 (Sun)		26 (Wed)	0.1	26 (Fri)	0.2	26 (Mon)	0.3	26 (Wed)	X
27 (Sat)		27 (Tues)	0.2	27 (Tues)	0.2	27 (Fri)	0.2	27 (Sun)		27 (Wed)	0.3	27 (Fri)	0.2	27 (Mon)	X	27 (Thurs)	0.2	27 (Sat)		27 (Tues)	0.3	27 (Thurs)	
28 (Sun)		28 (Wed)	0.1	28 (Wed)	0.1	28 (Sat)		28 (Mon)	X	28 (Thurs)	0.3	28 (Sat)		28 (Tues)	0.2	28 (Fri)	0.2	28 (Sun)		28 (Wed)	0.1	28 (Fri)	
29 (Mon)	0.2			29 (Thurs)	0.1	29 (Sun)		29 (Tues)	0.2	29 (Fri)	0.3	29 (Sun)		29 (Wed)	0.1	29 (Sat)		29 (Mon)	0.3	29 (Thurs)	0.1	29 (Sat)	
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31 (Wed)	0.1			31 (Sat)				31 (Thurs)	0.1			31 (Tues)	0.3	31 (Fri)	0.2			31 (Wed)	0.1			31 (Mon)	











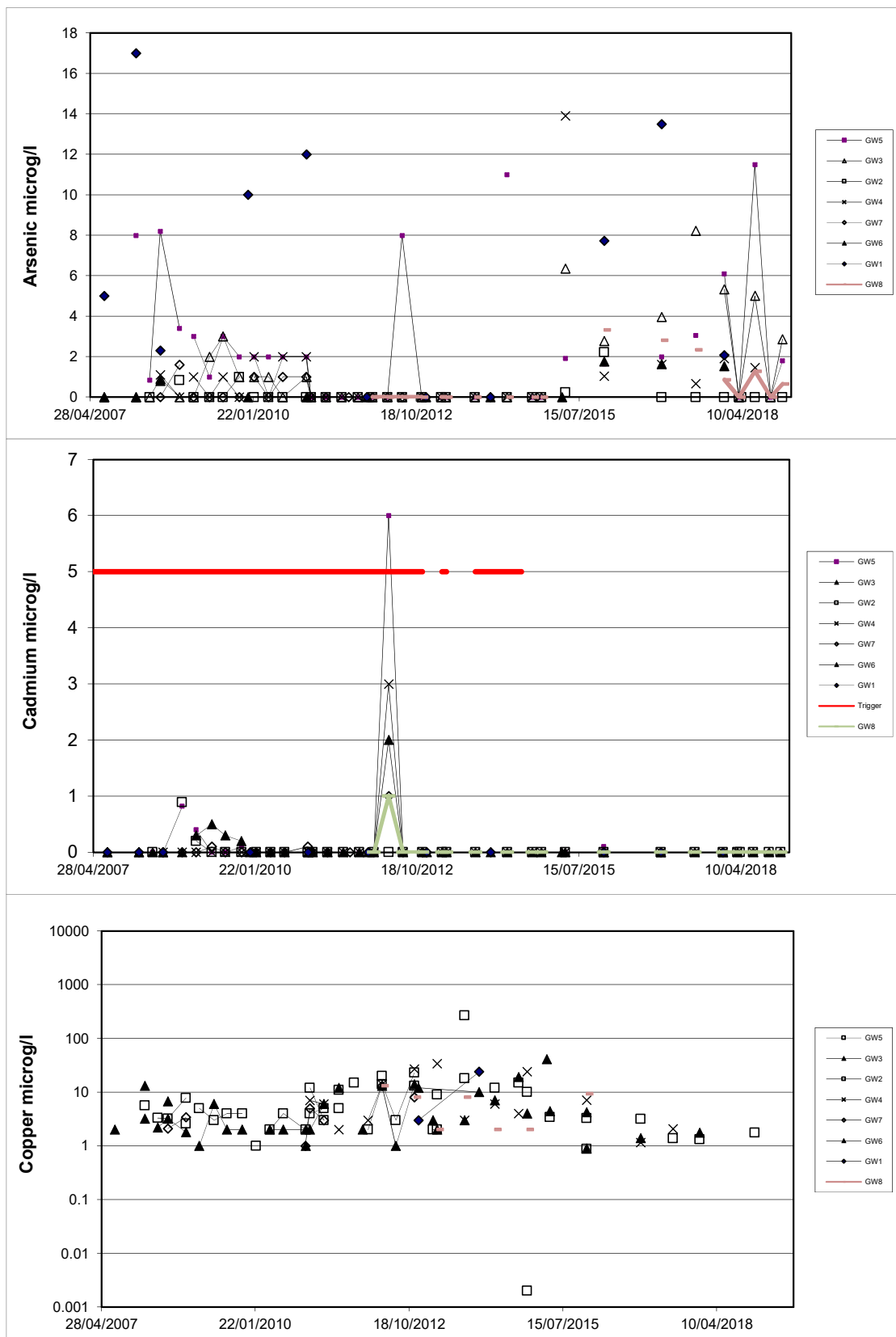
**PALLEG LANDFILL
LOWER CWMTWRCH**

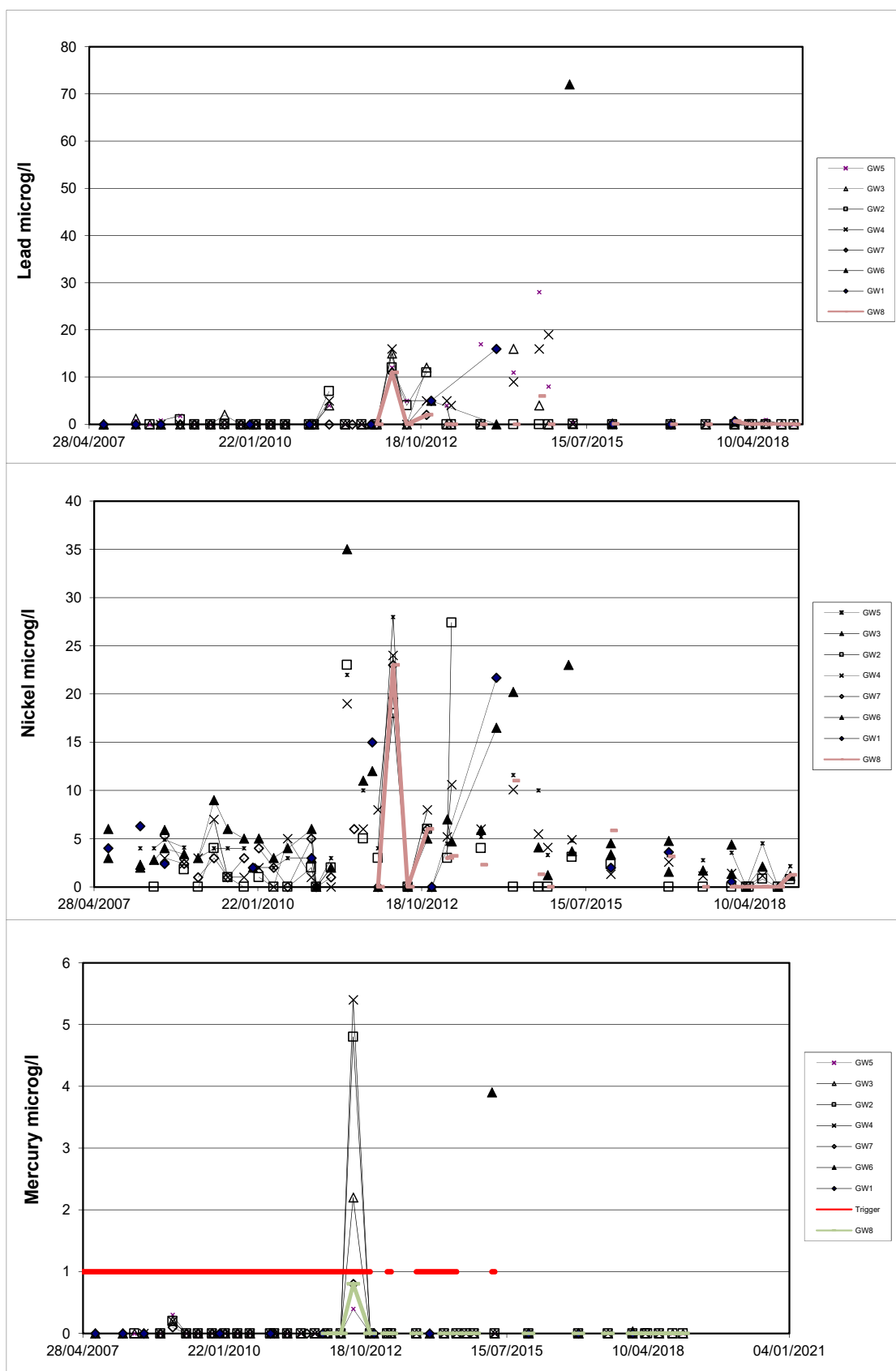
PERMIT BT19081X

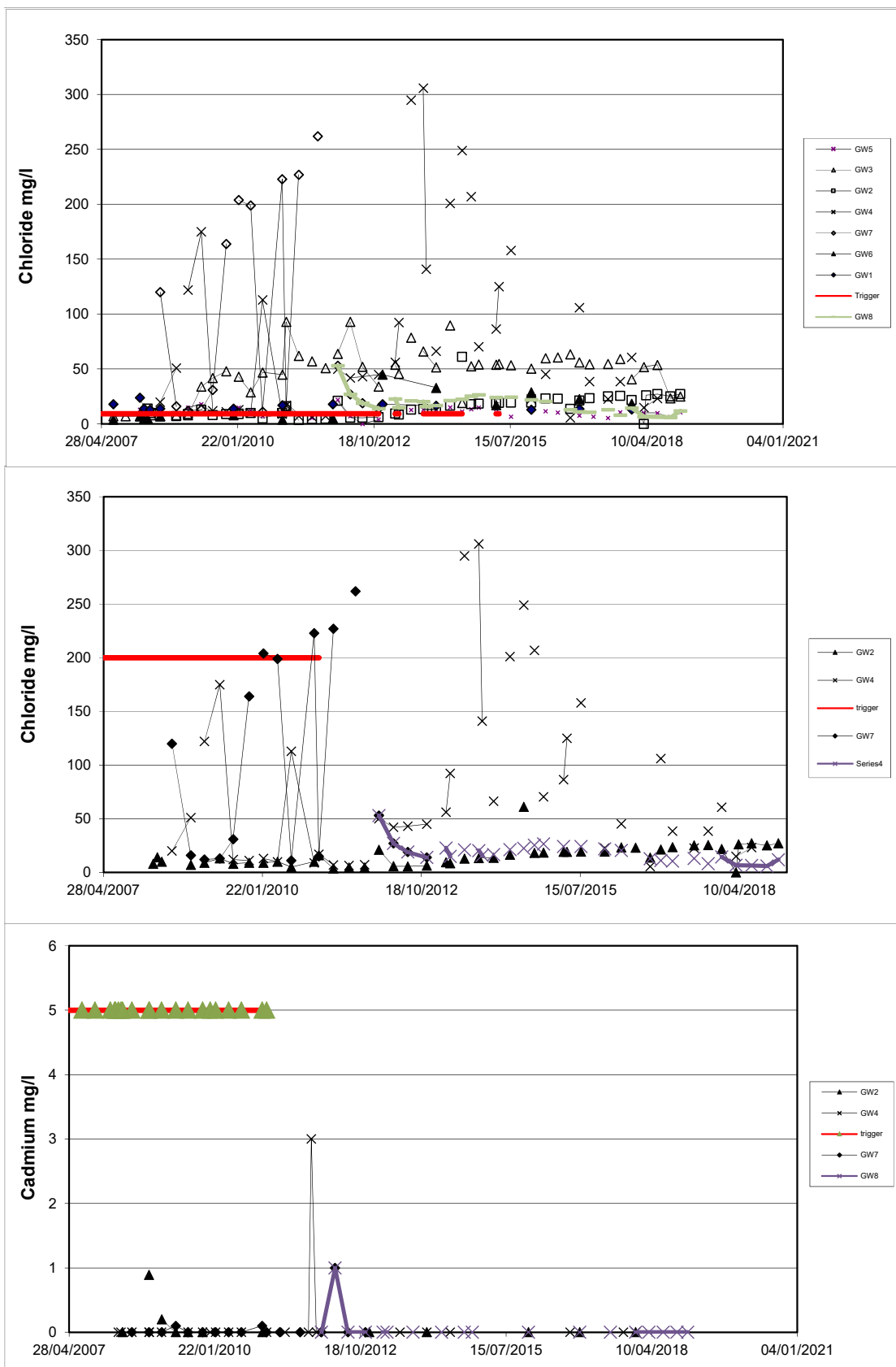
**Review of 2018
Landfill Monitoring**

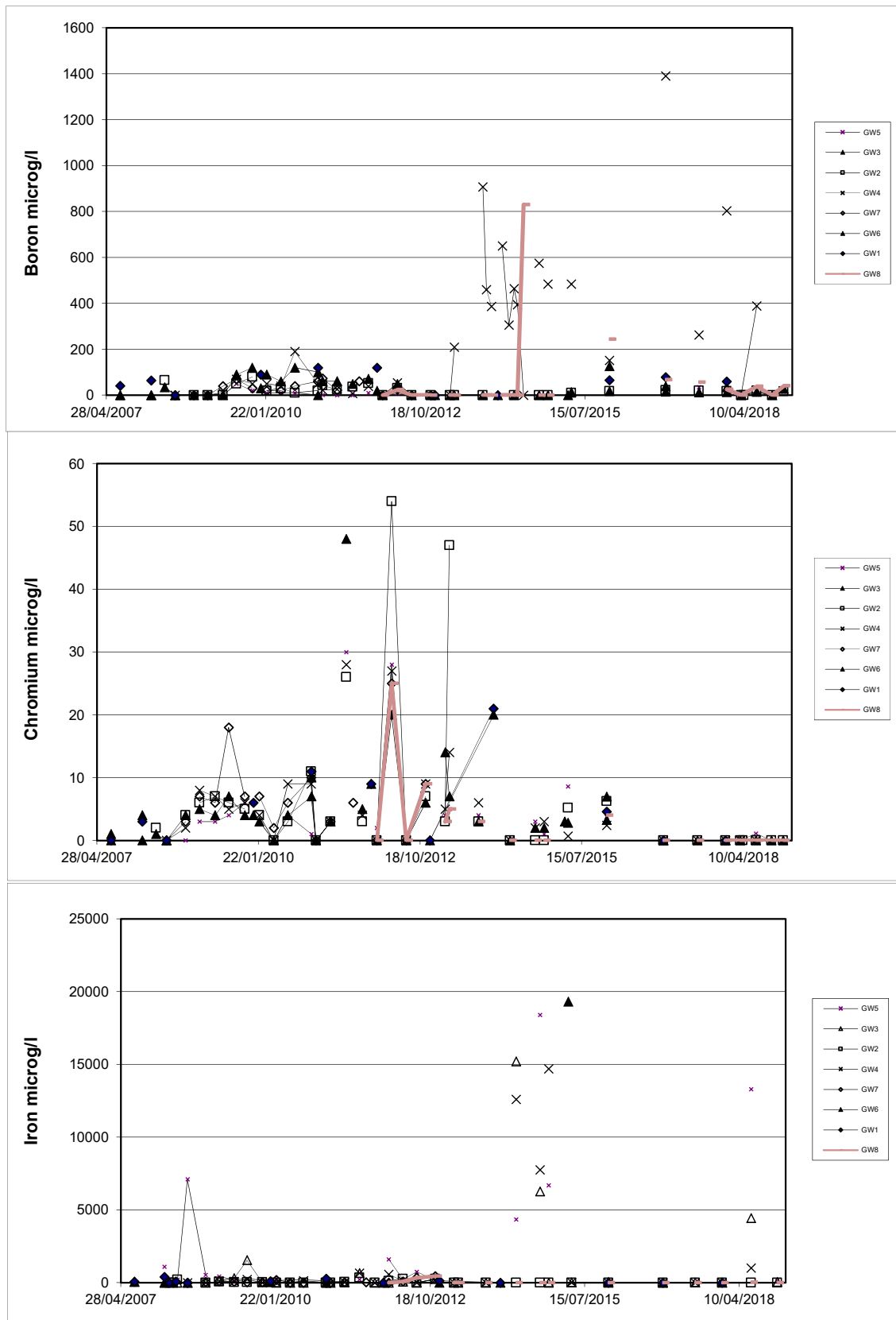
**Appendix 4
Summary of Groundwater
Monitoring Data**

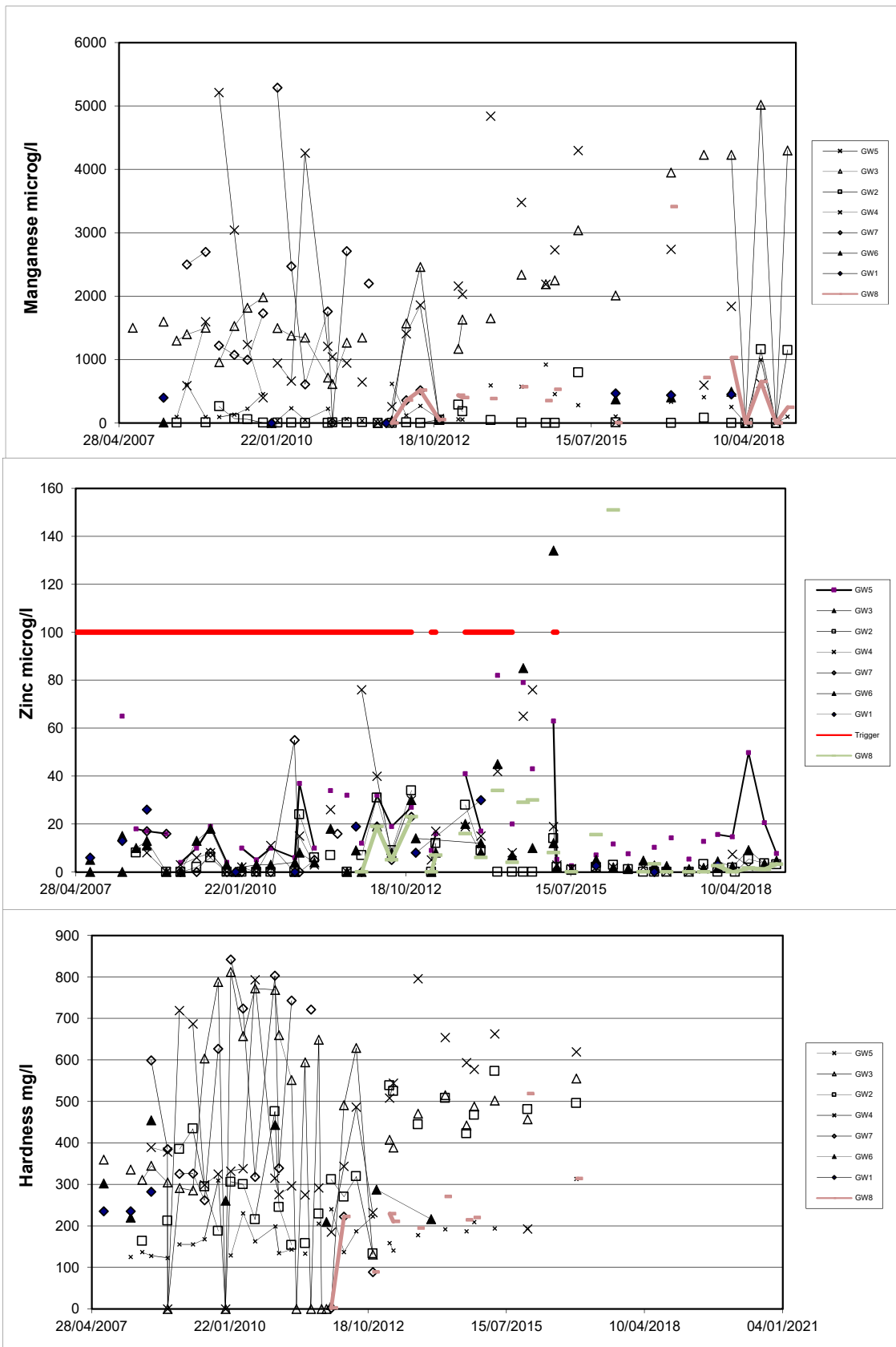
Report Number 1783r1v1d0319

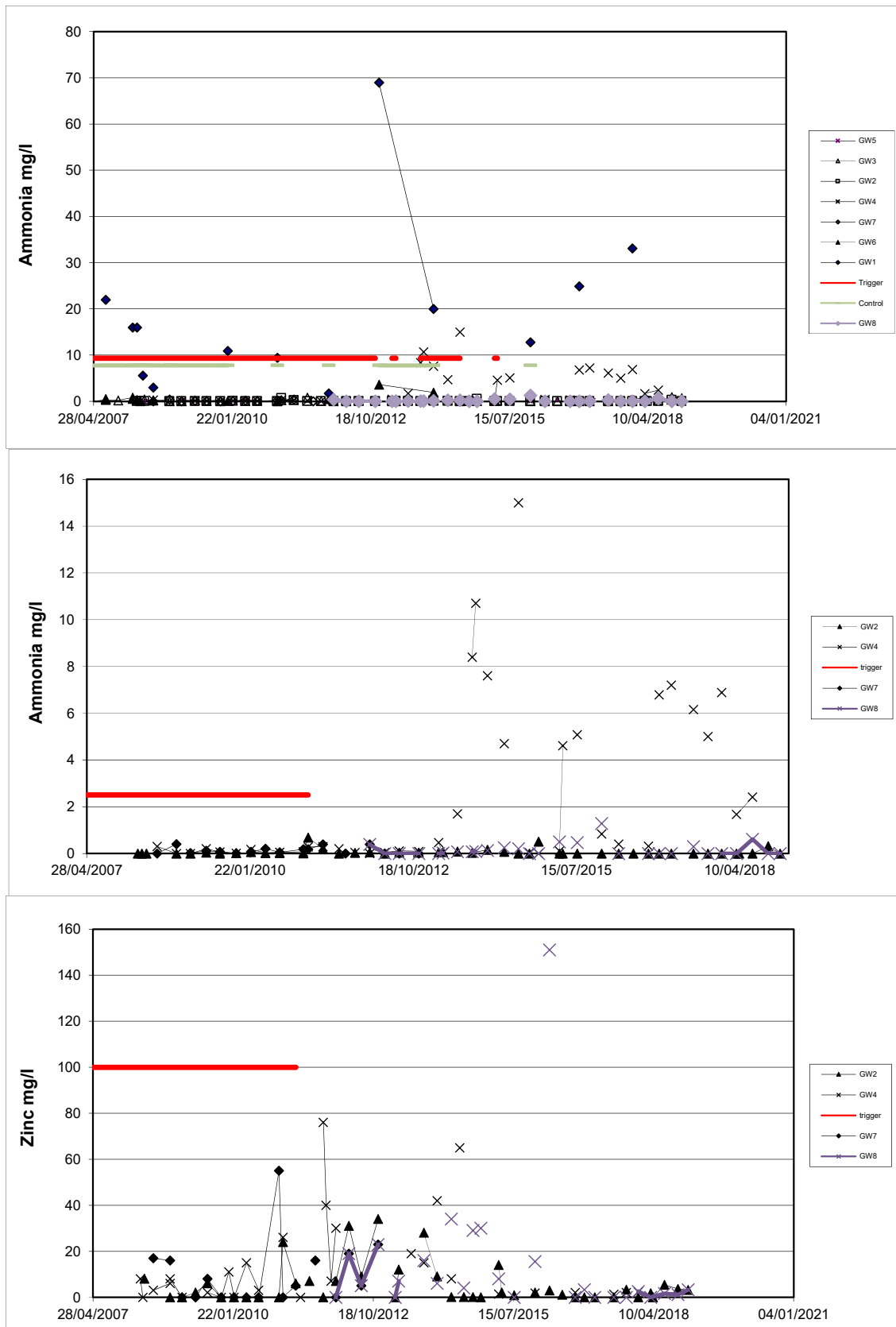


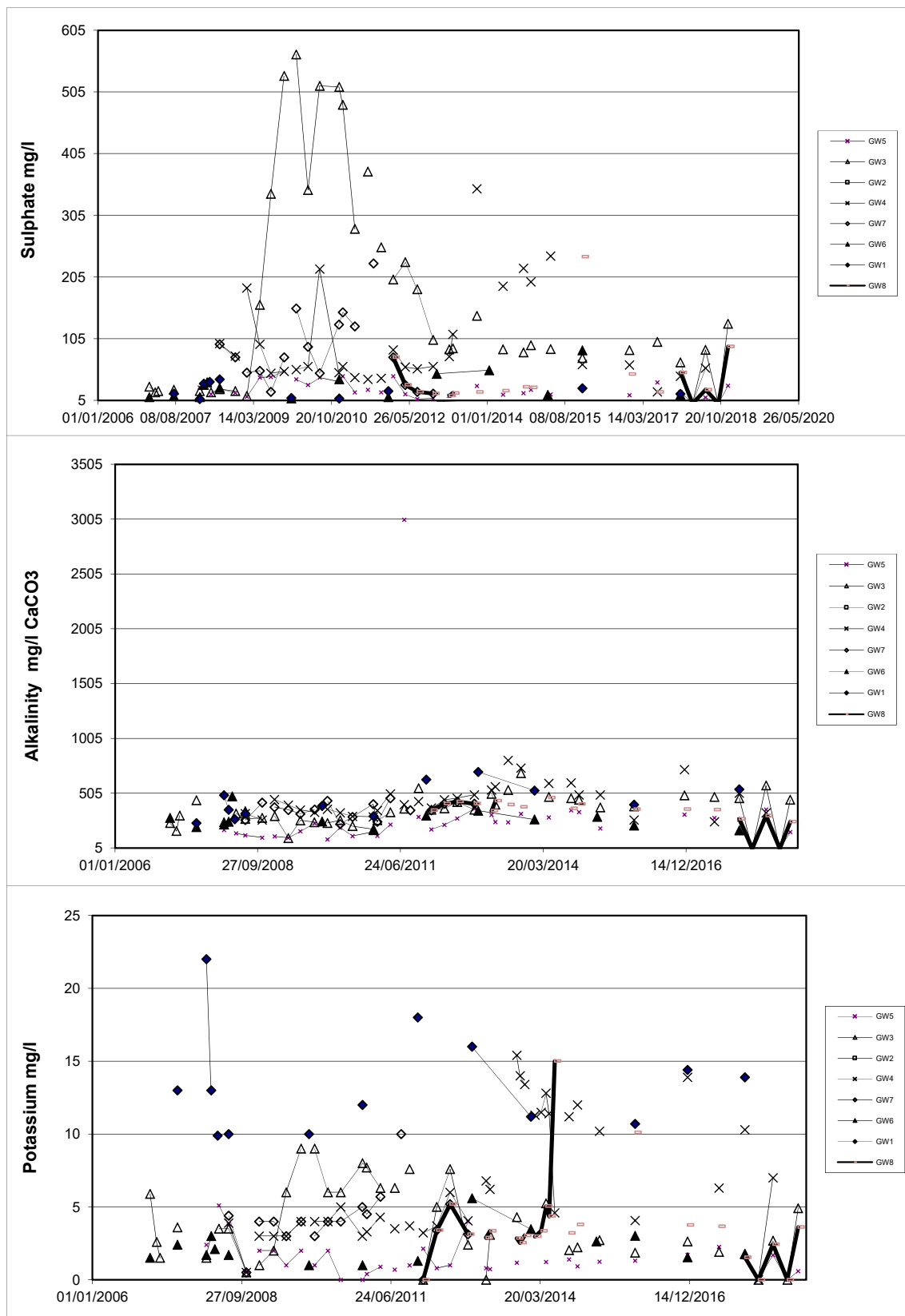


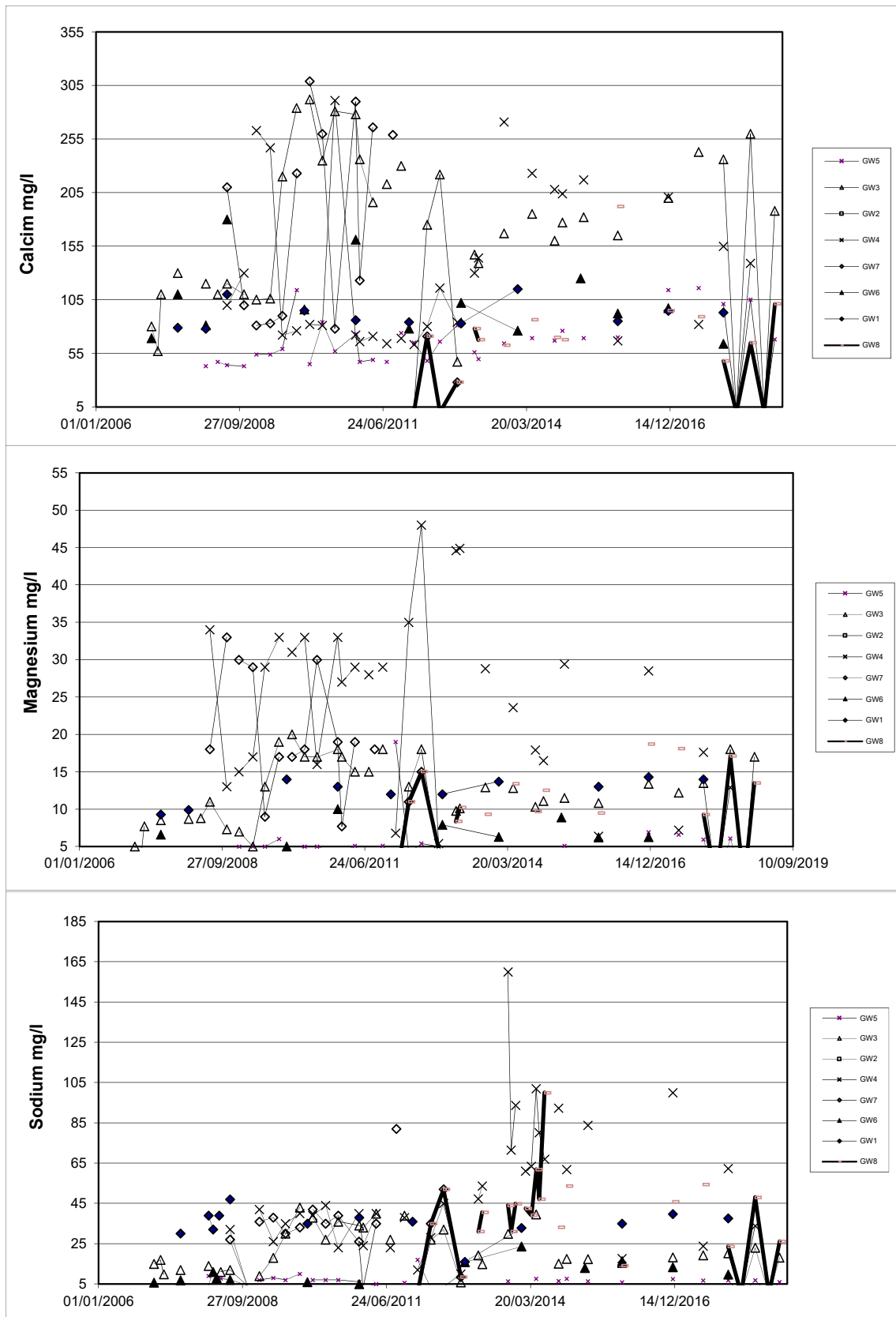


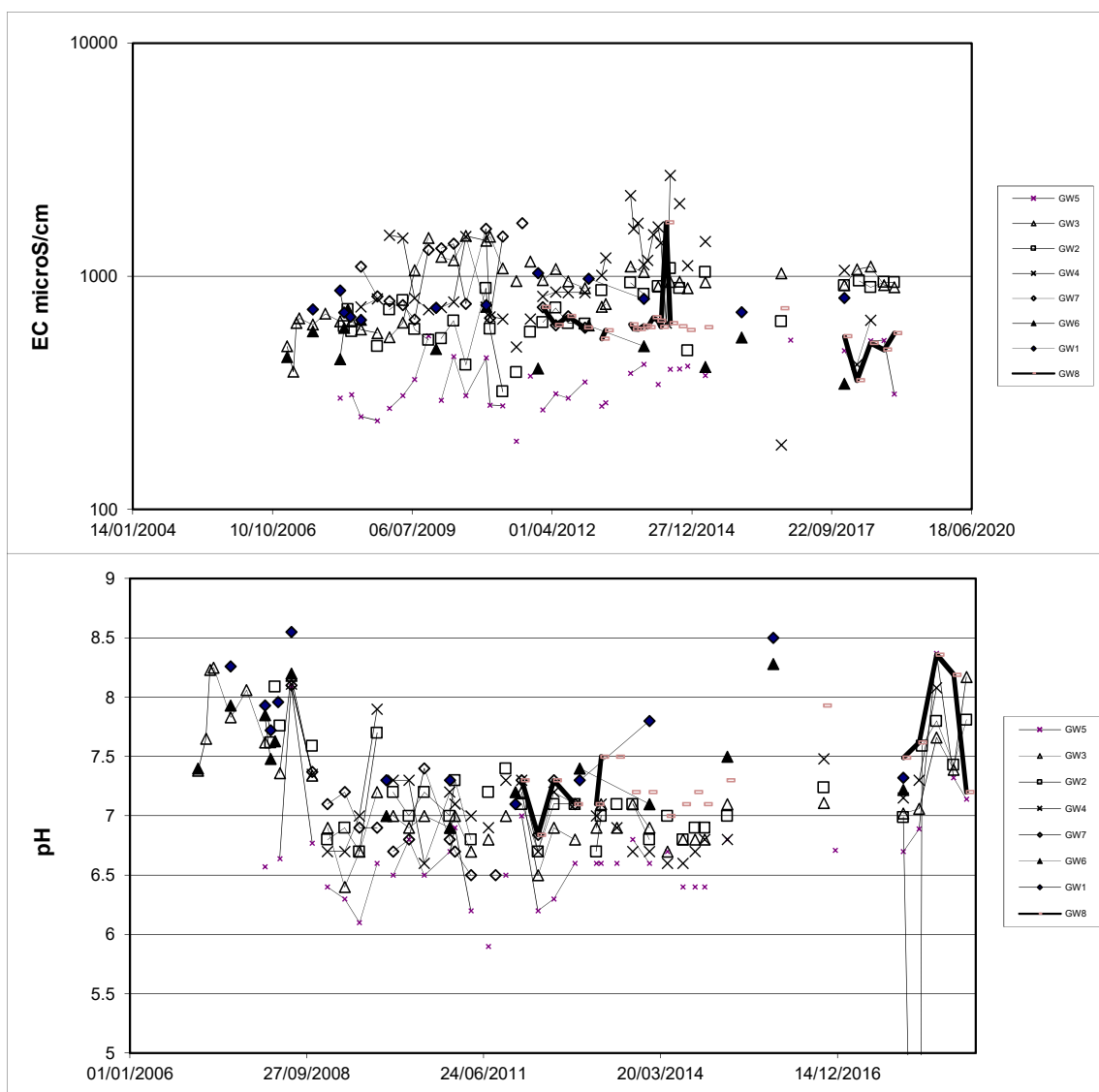


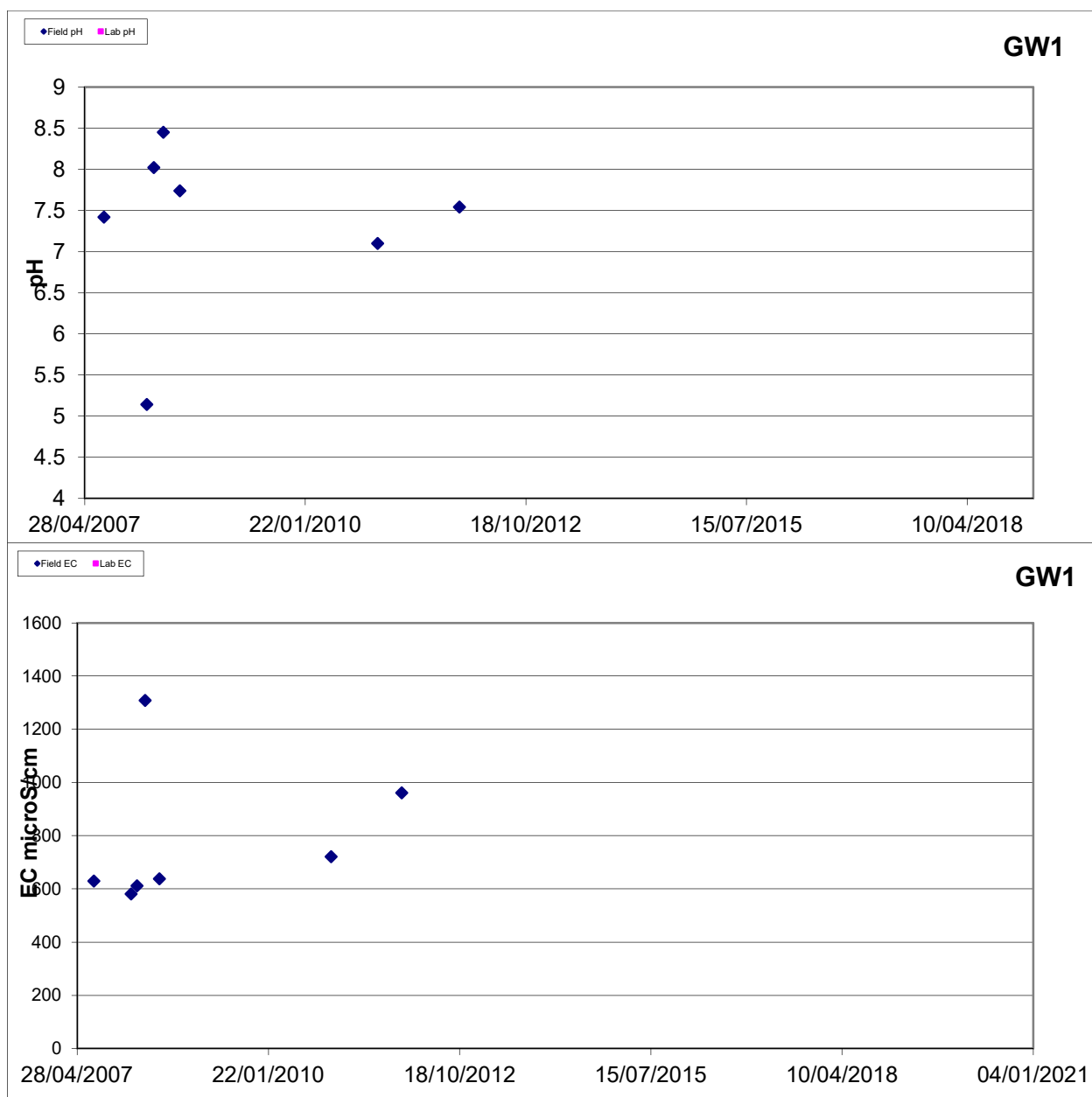


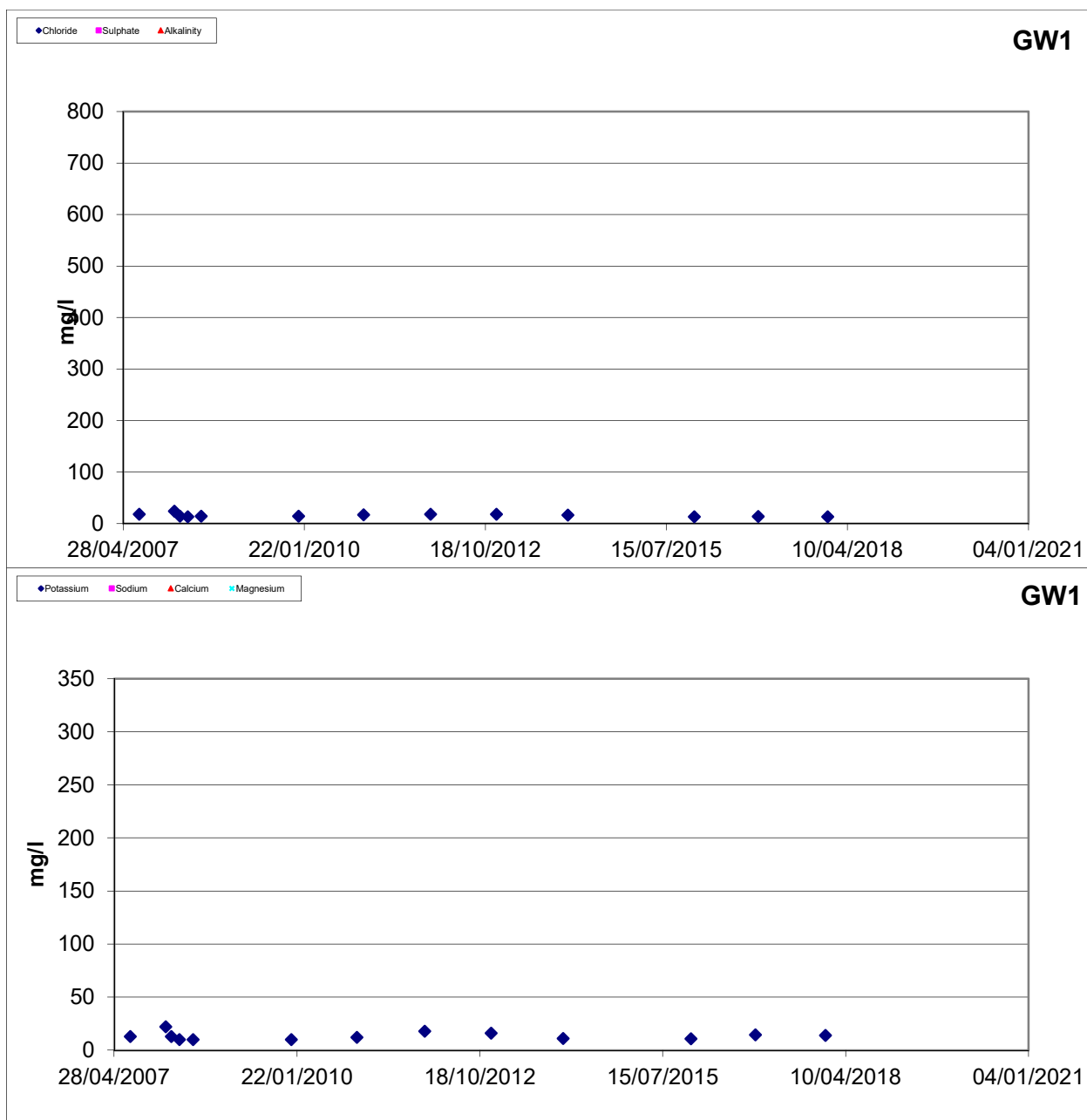


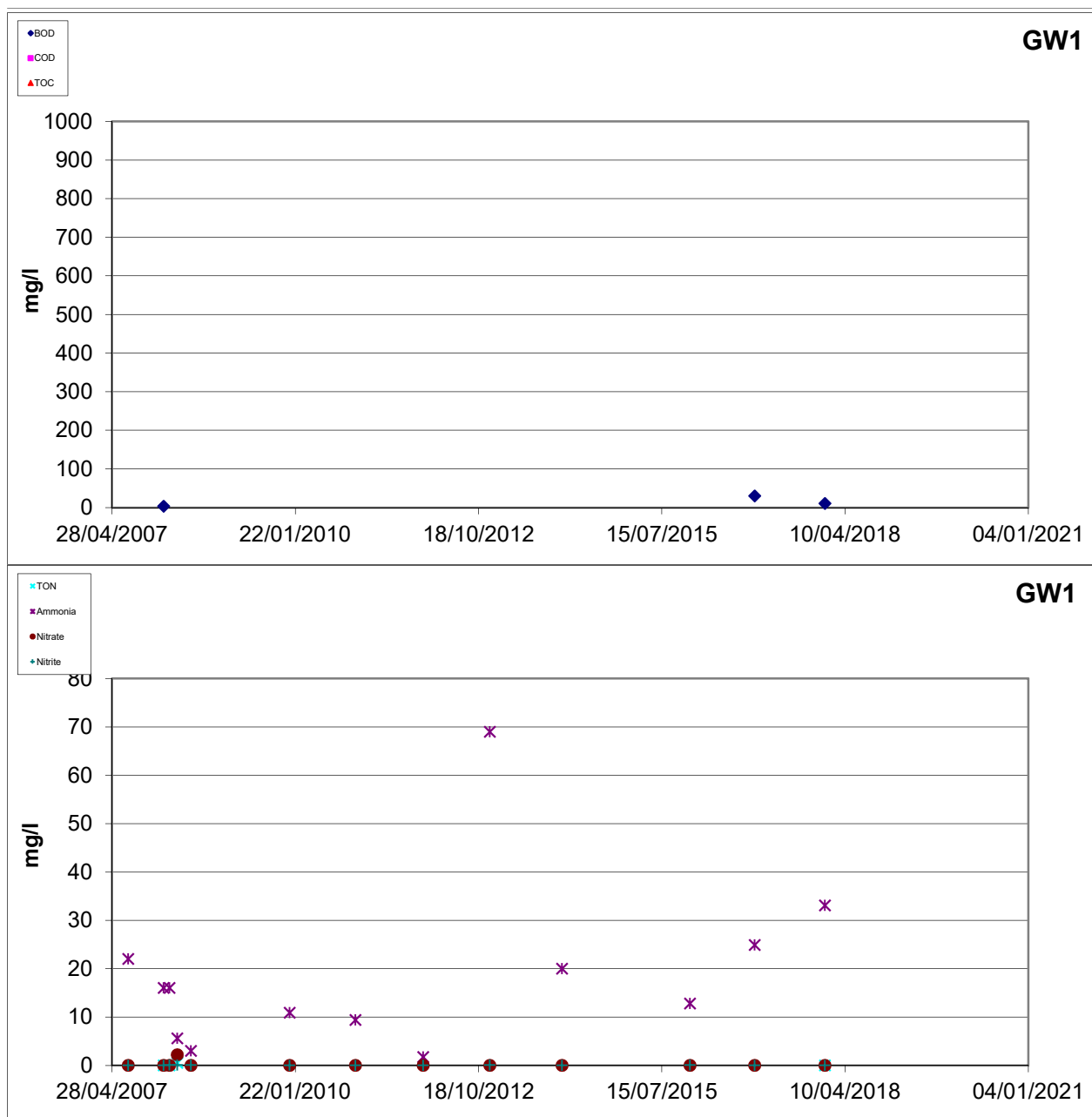


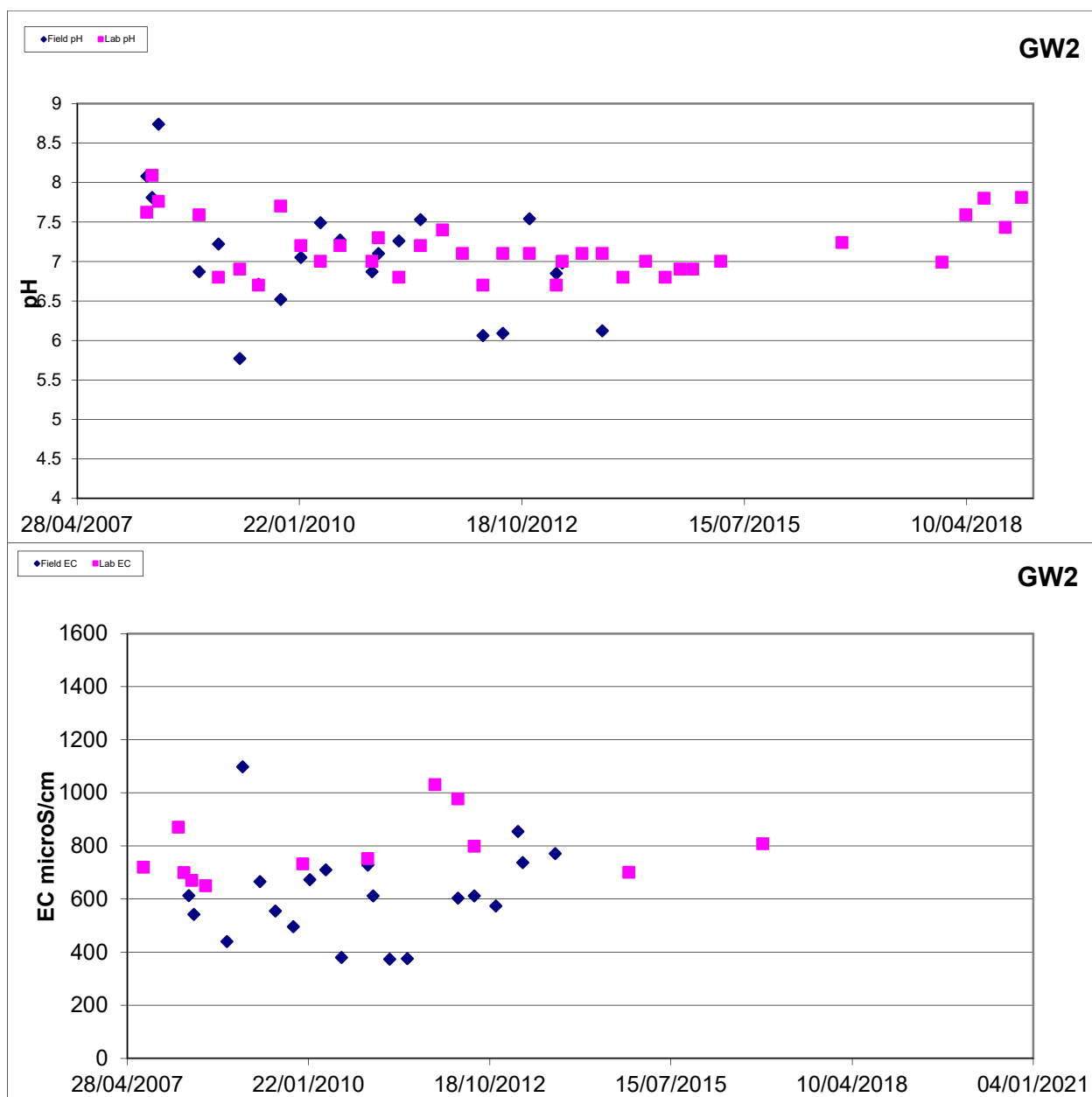


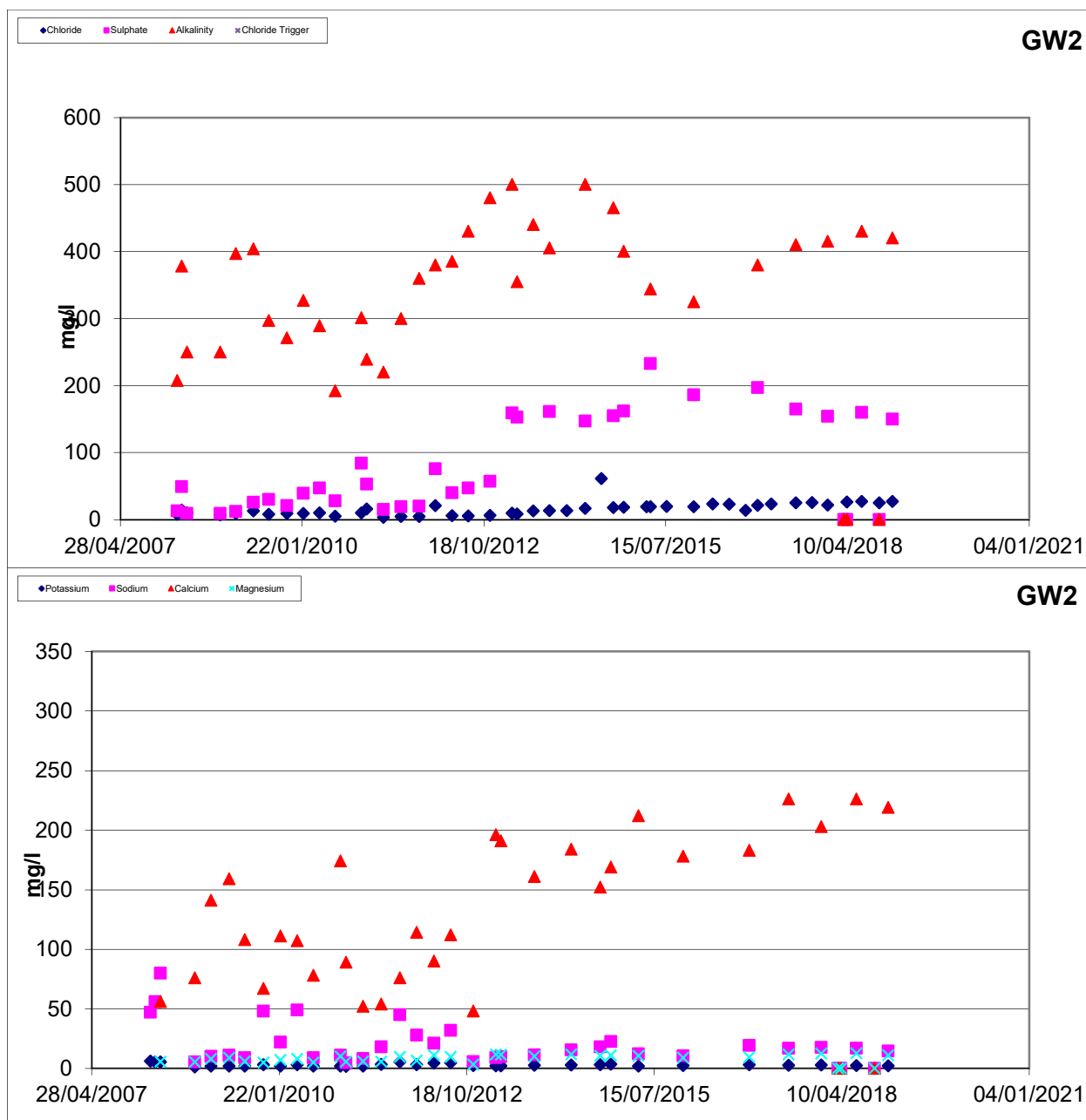


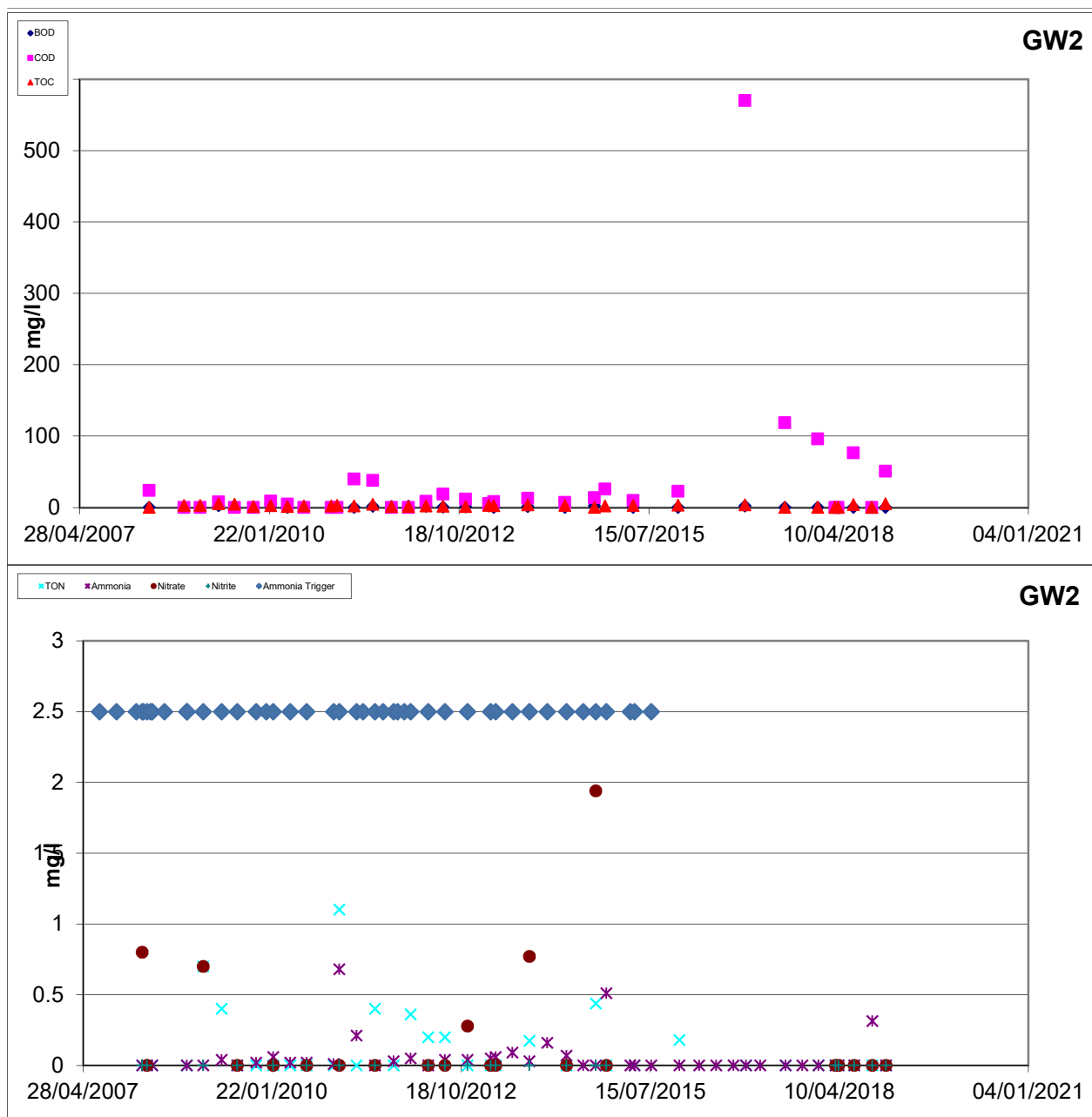


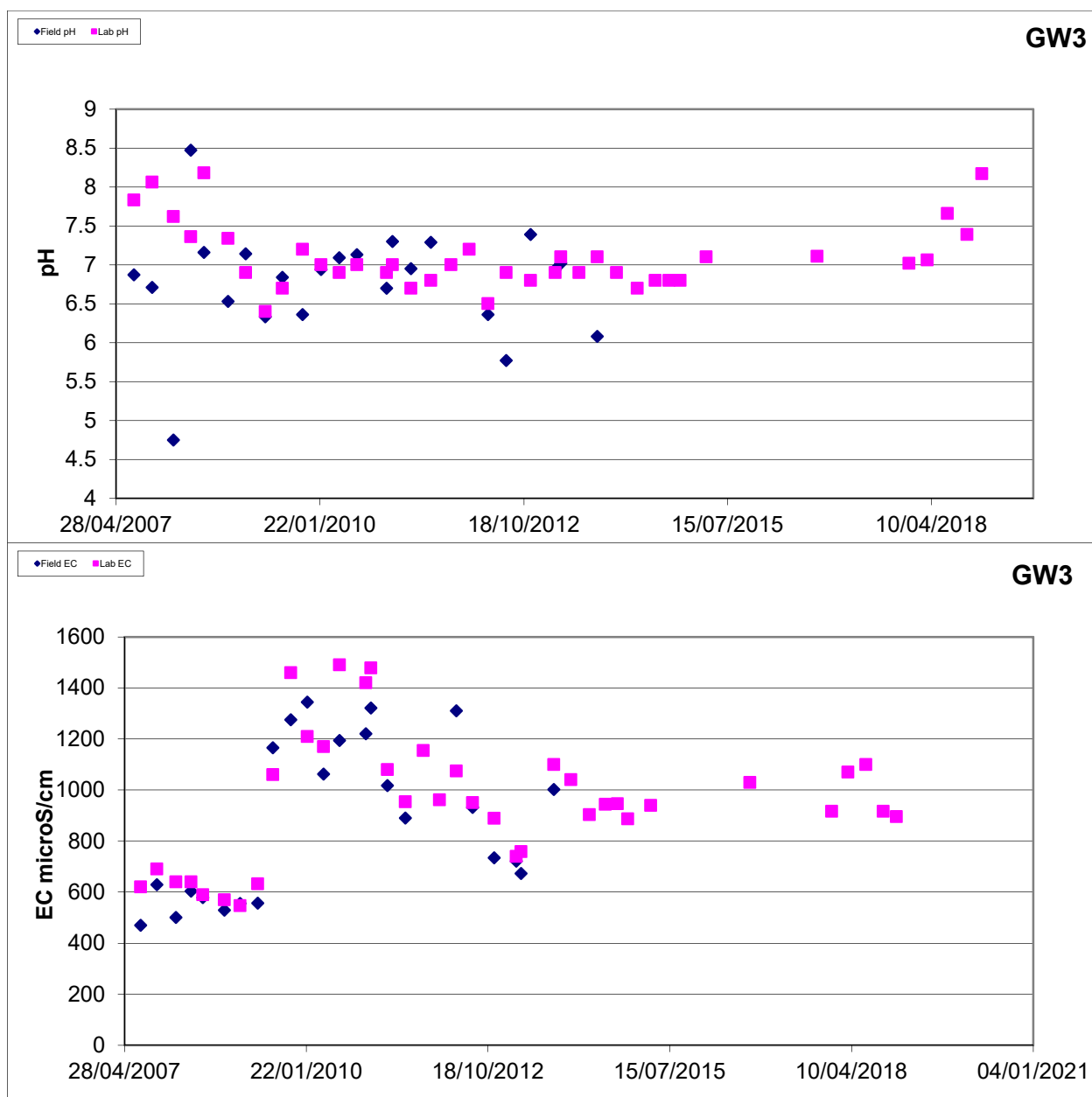


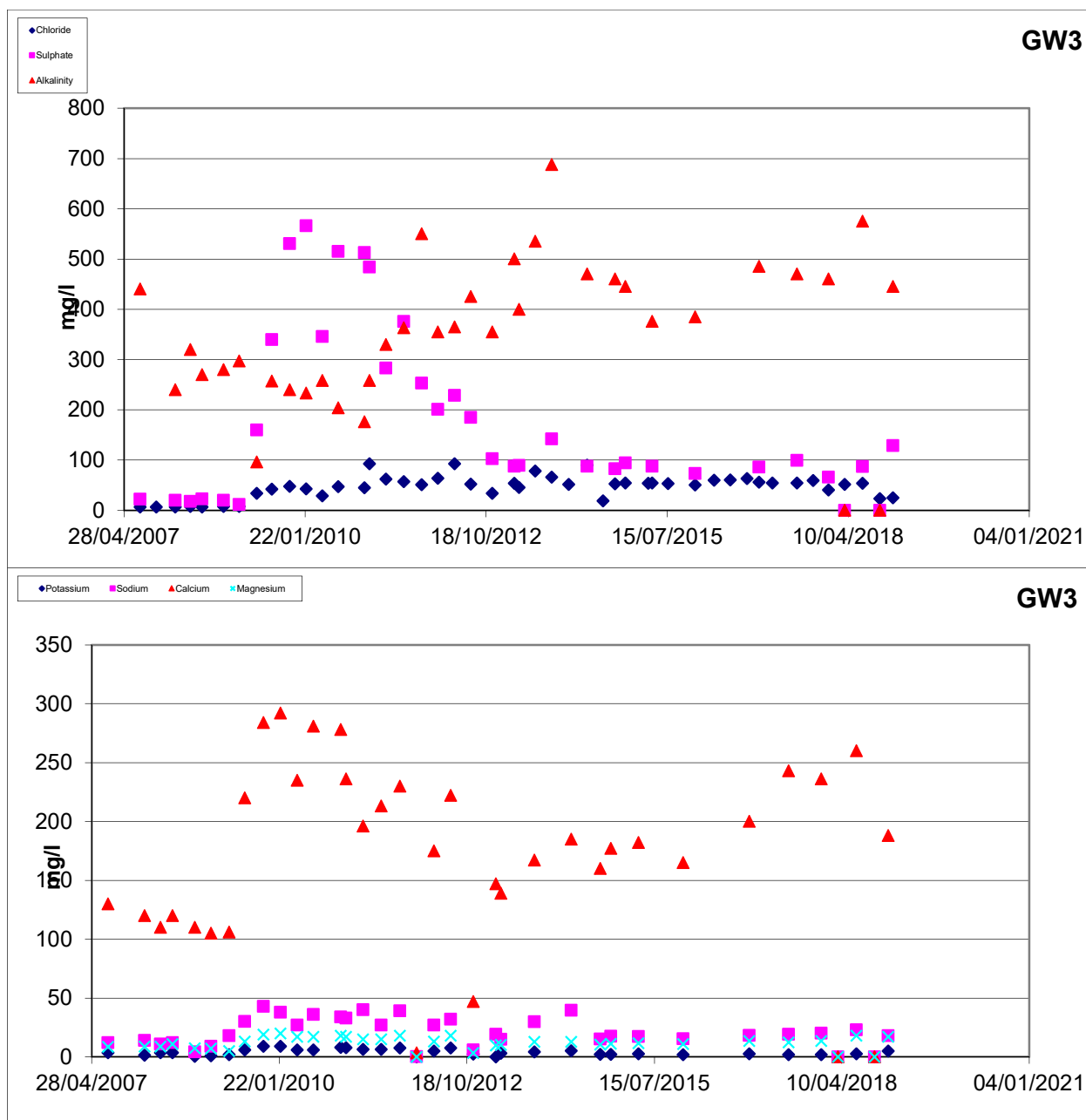


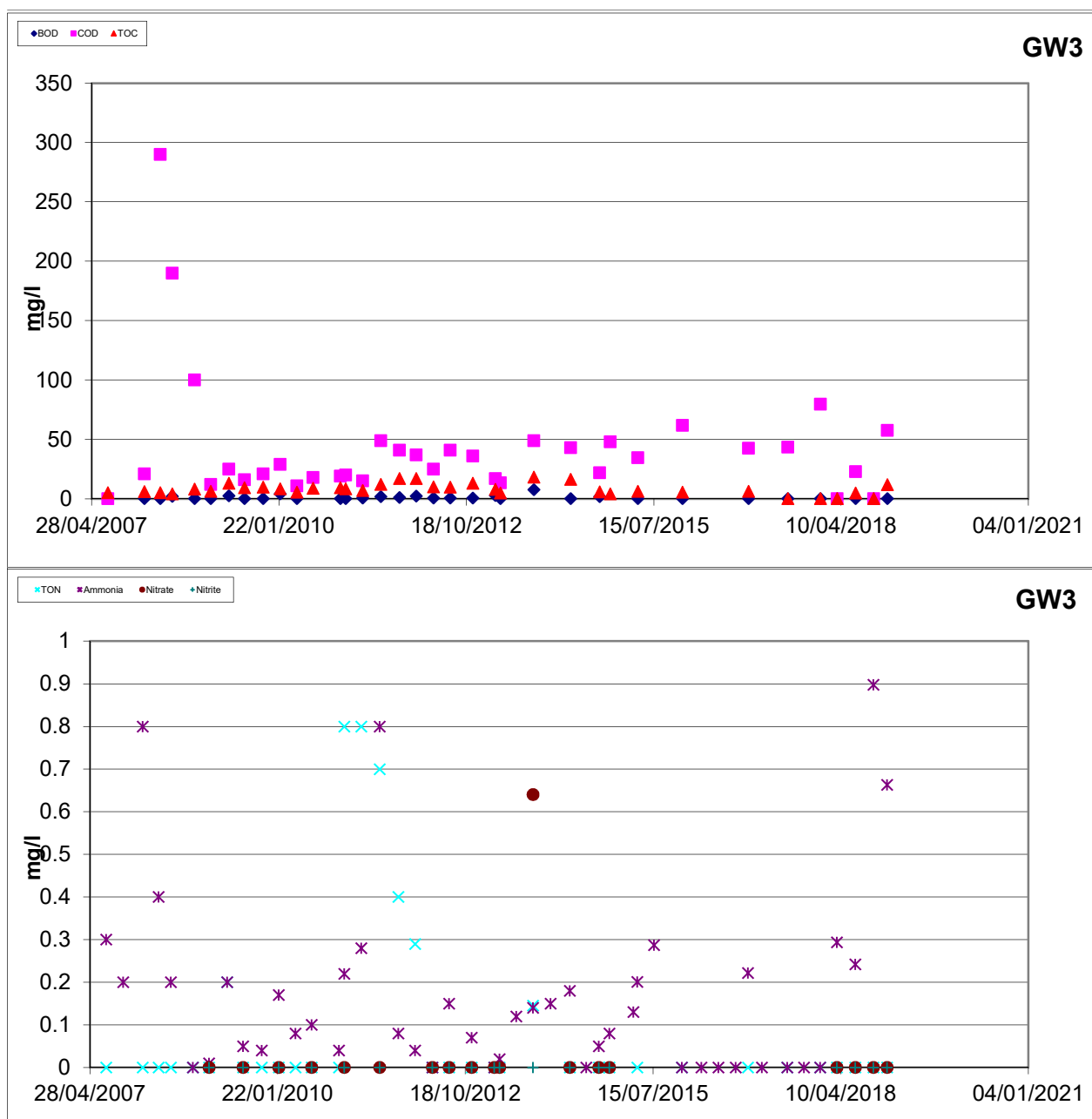


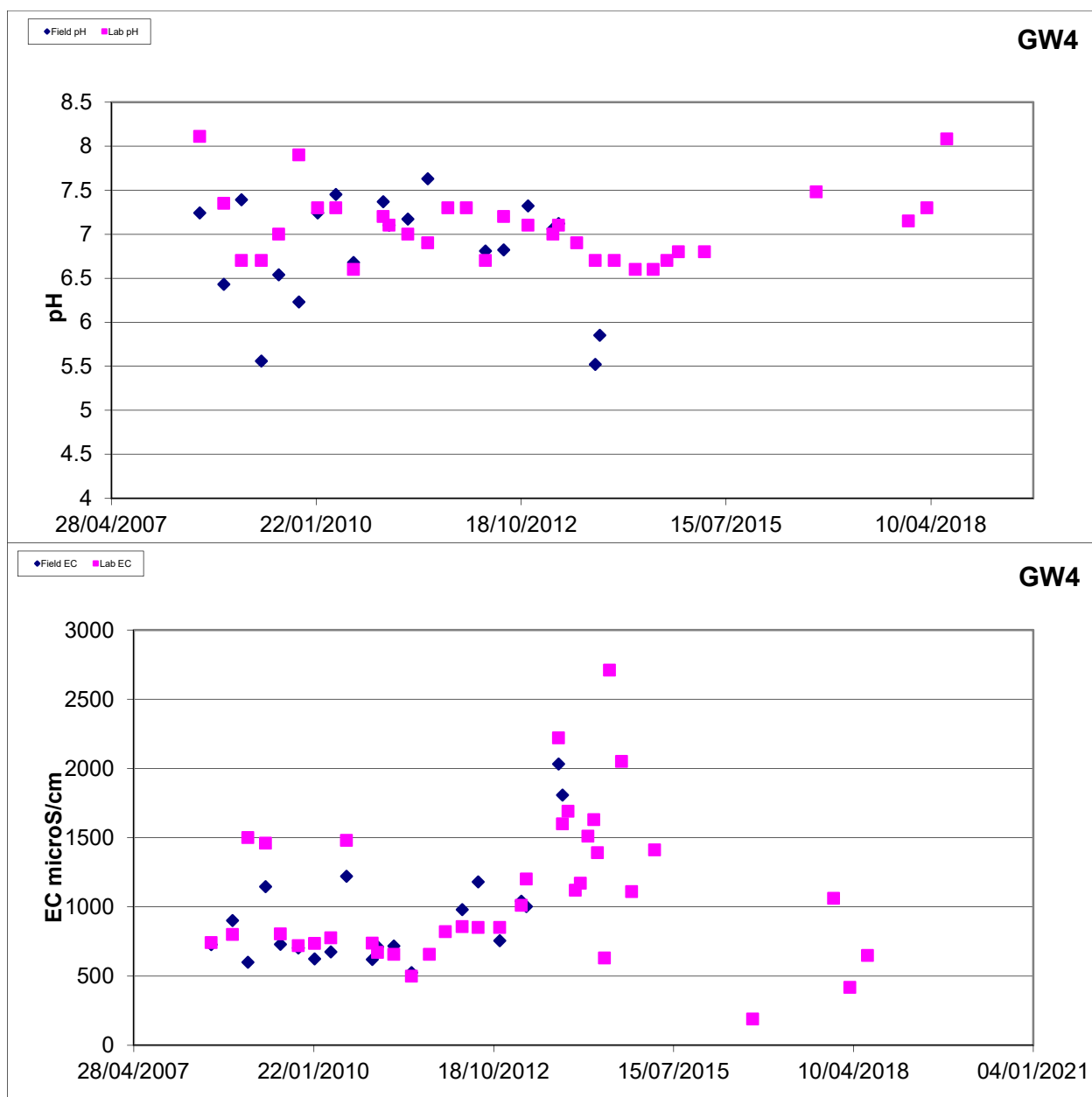


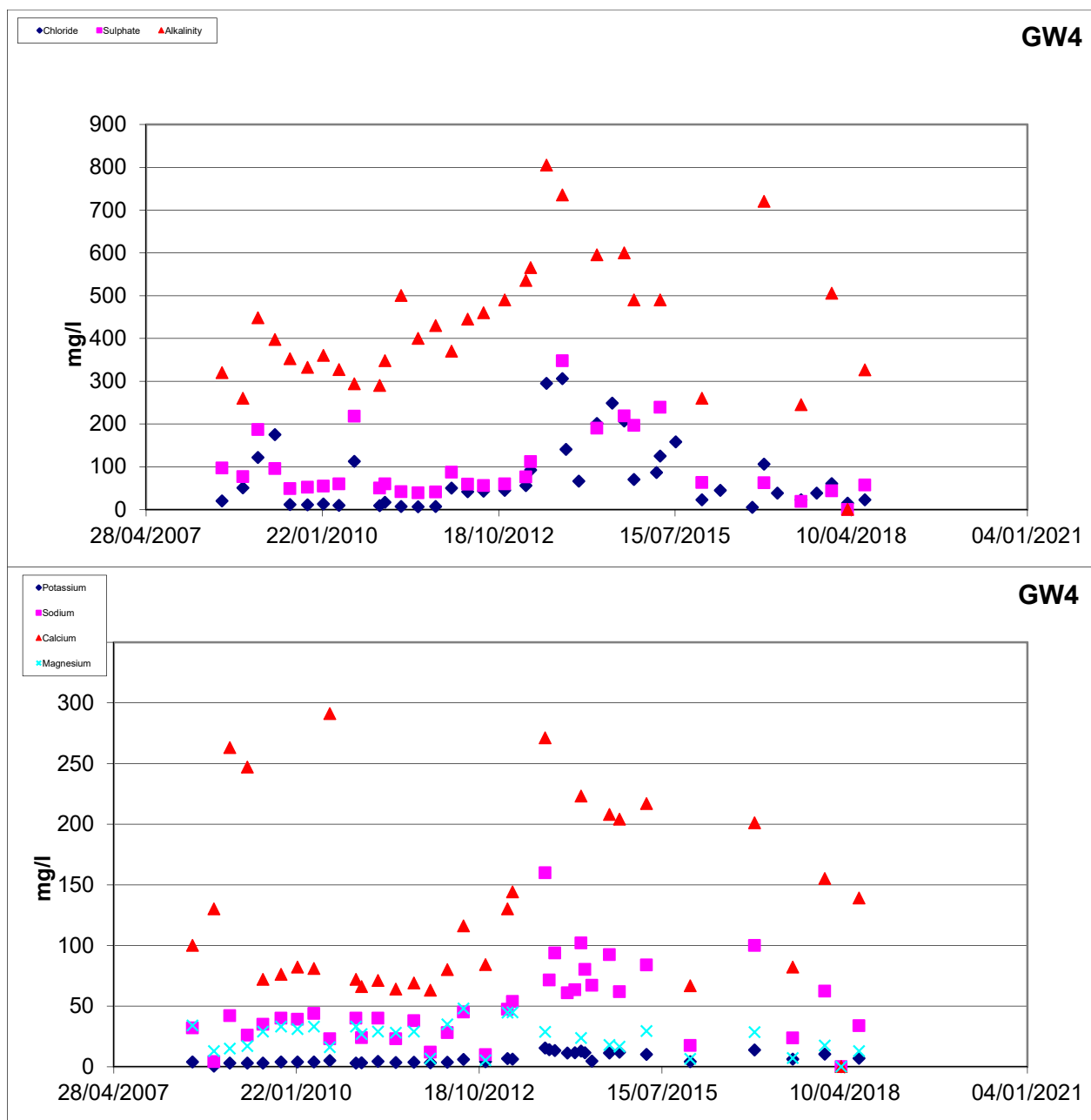


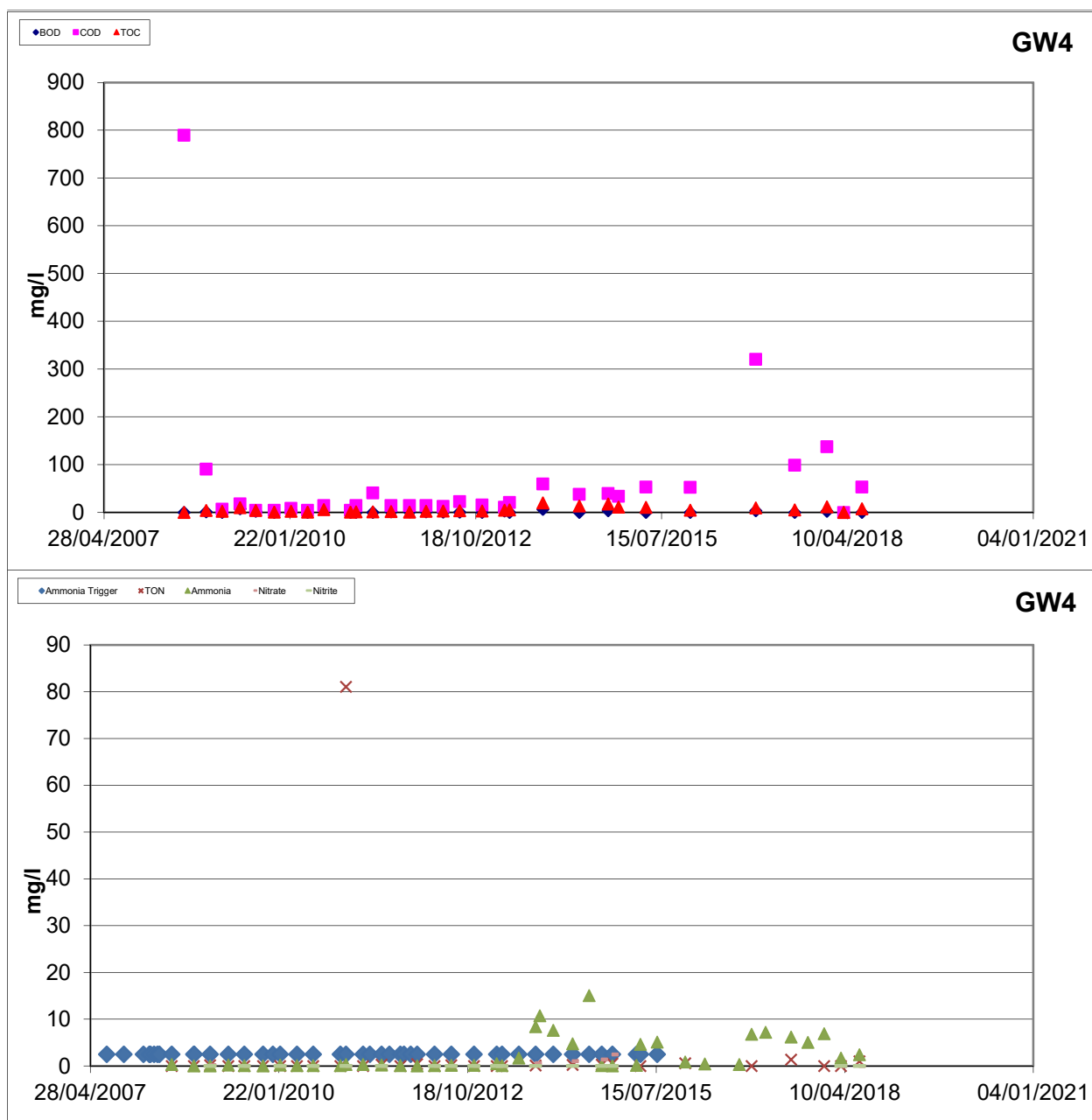


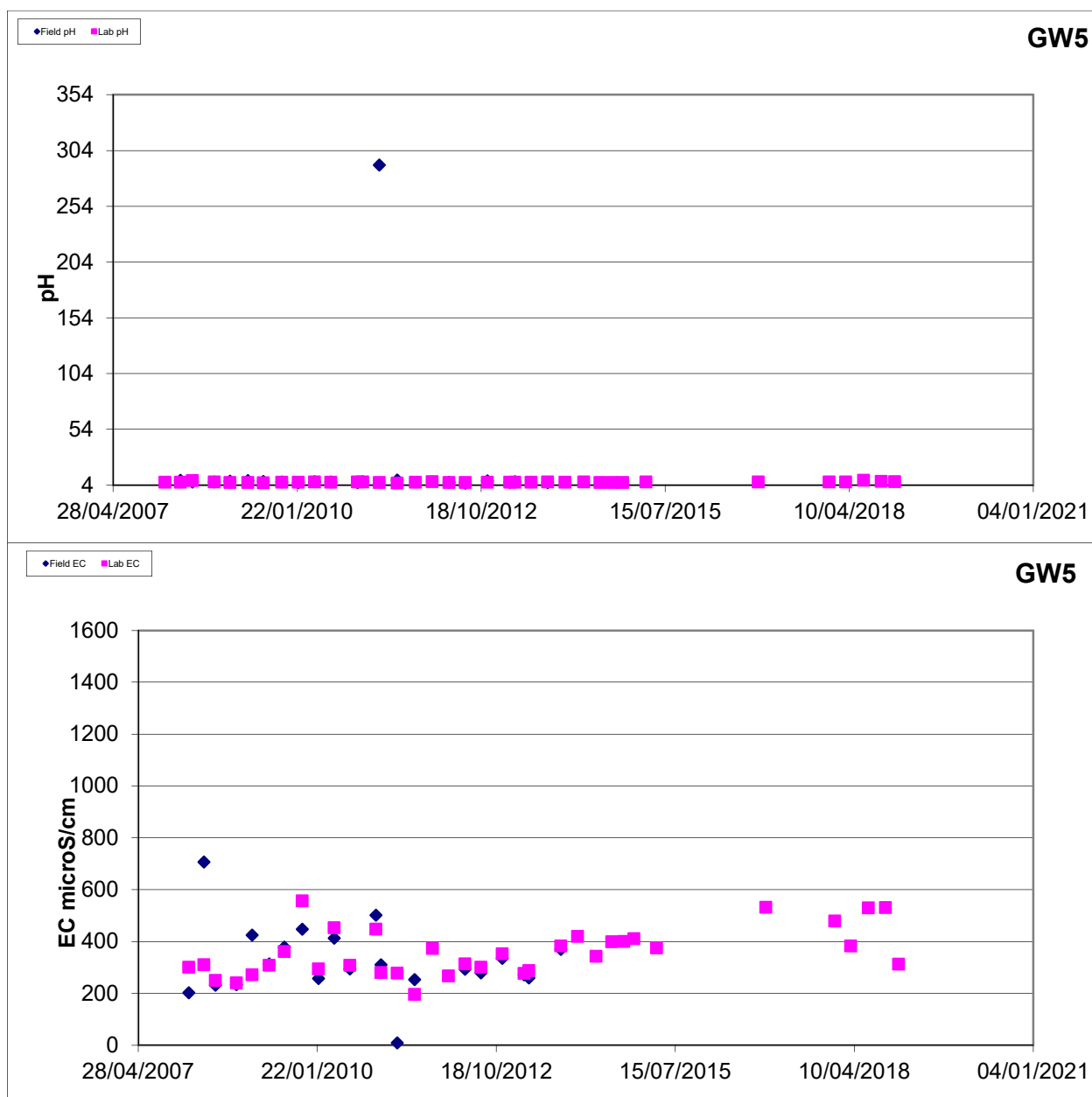


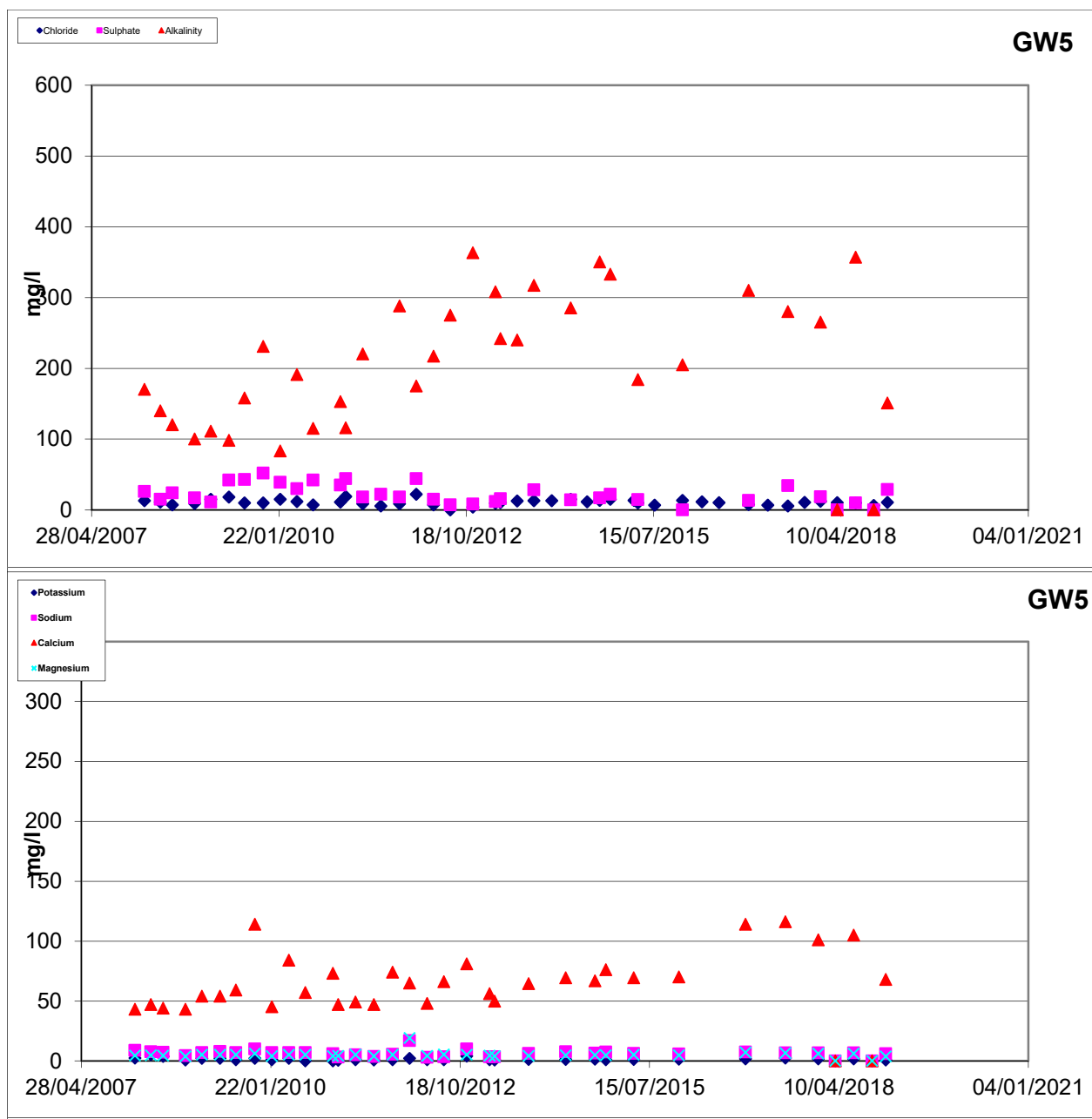


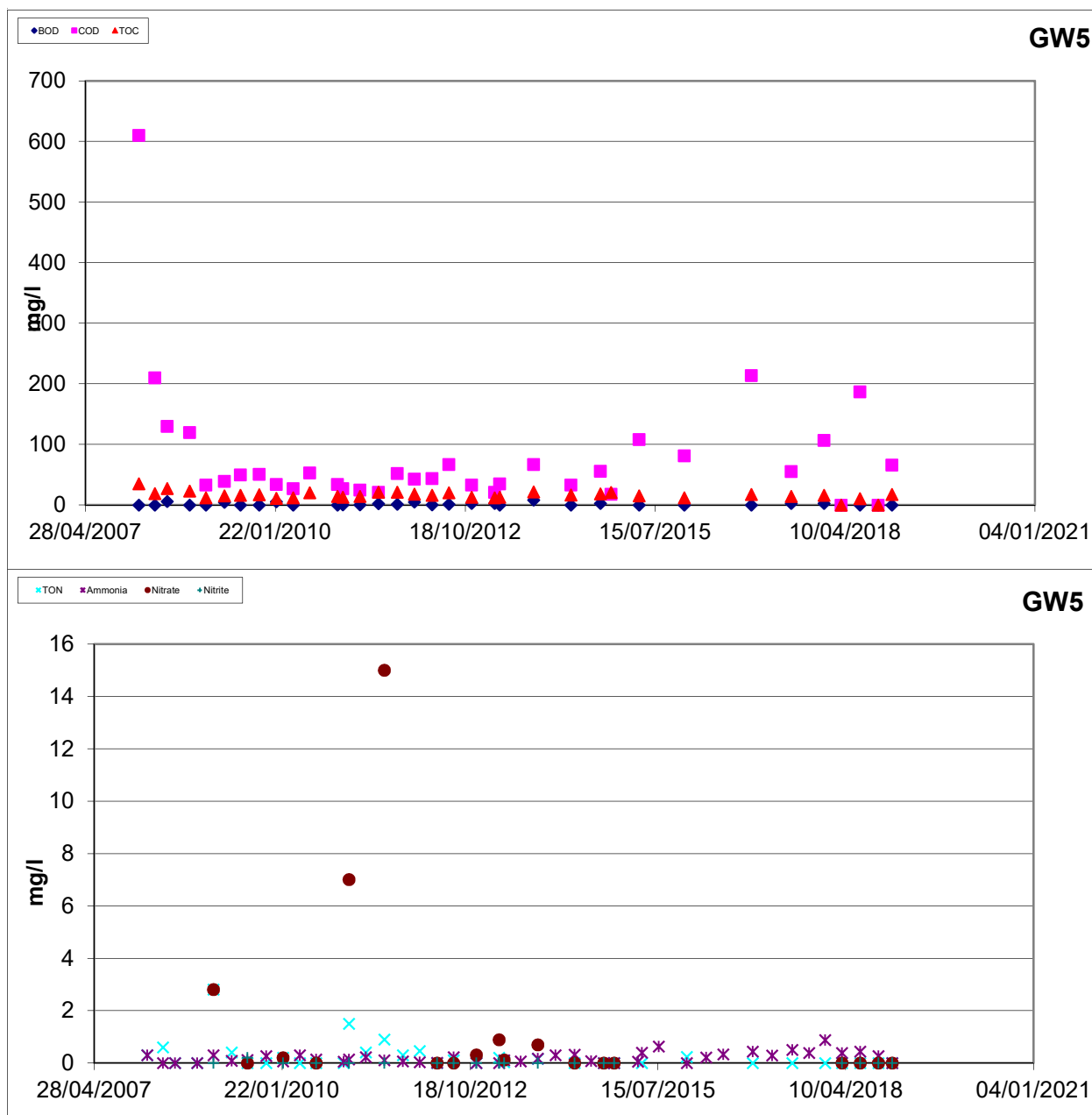


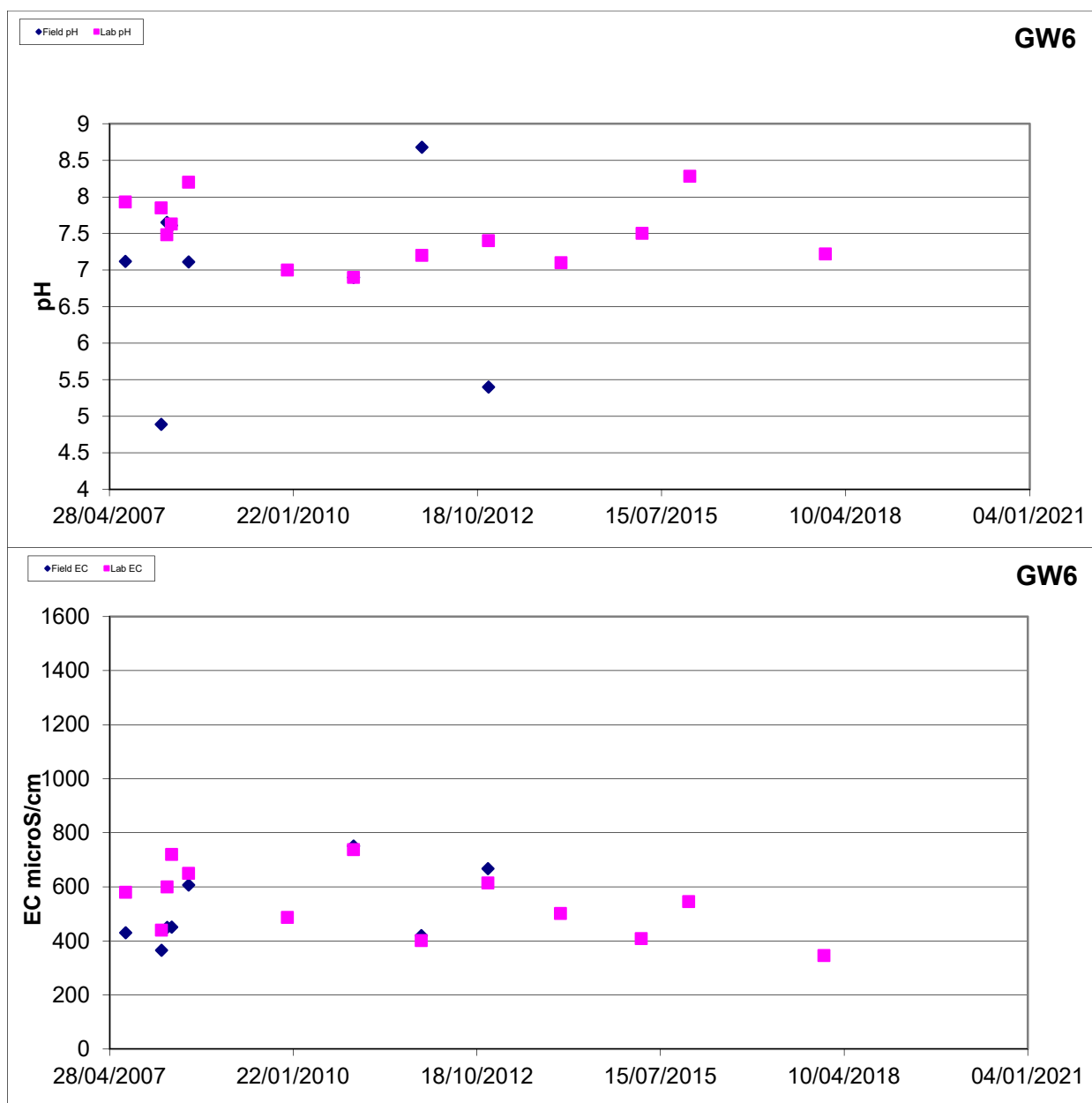


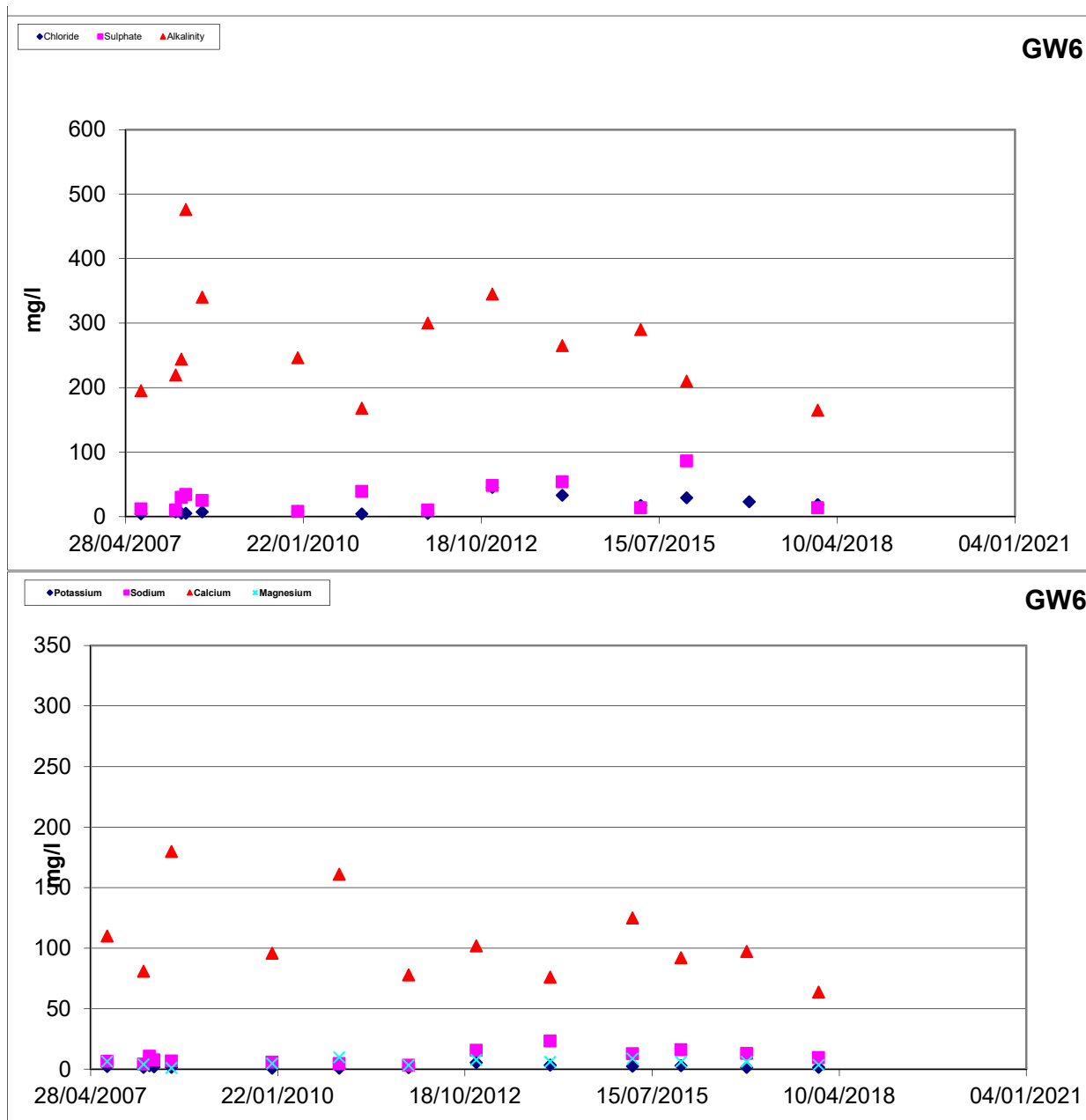


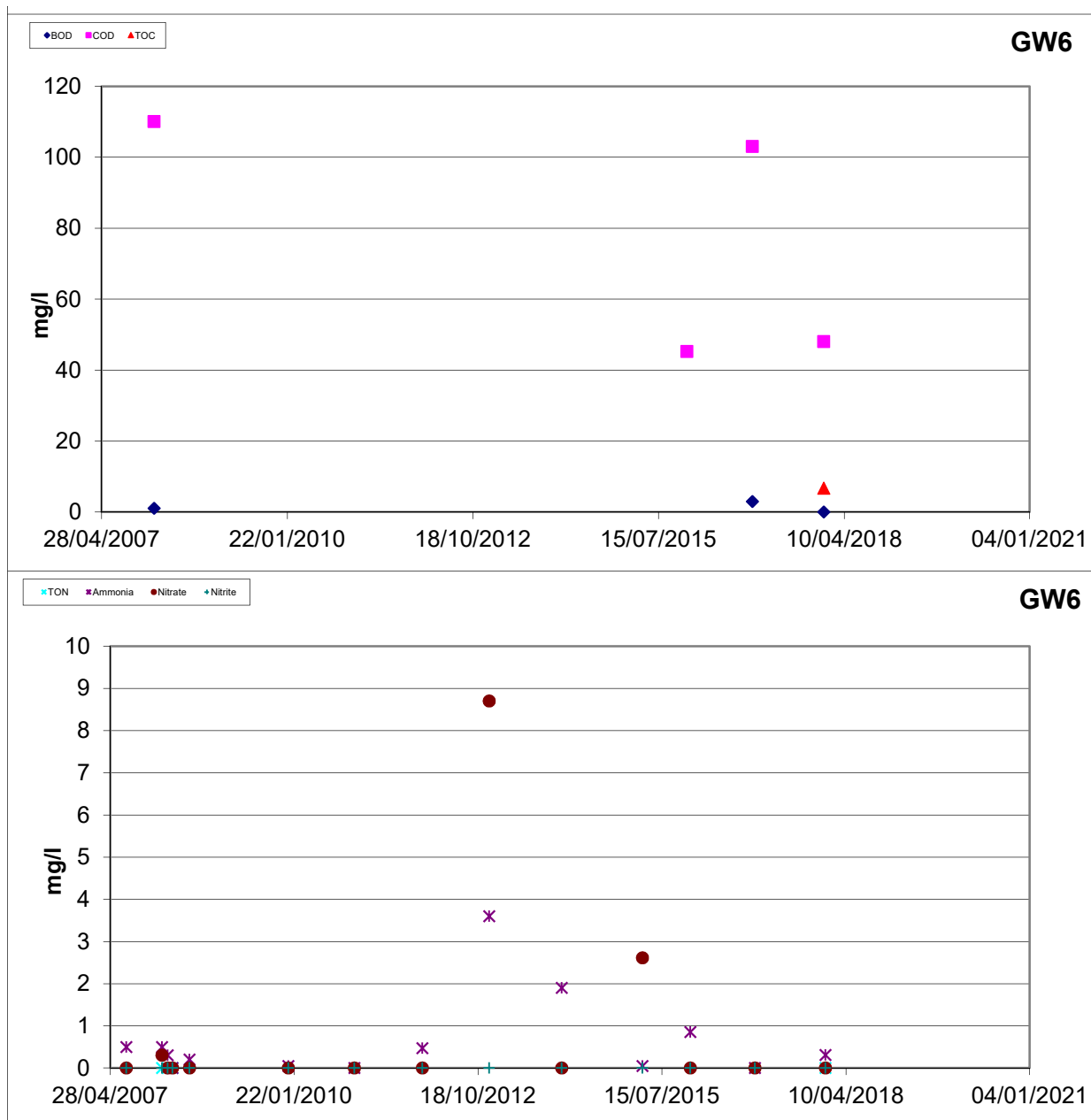


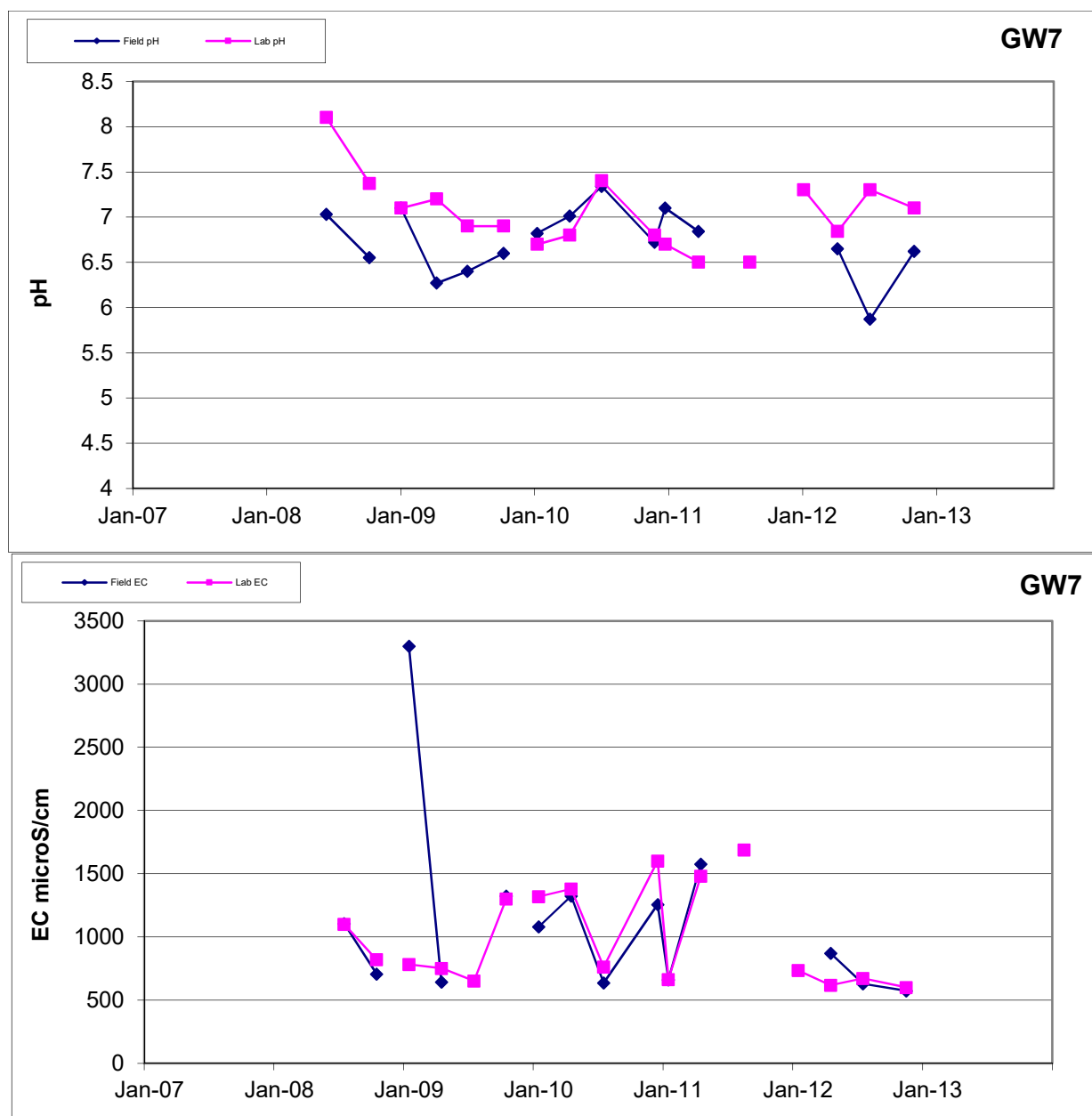


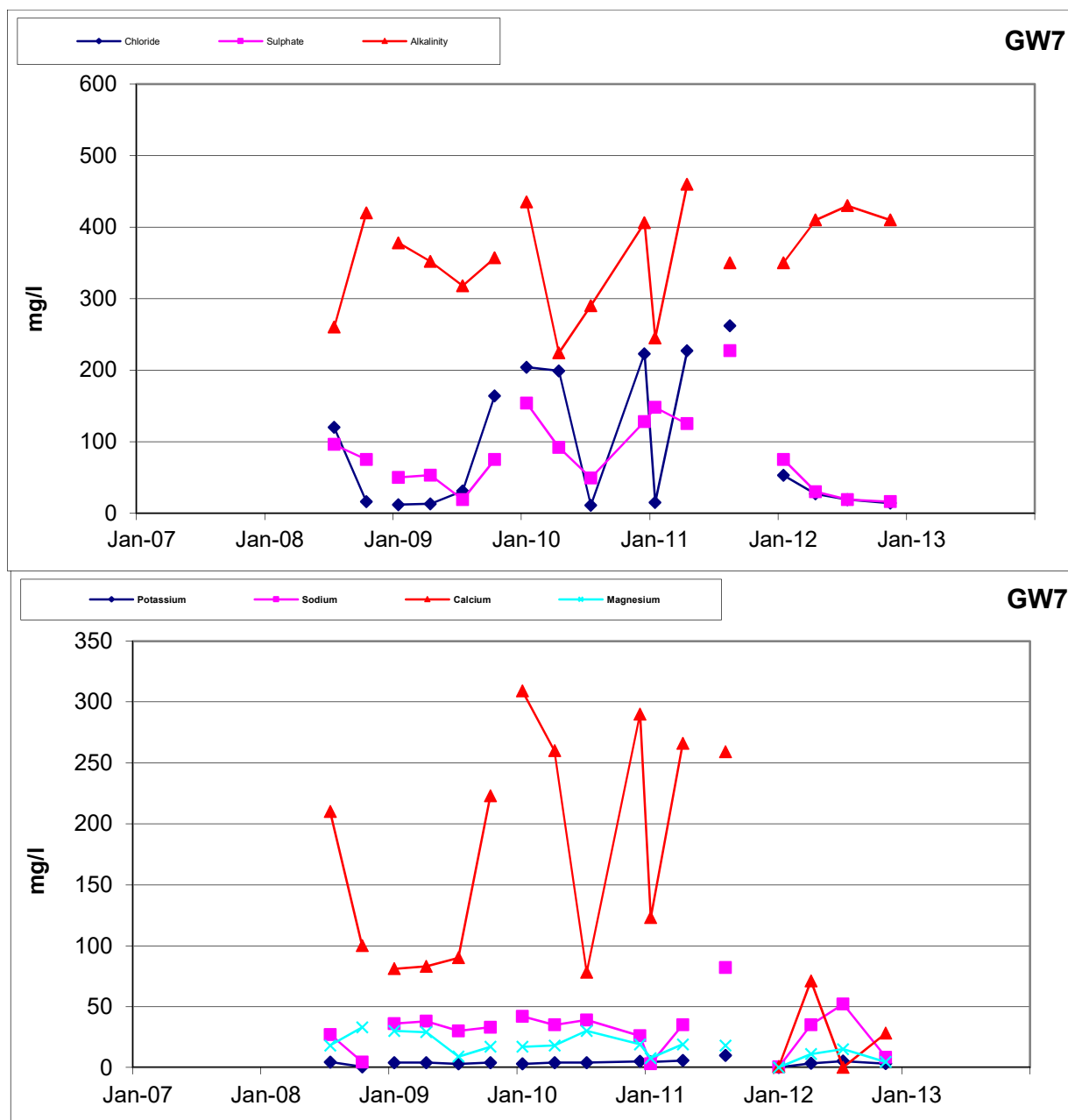


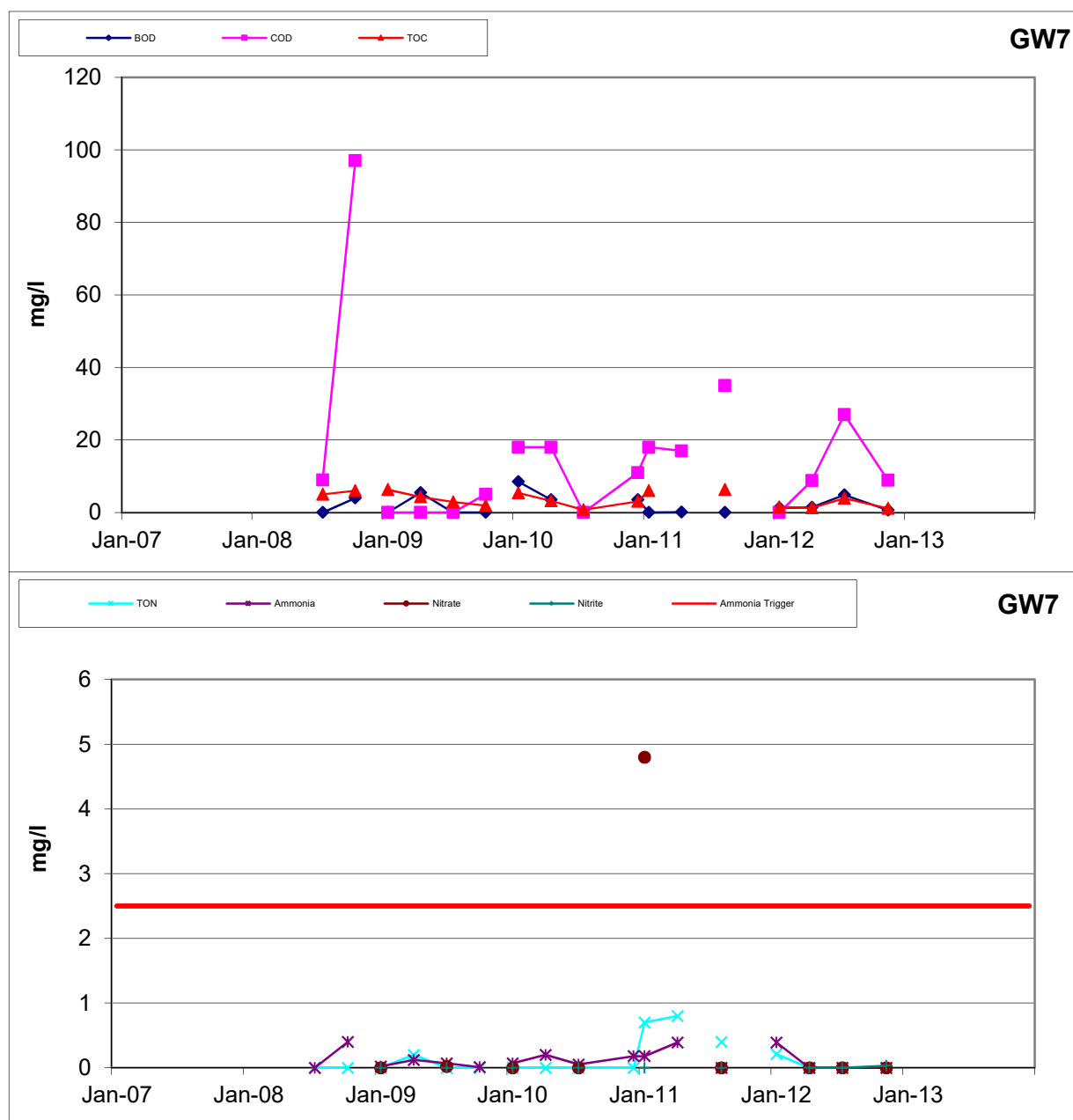


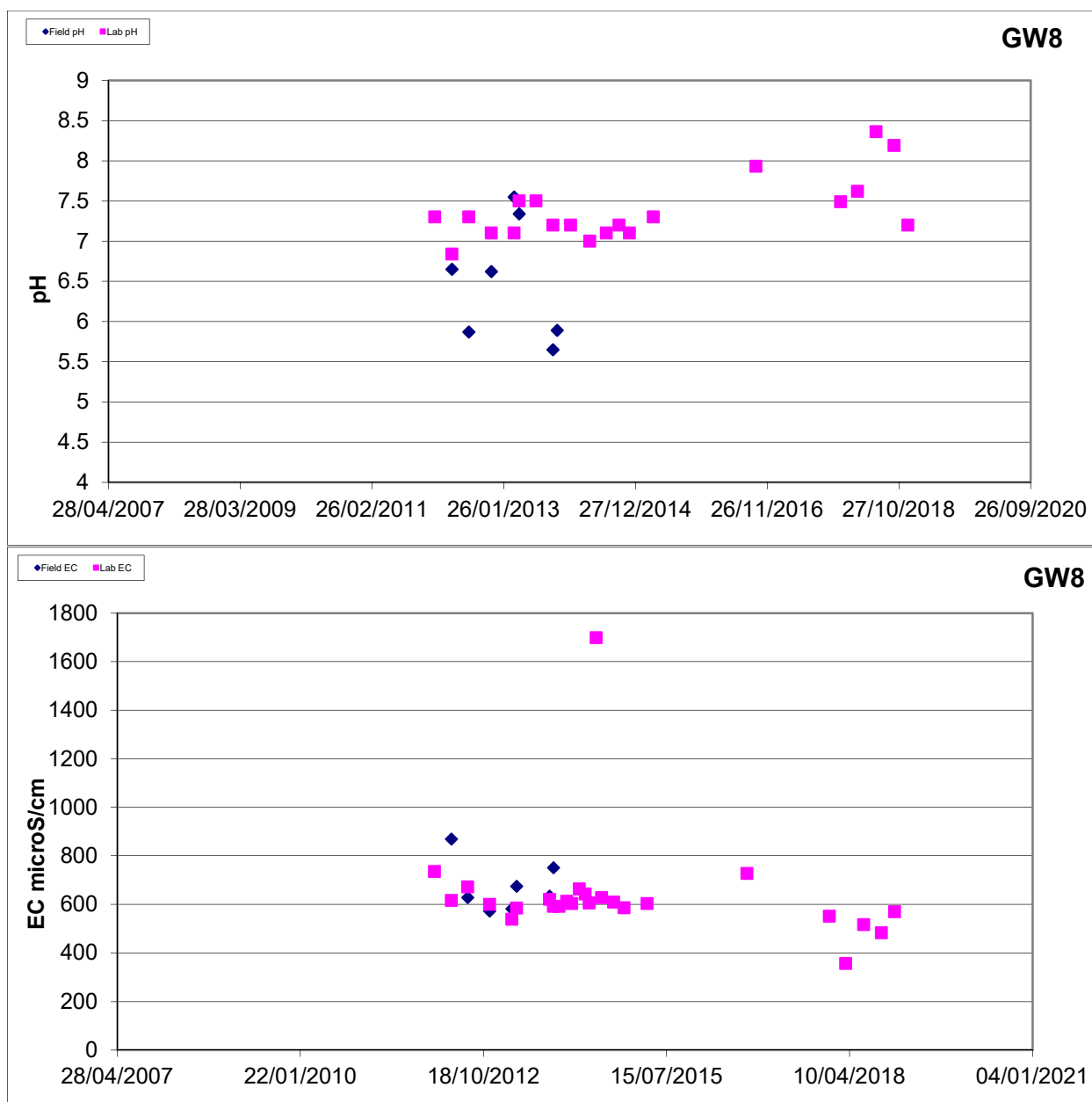


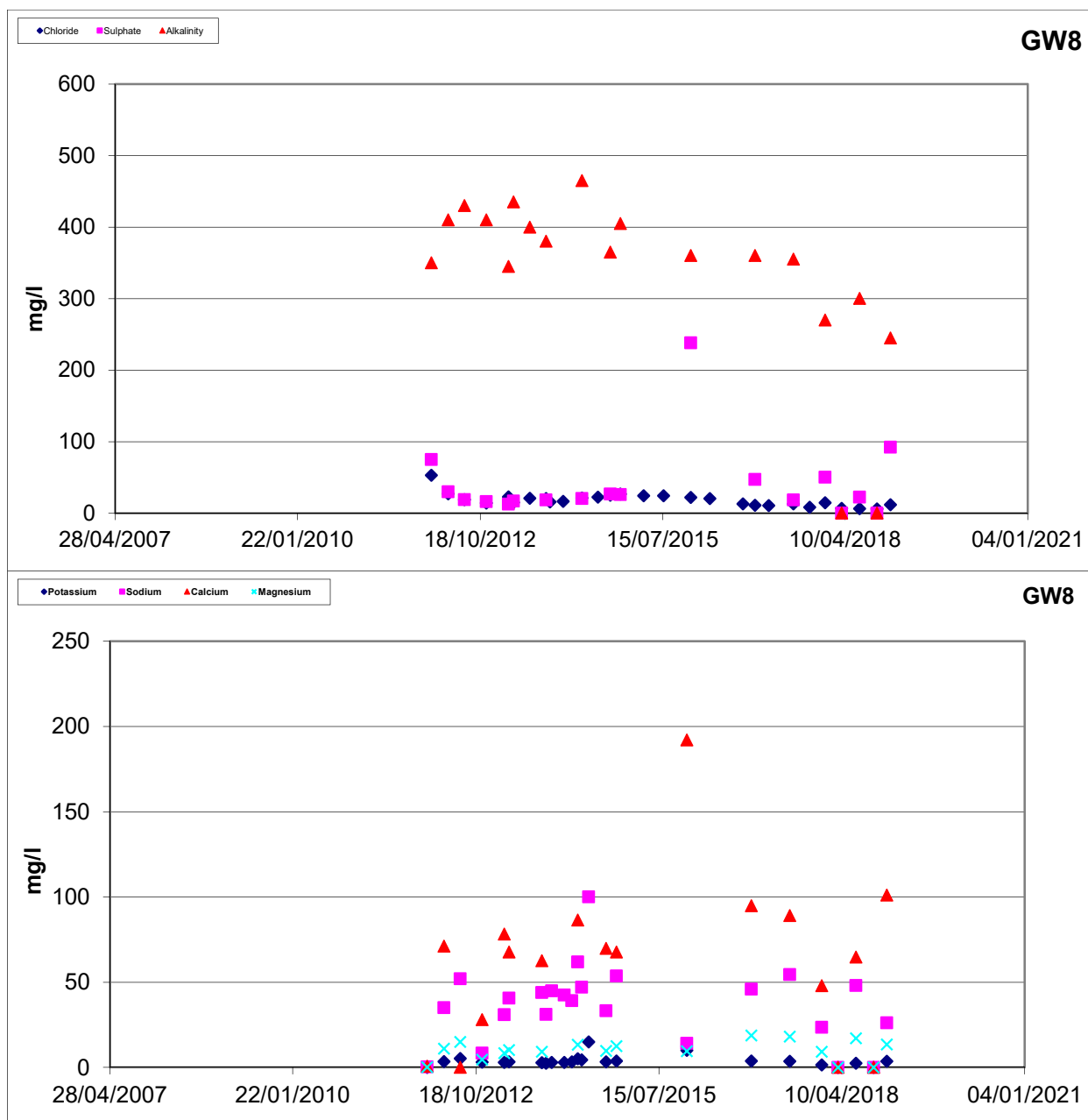


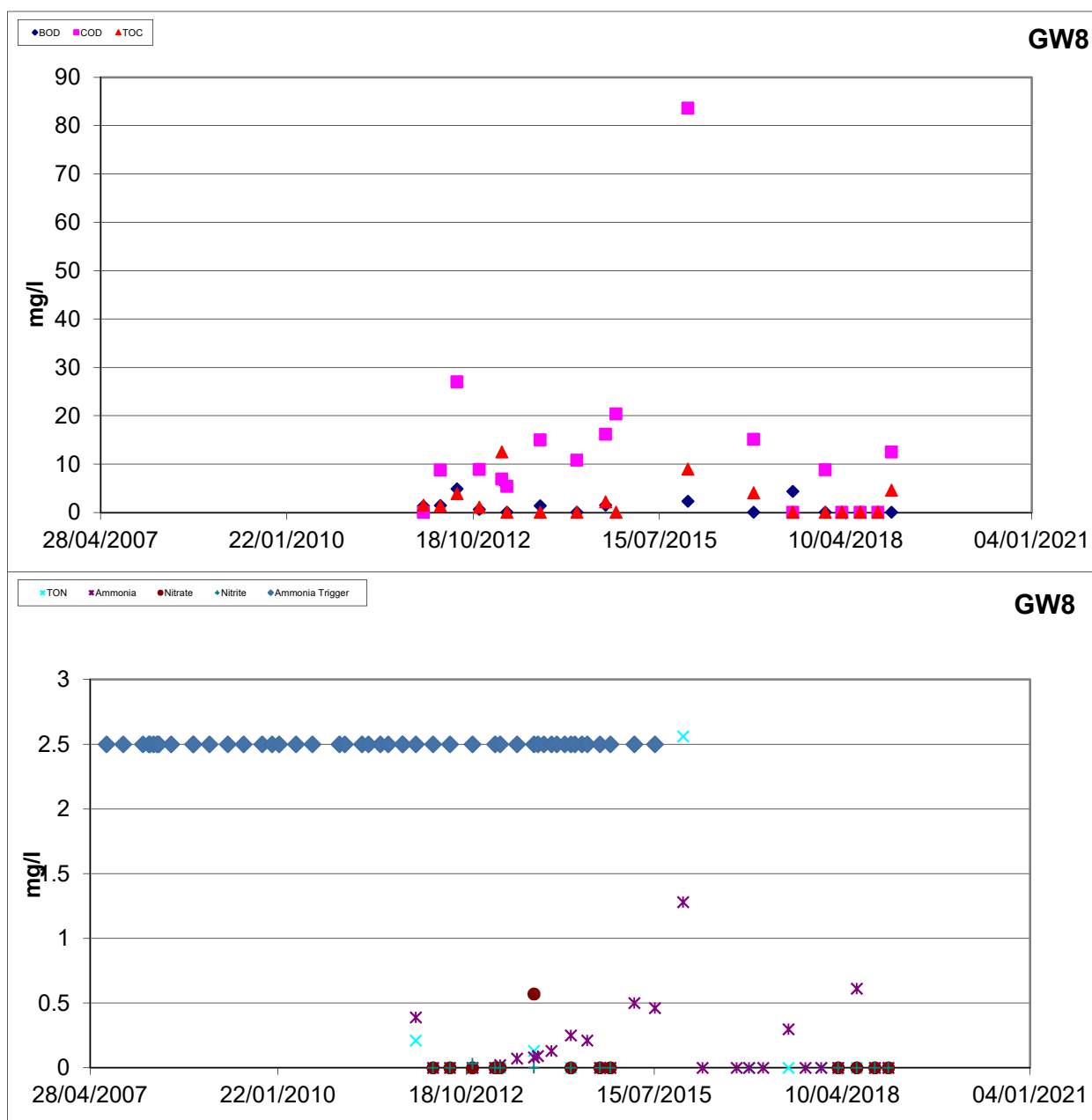


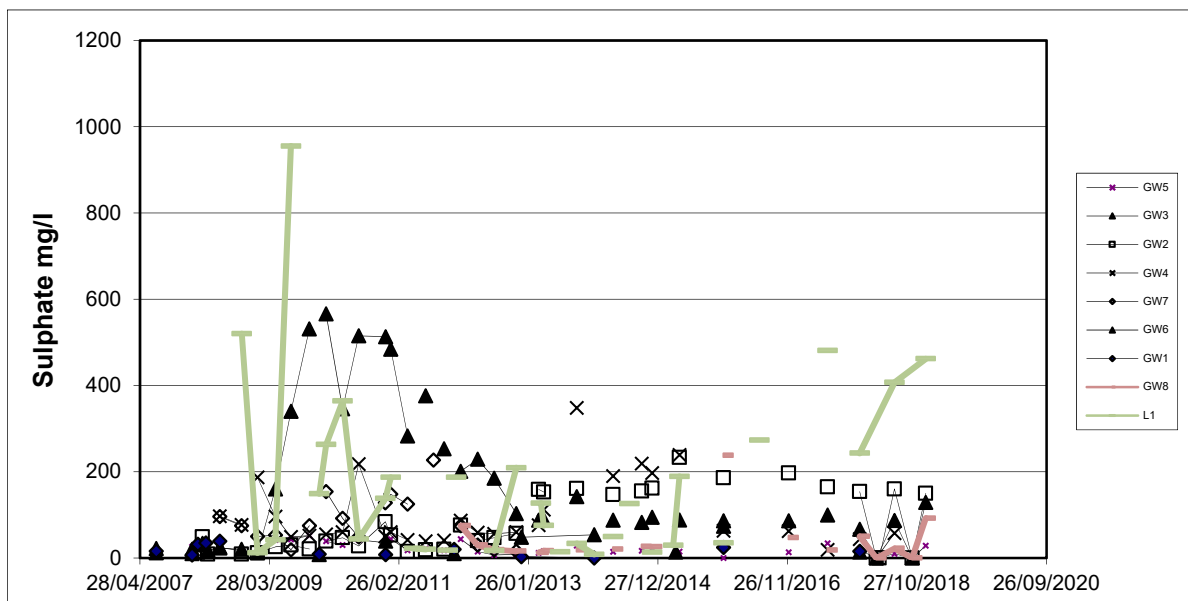
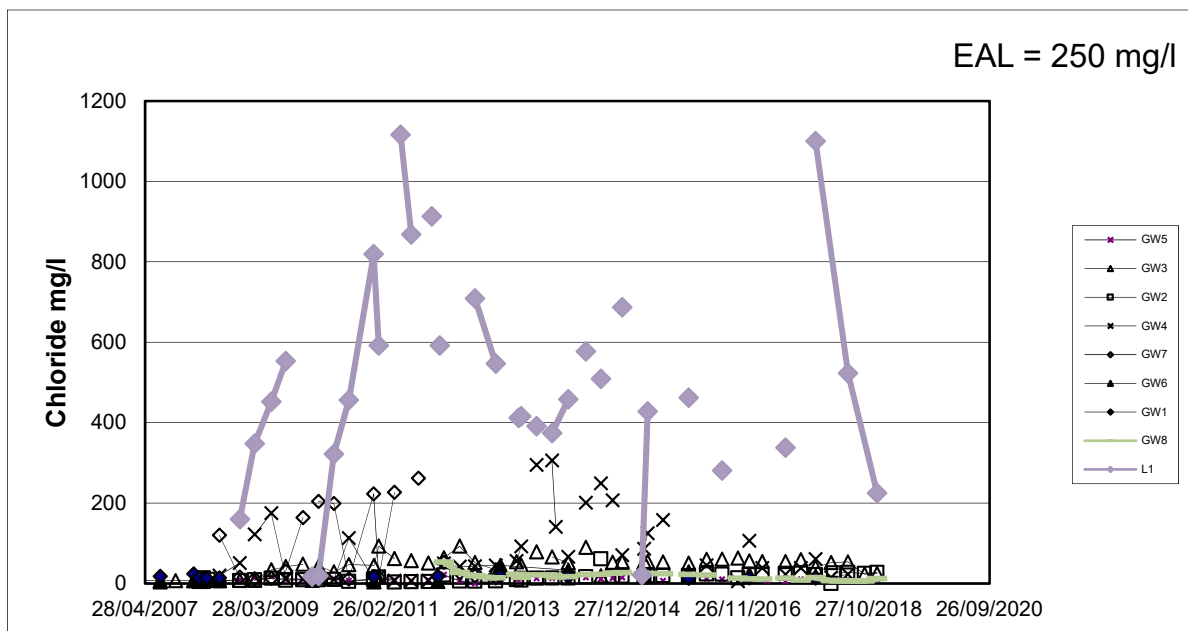
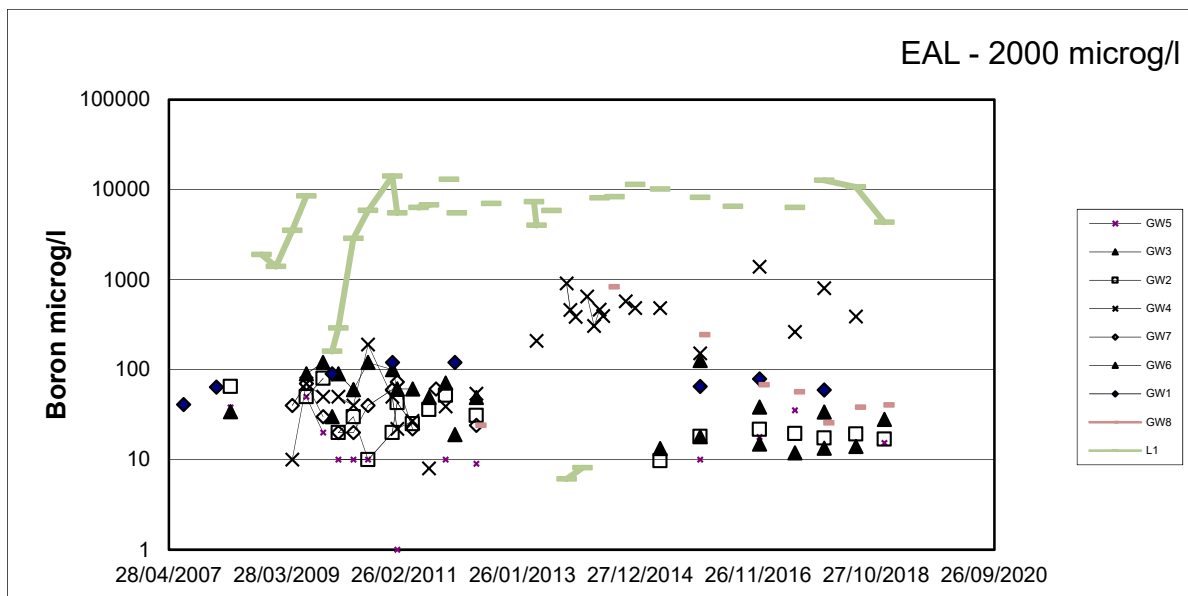


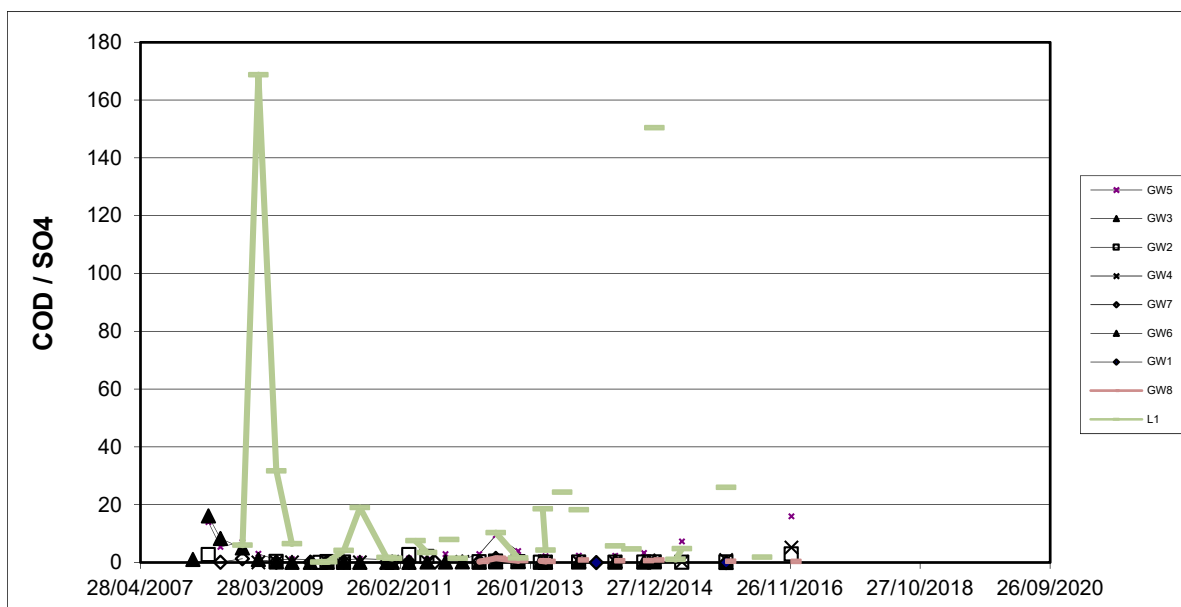
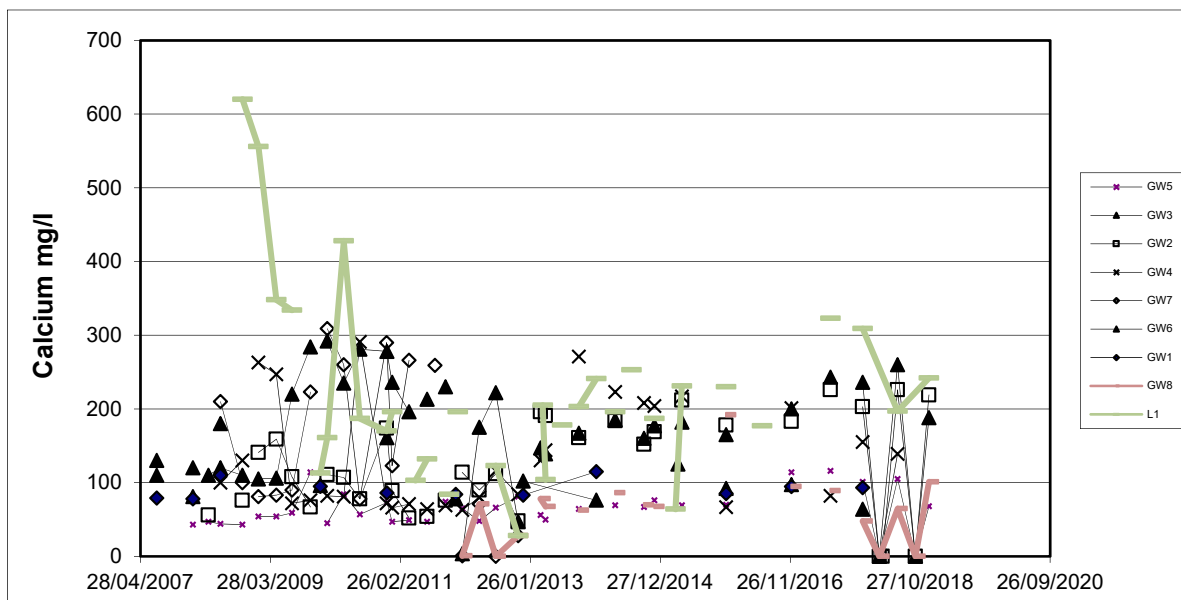
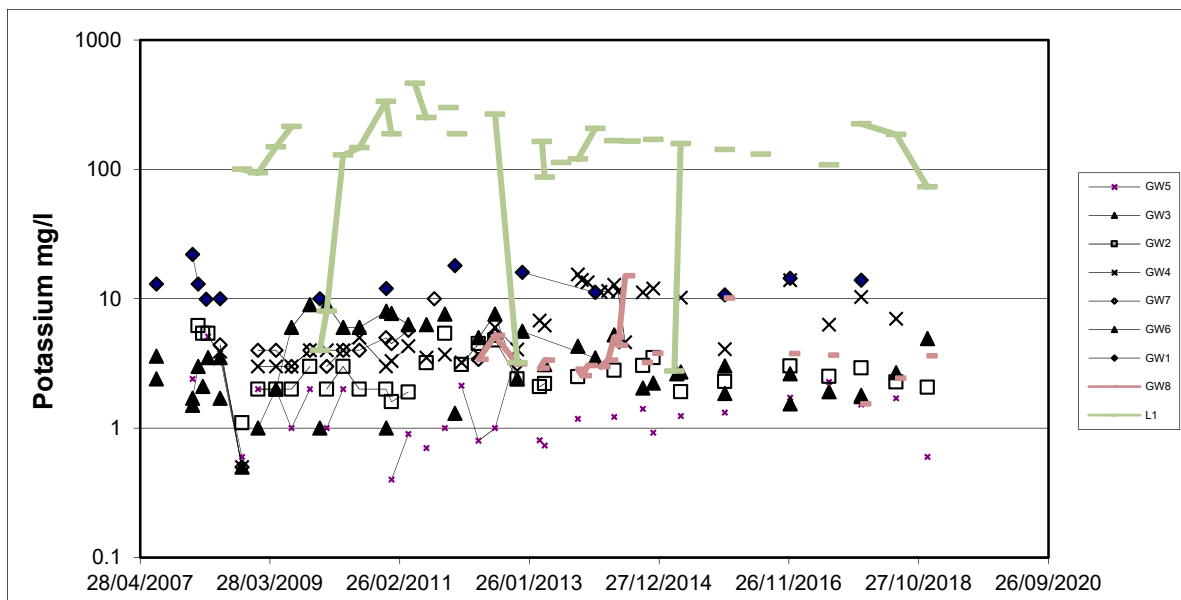


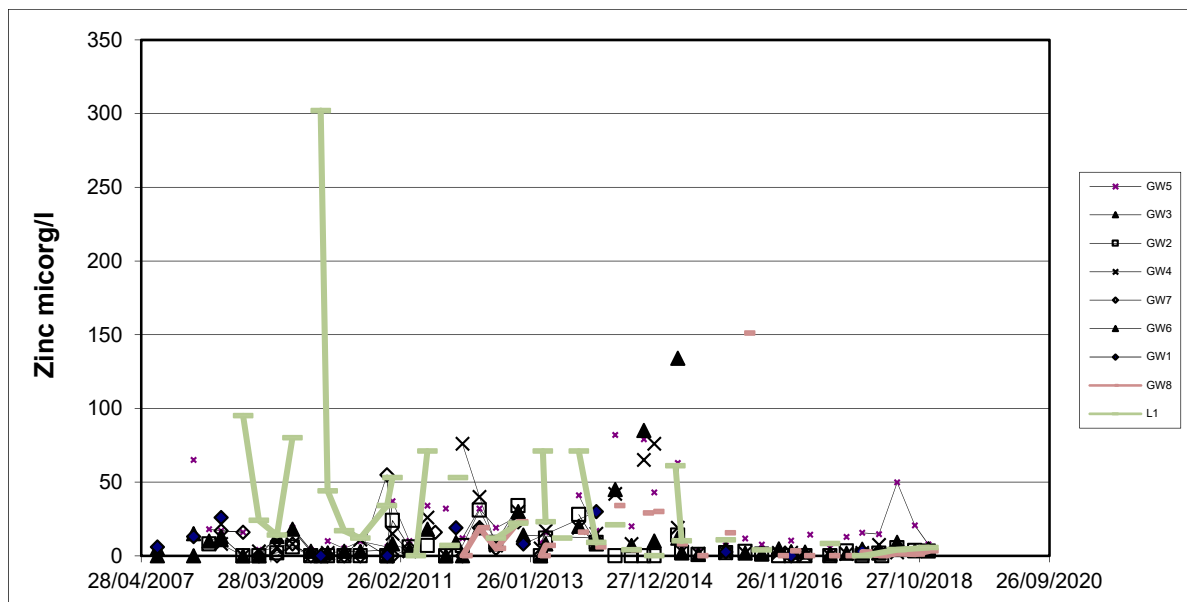


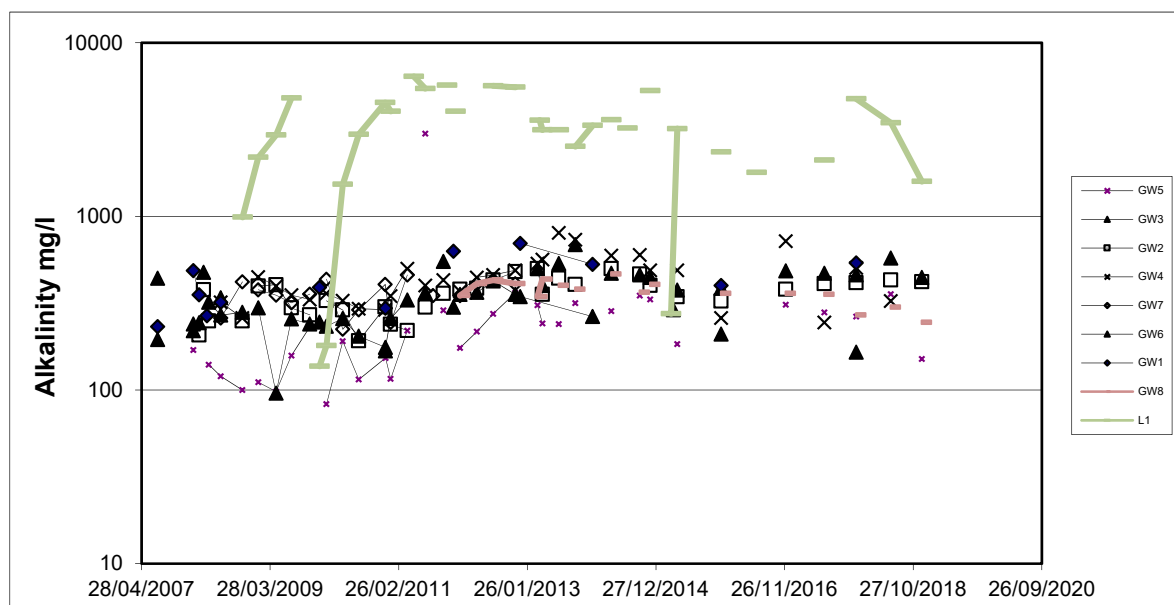
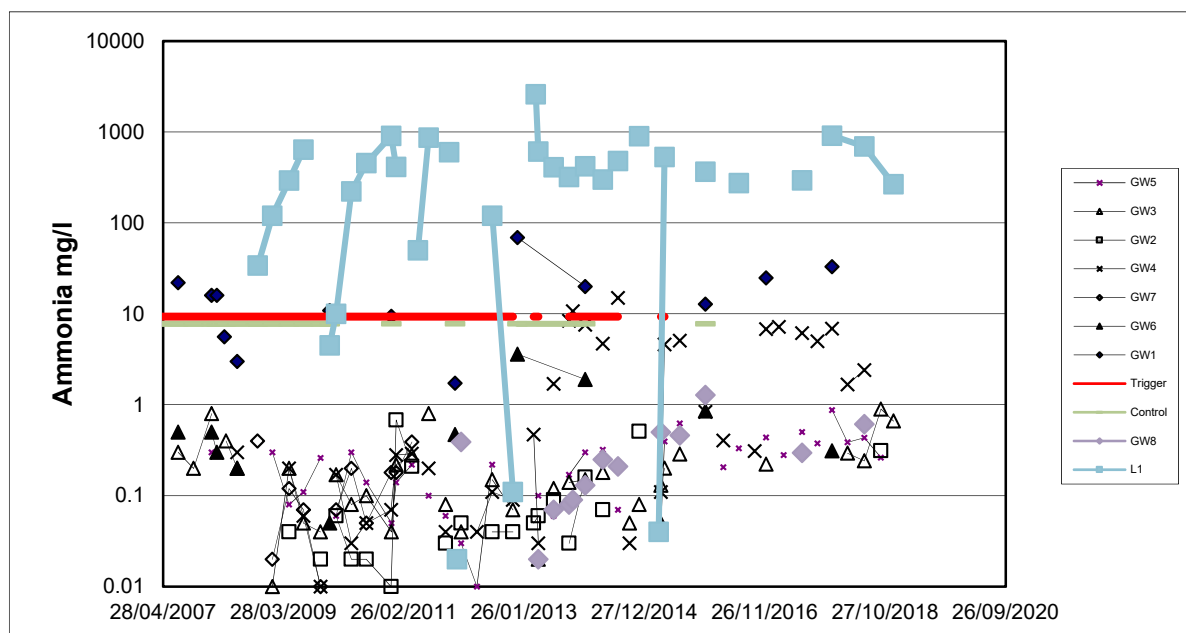
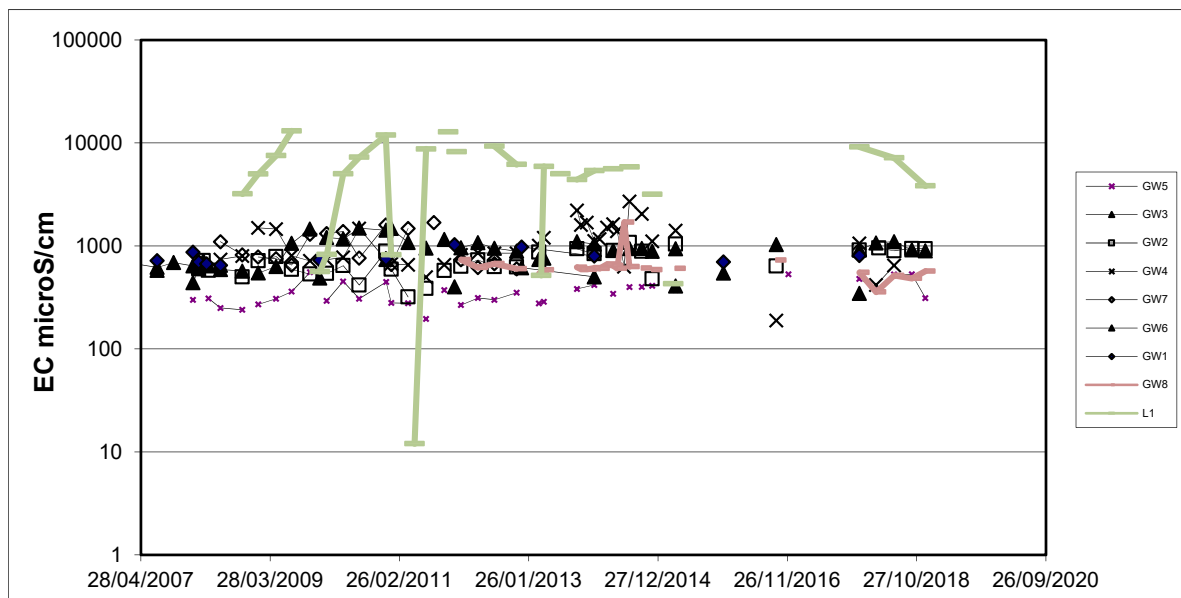


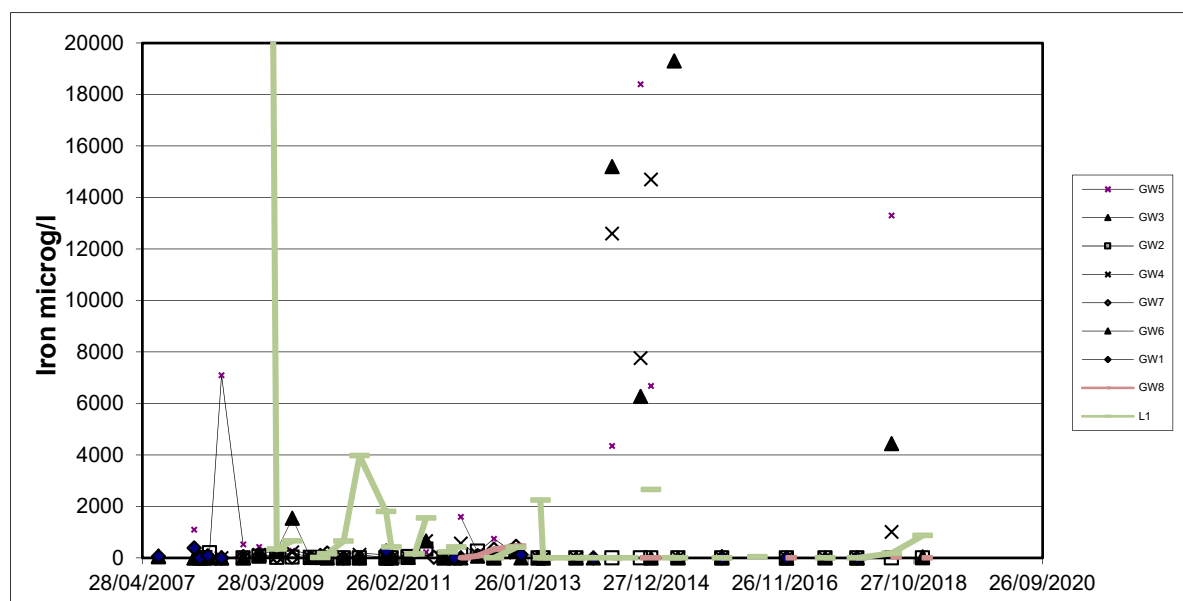
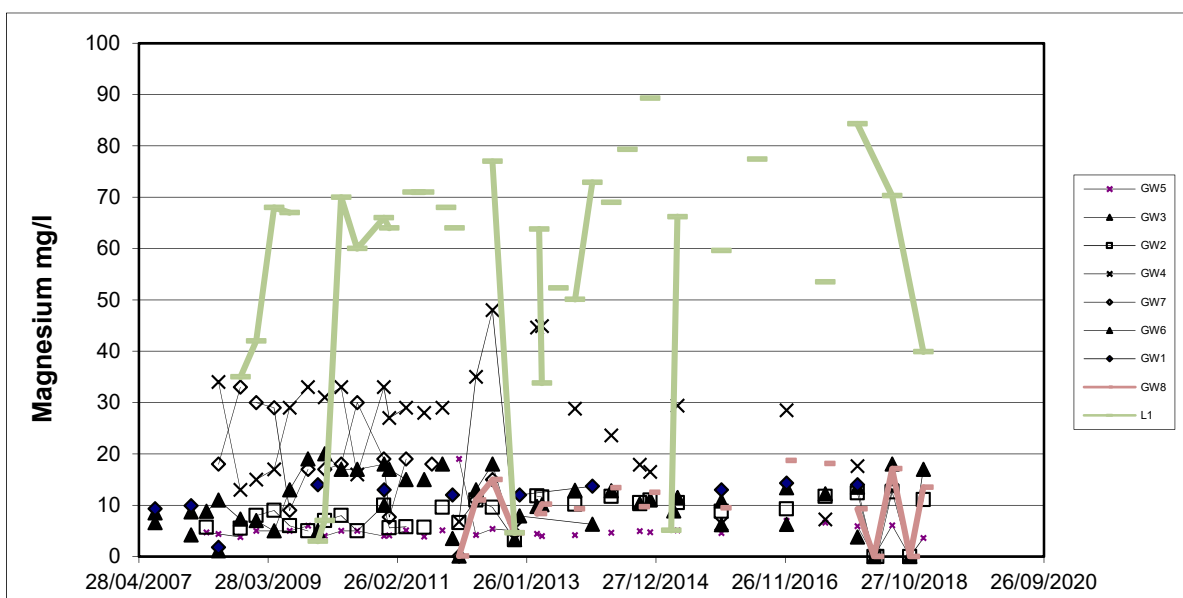
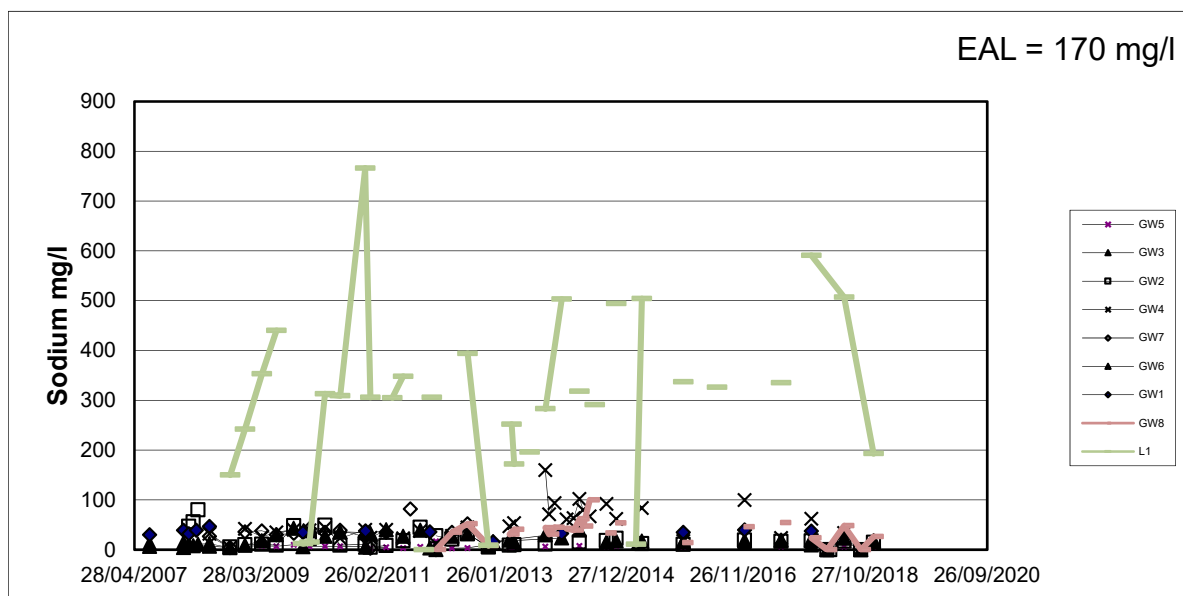












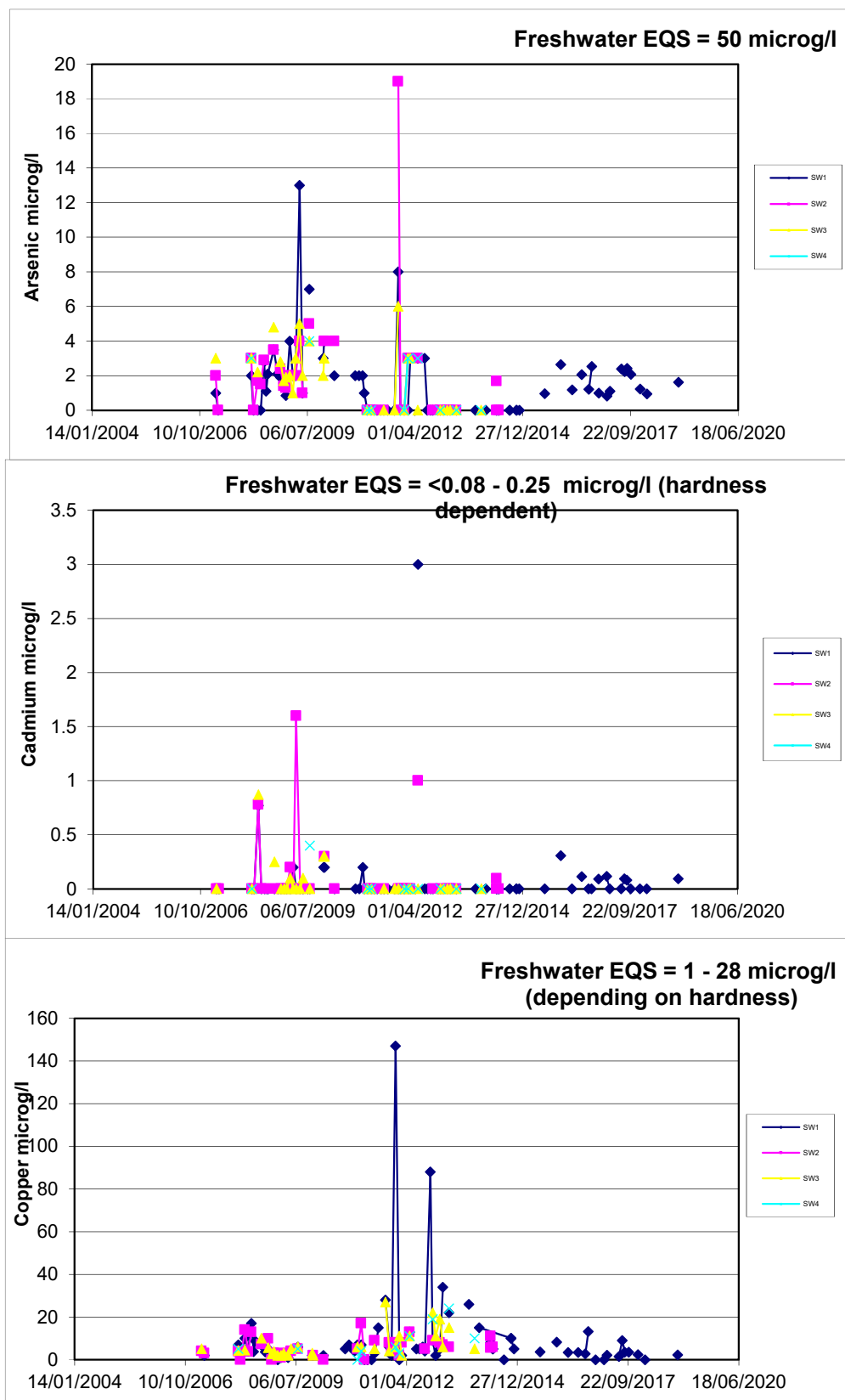
**PALLEG LANDFILL
LOWER CWMTWRCH**

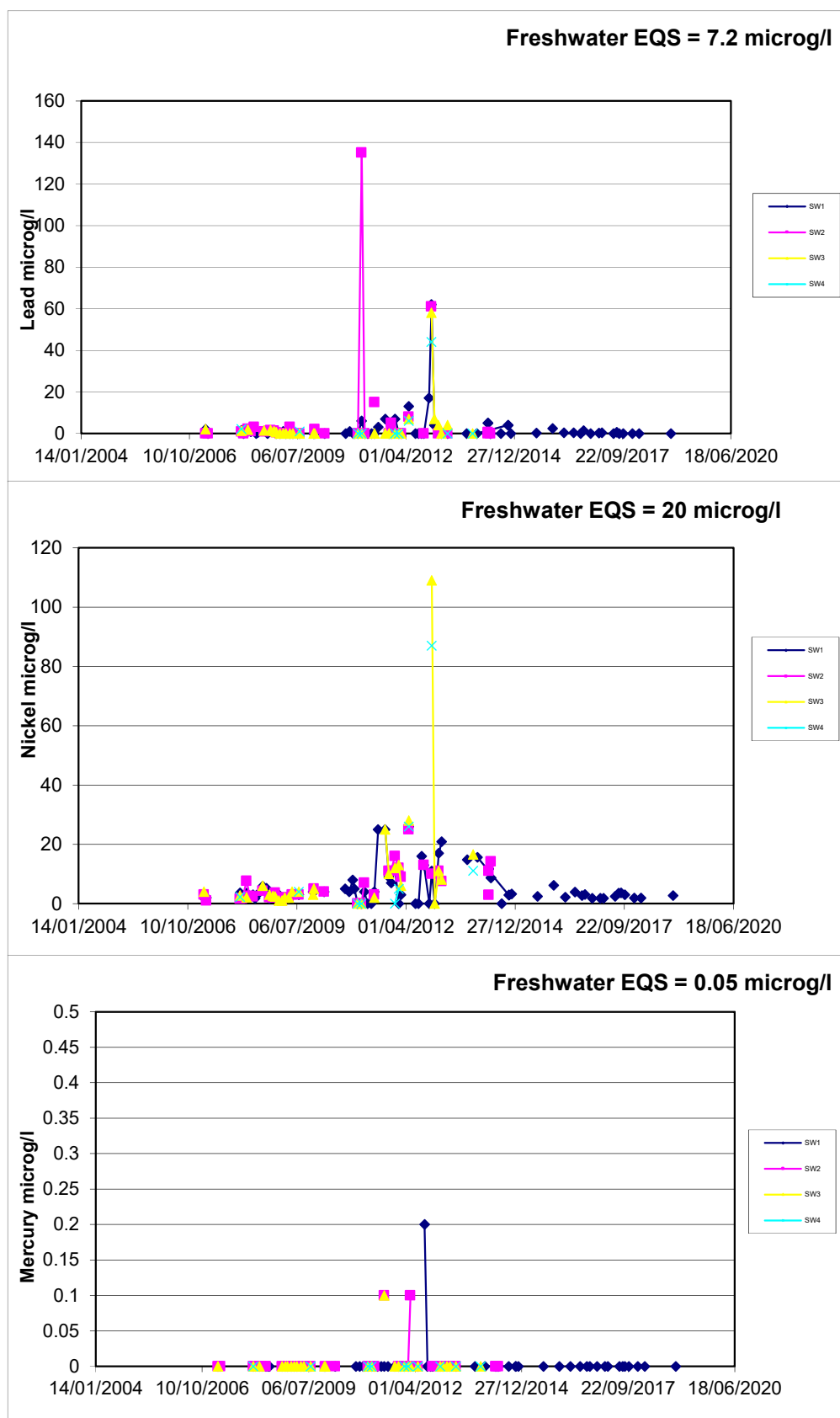
PERMIT BT19081X

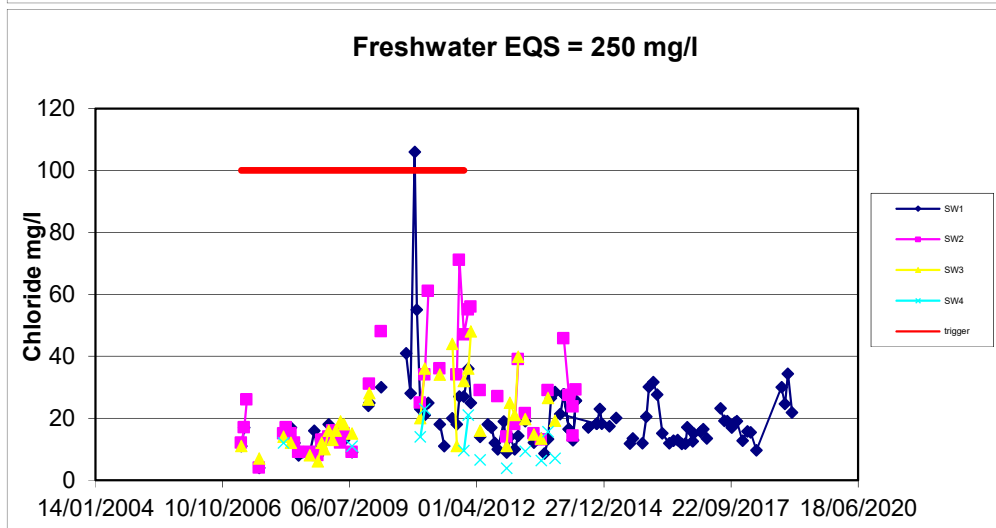
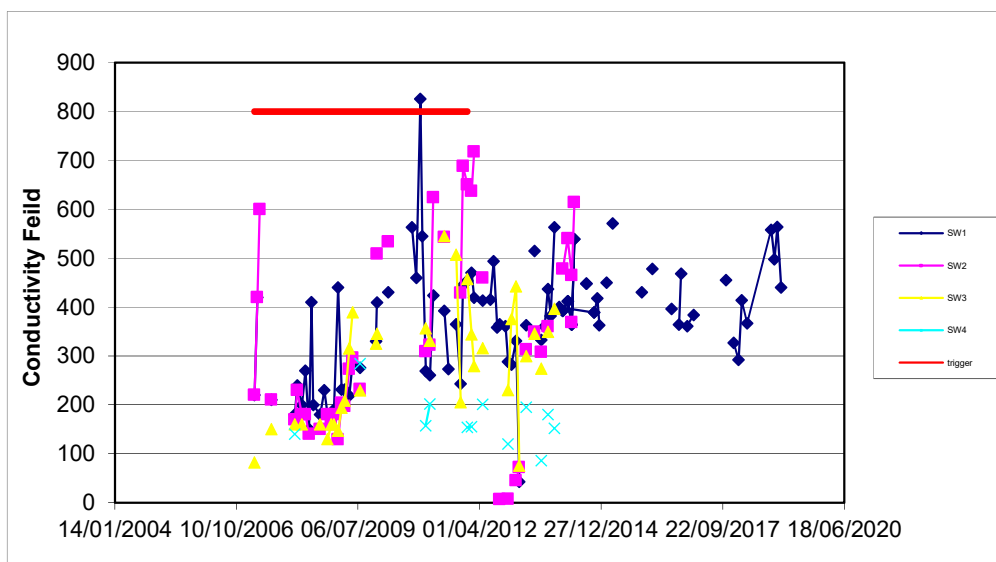
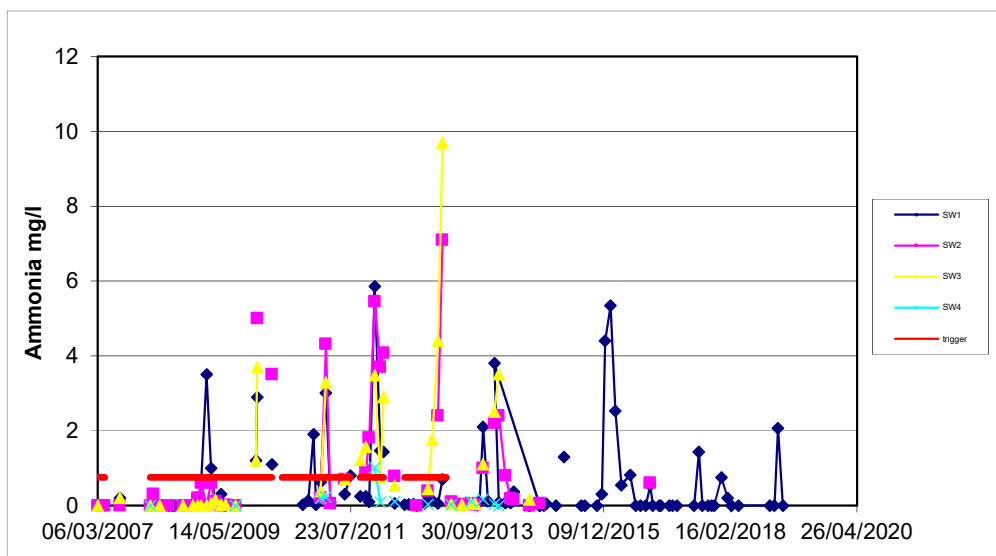
**Review of 2018
Landfill Monitoring**

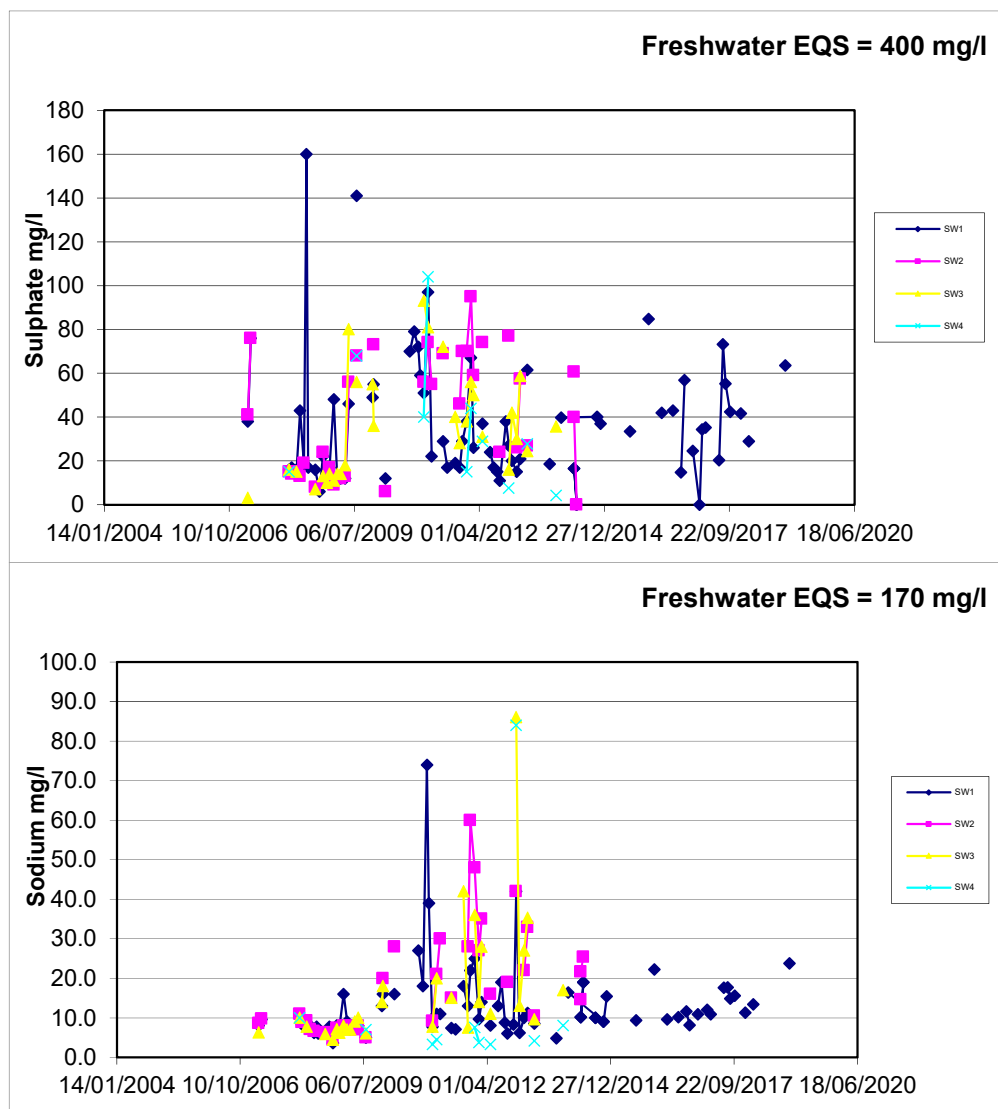
**Appendix 5
Summary of Surface
Water Monitoring Data**

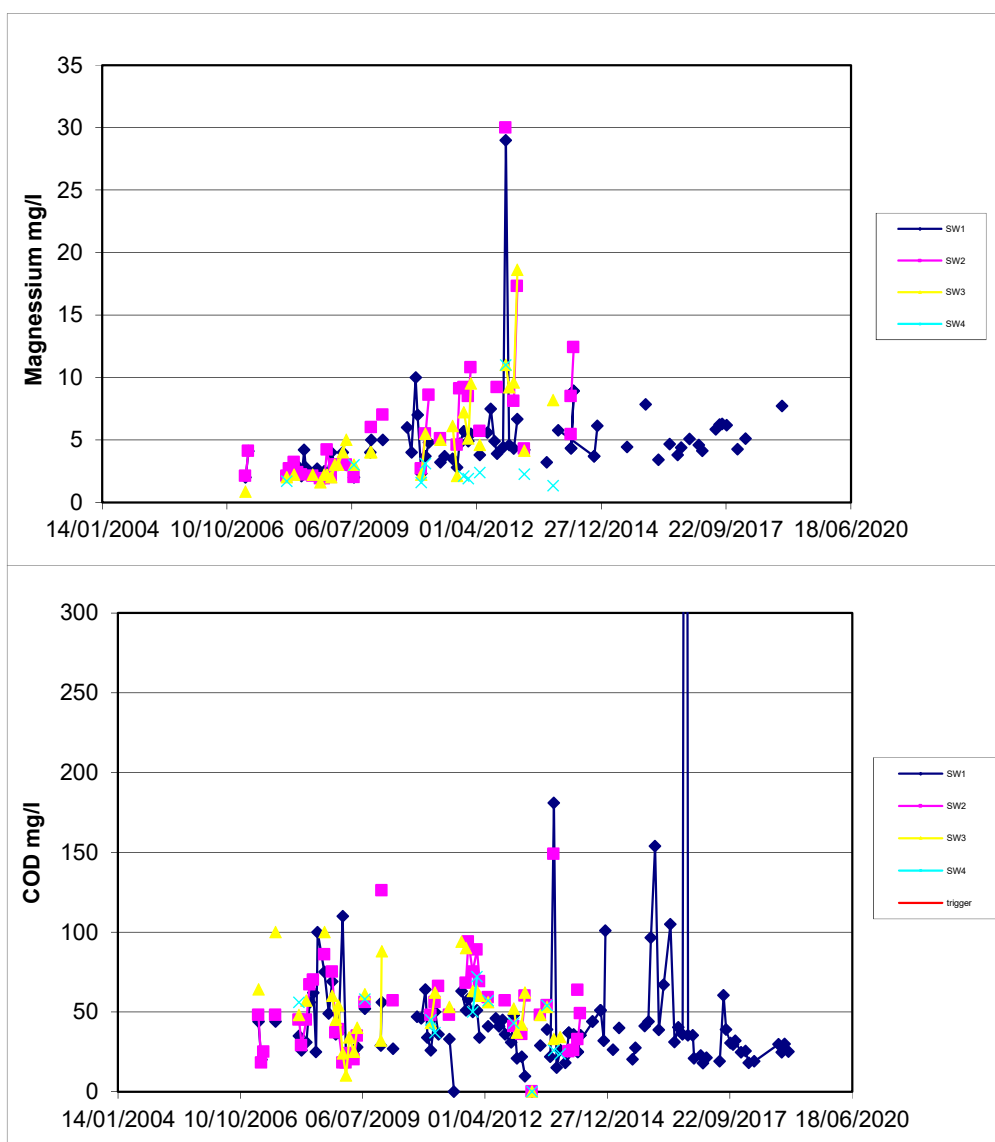
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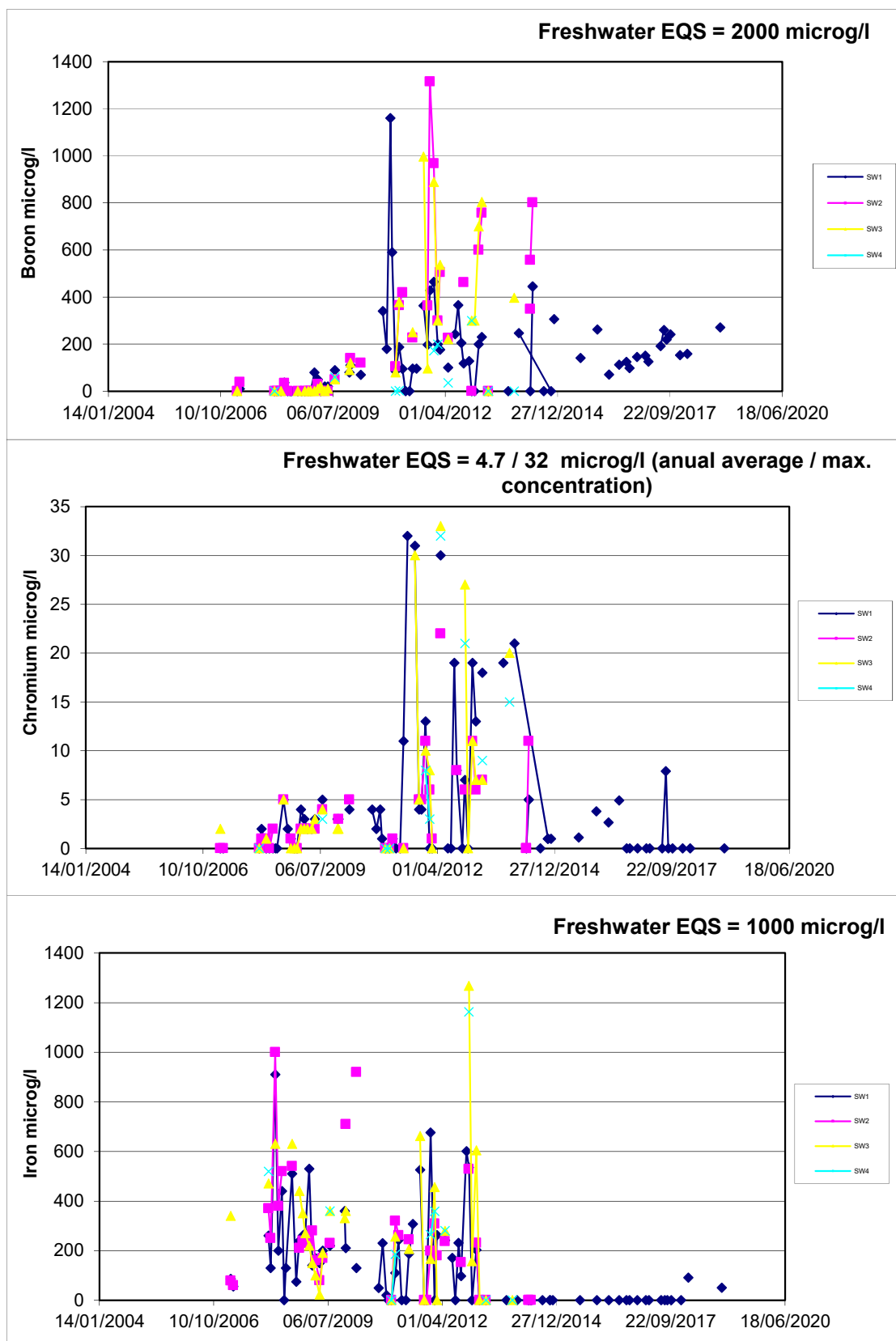


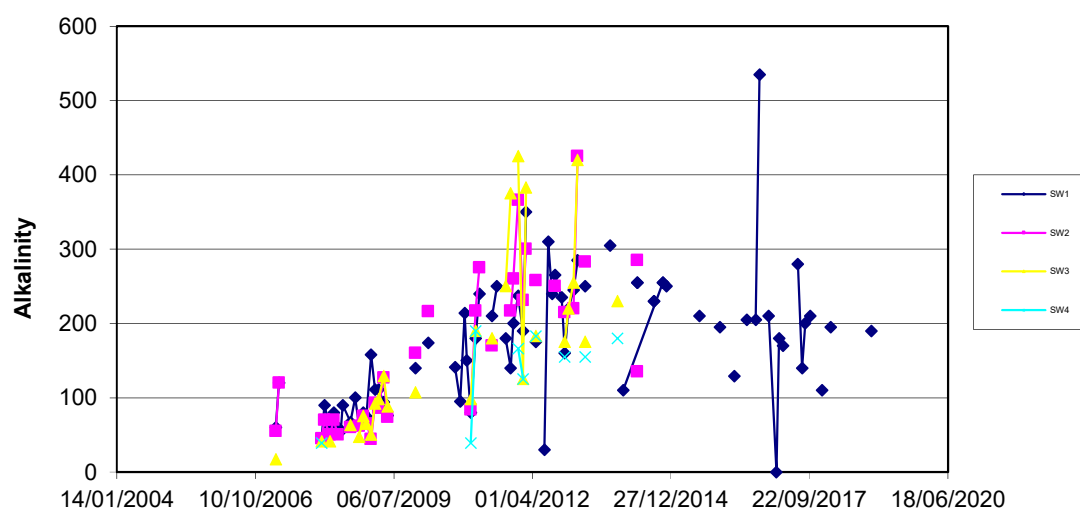
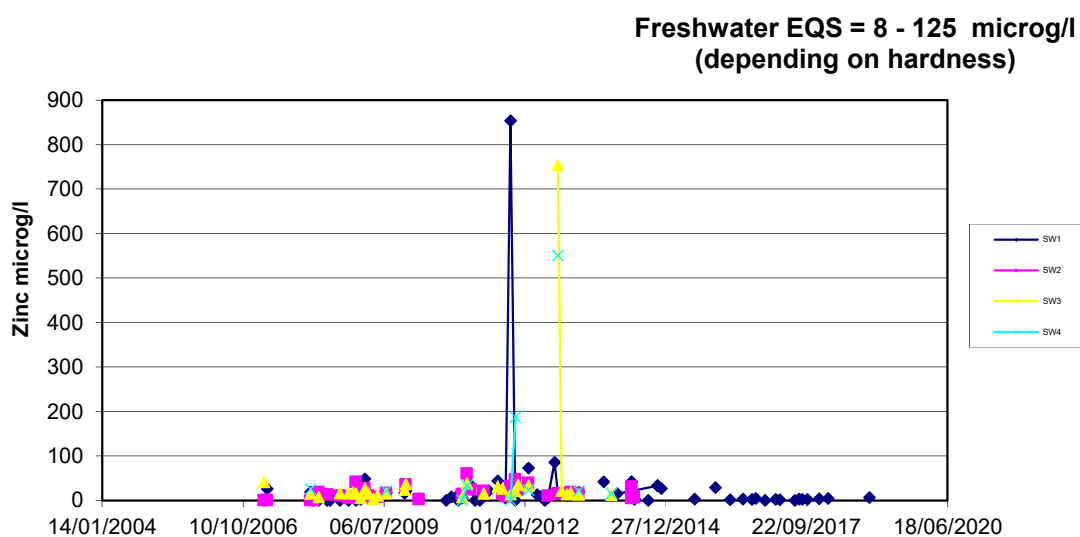
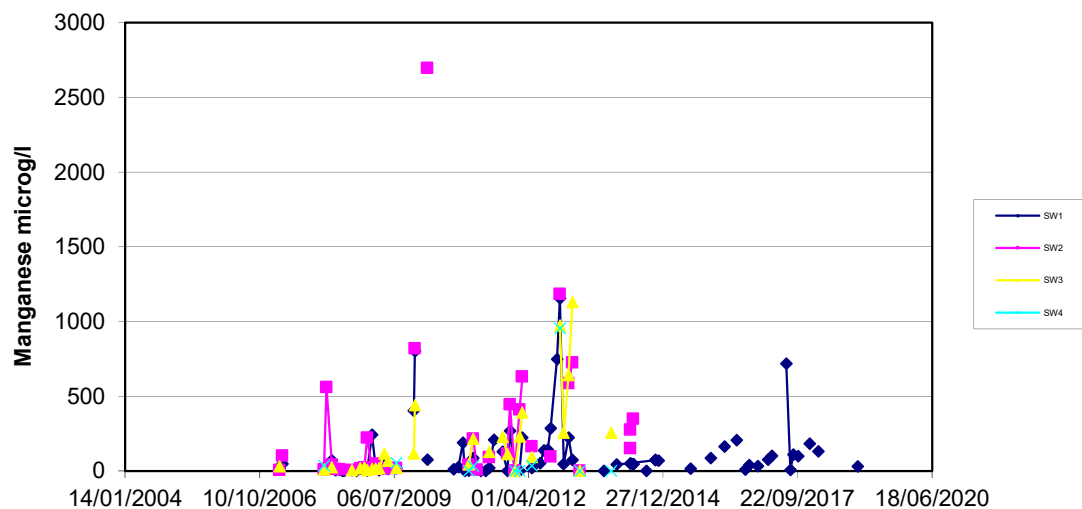


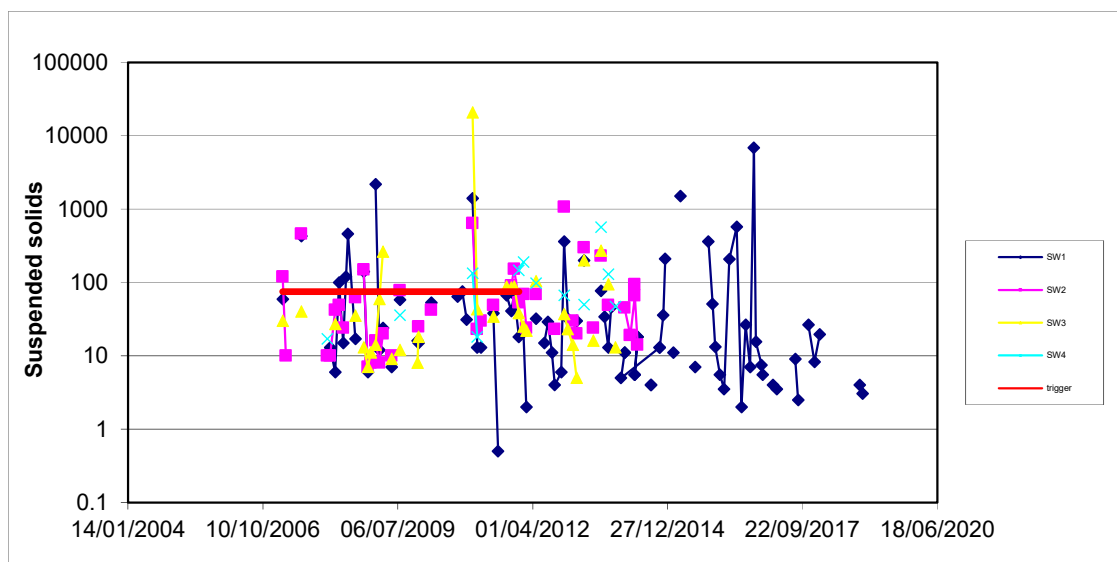
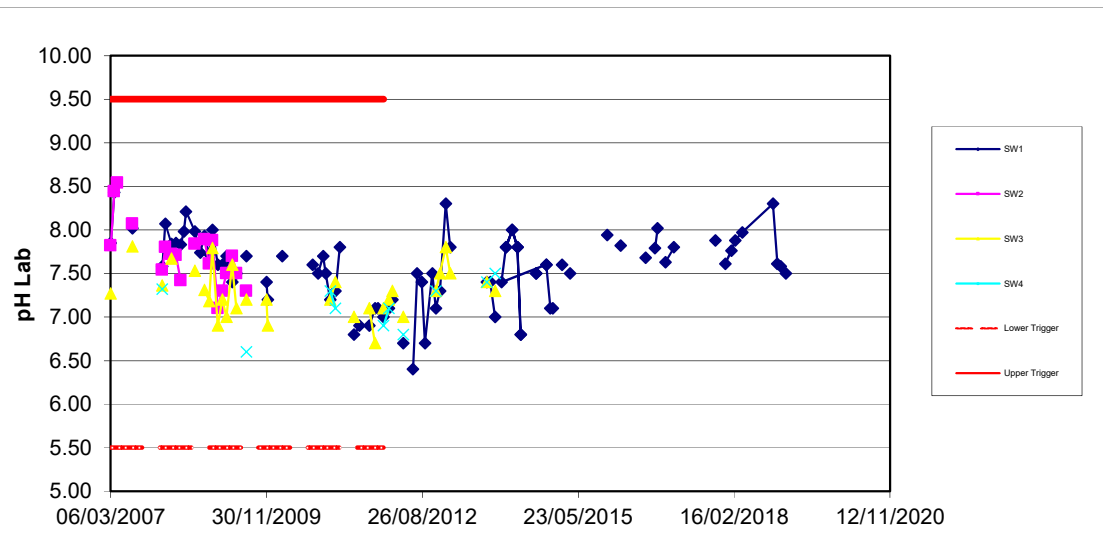


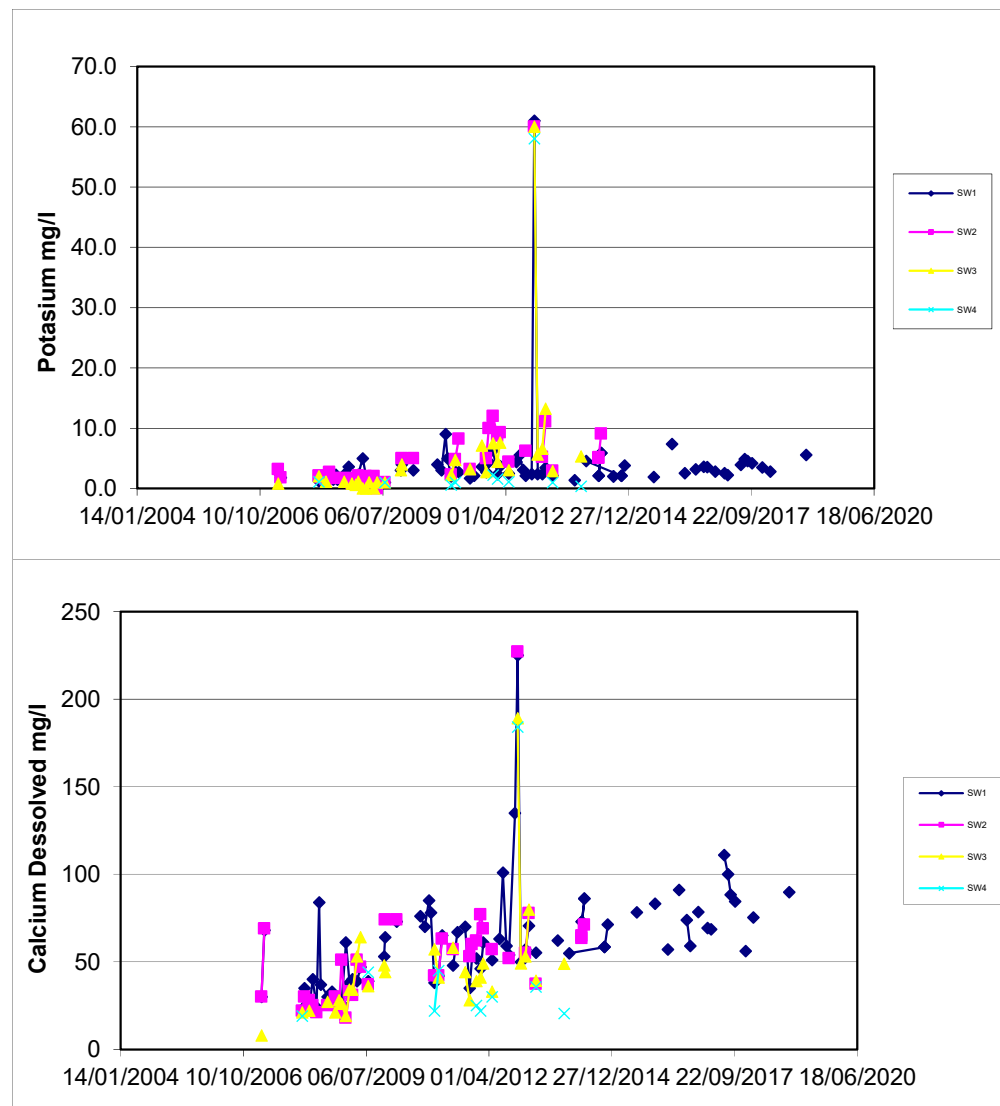


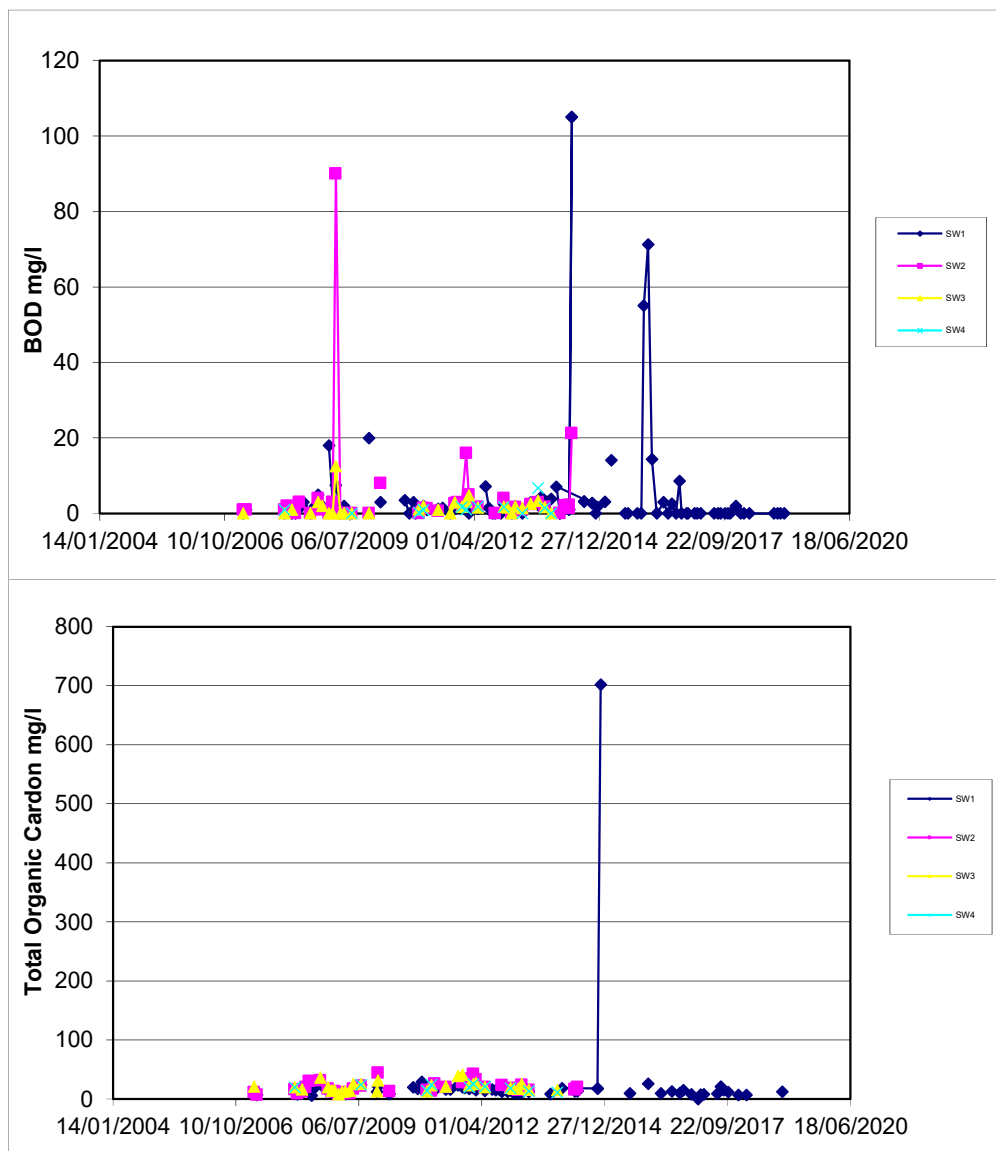












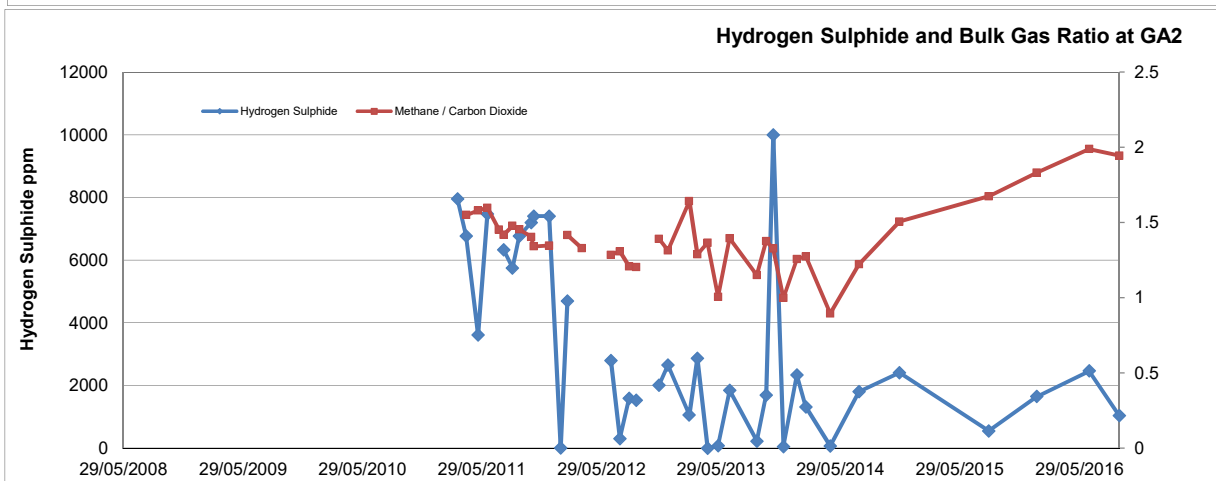
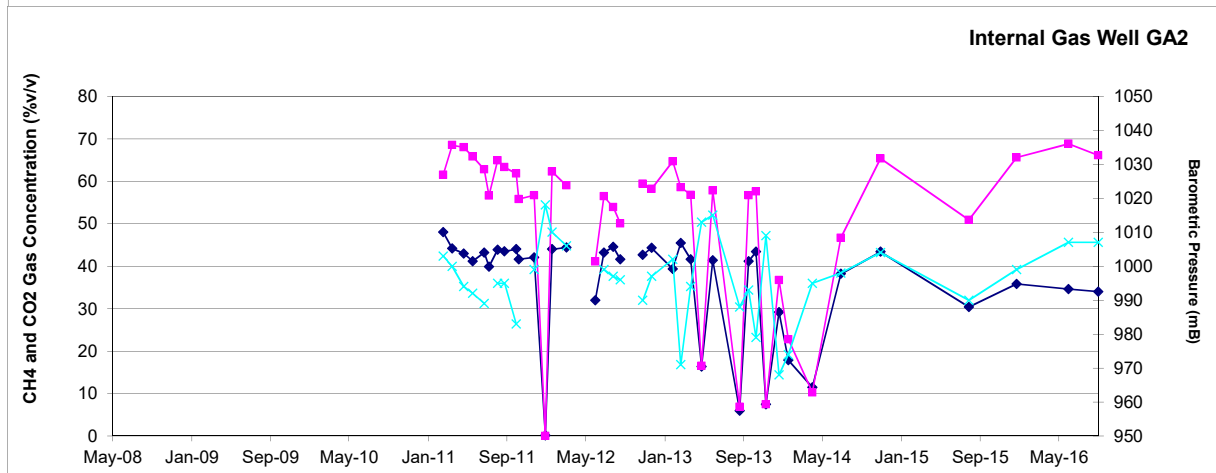
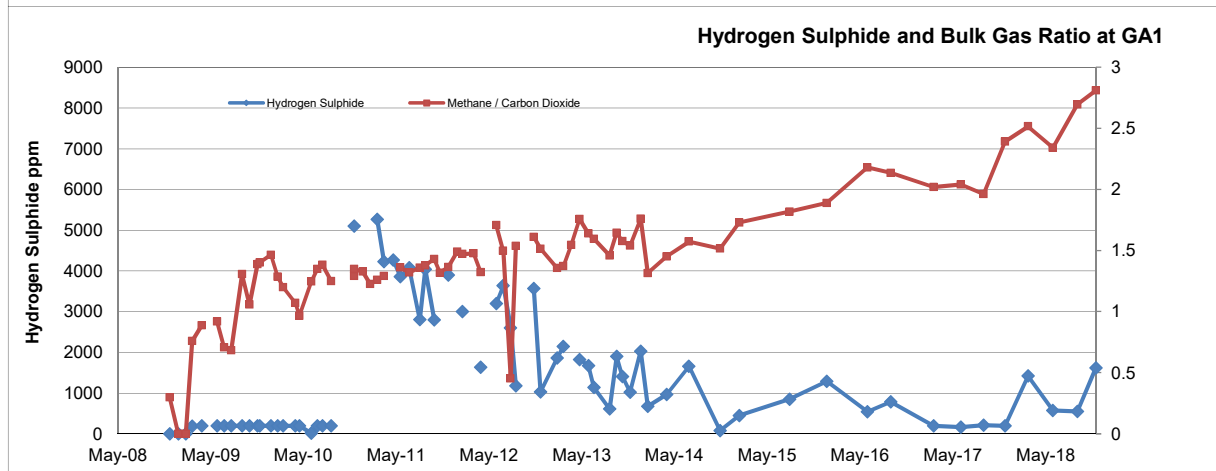
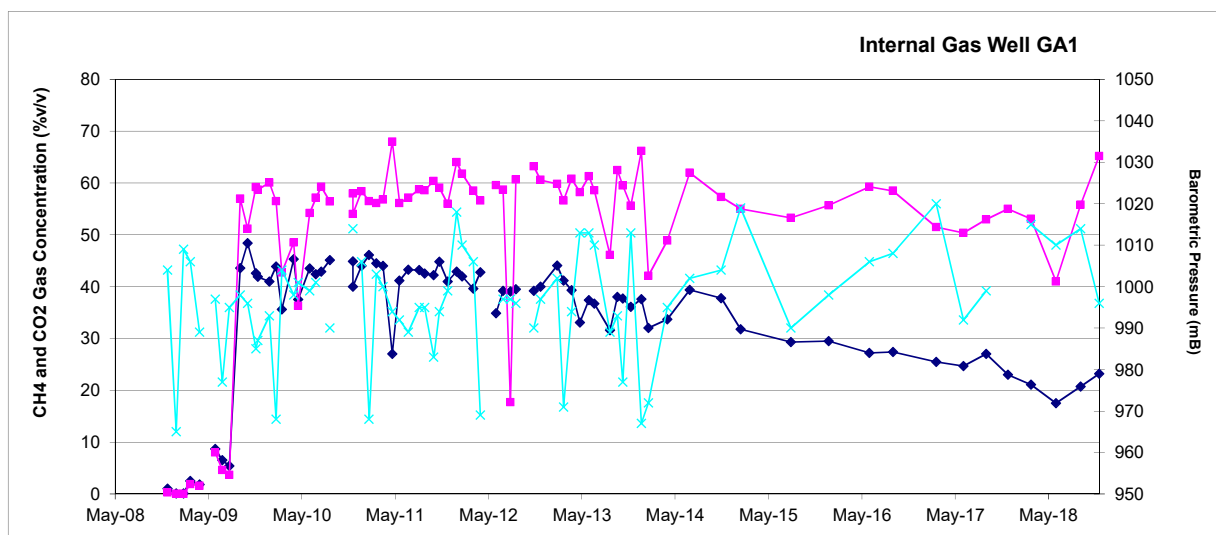
**PALLEG LANDFILL
LOWER CWMWRCH**

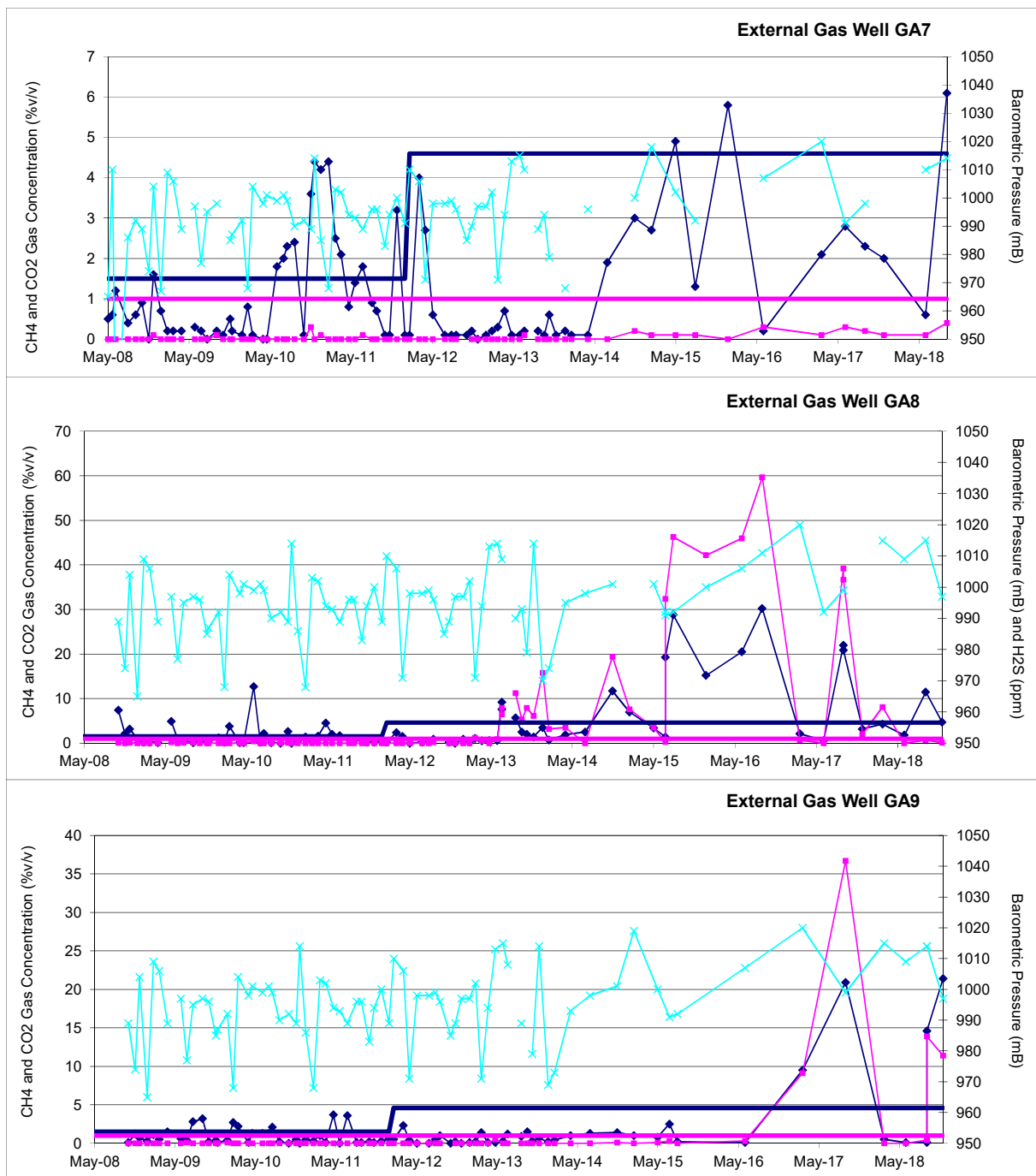
PERMIT BT19081X

**Review of 2018
Landfill Monitoring**

**Appendix 6
Summary of Gas
Monitoring Data**

Report Number 1783r1v1d0319







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