

**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

Report Number 2093r1v1d0221

Commissioned by
Tata Steel UK Limited
Port Talbot Works
Margam
Port Talbot
SA13 2NG

Prepared by
Geotechnology Ltd
Ty Coed
Cefn-yr-Allt
Aberdulais
SA10 8HE



February 2021

Table of Contents

1 INTRODUCTION	1
2 REGULATORY FRAMEWORK	2
2.1 Background	2
2.2 Application of Assessment Criteria	3
2.3 Hydrogeological Risk Assessment Criteria	3
3 MONITORING NETWORK PERFORMANCE	5
3.1 Monitoring Network Infrastructure	5
3.1.1 Landfill Leachate	5
3.1.2 Groundwater Monitoring Network	5
3.1.3 Shallow Piezometer Monitoring Network	5
3.1.4 Surface Water Monitoring Network	5
3.1.5 Gas Monitoring Network	5
3.1.6 Dust Monitoring Network	5
3.2 Action required	6
4 SITE ACTIVITY	7
4.1 Hazardous Waste Deposition	7
4.2 Progressive Restoration	7
4.3 Leachate Management	8
4.4 Restoration of Morfa Closed Landfill (MCL)	8
4.5 Construction and Landfilling at Non Hazardous Landfill	8
4.6 Summary of Landfilling and Restoration Activity	8
5 TOPOGRAPHIC SURVEY AND VOID SPACE	10
5.1 Topographic Survey	10
5.2 Remaining Void Space	10
6 LEACHATE	11
6.1 Leachate Level	11
6.2 Leachate Chemistry	11
6.3 Assessment against Control Levels and LandSim Criteria	12
6.4 Contingency Actions Taken	12
7 GROUNDWATER	13
7.1 Groundwater Level and Flow	13
7.2 Groundwater Quality	13
7.3 Assessment against Permit Compliance Level	13
8 SURFACE WATER	15
8.1 Surface Water Levels	15
8.2 Assessment against Permit Control Levels	15
8.3 Contingency Actions Taken	15
9 DUST	16
9.1 Assessment against Permit Control Levels	16
9.2 Contingency Actions Taken	16

10 ASBESTOS	17
10.1 Assessment against Permit Compliance Levels	17
10.2 Contingency Actions Taken	17
11 SUMMARY AND RECOMMENDATIONS	18
11.1 Environmental Protection	18
11.2 Regulatory Framework	18
11.3 Actions Required	18

List of Tables

Table 2-1 Modelled leachate inventory	4
Table 4-1 Summary of landfilling activity to date	9
Table 5-1 Cell Volume Capacity	10
Table 6-1 Evaluation of Leachate Chemistry	12
Table 7-1 Comparison of selected groundwater chemistry with Trigger Levels	14
Table 8-1 Comparison of surface water quality with assessment levels	15

List of Figures

- | | |
|----|------------------------------|
| 1. | Site Location Plan |
| 2. | Available Monitoring Network |
| 3. | Leachate Pipe Route |
| 4. | Topographic plan of Landfill |

List of Appendices

- | | |
|-----|---|
| 1. | Correspondence with NRW |
| 2. | Temporal variation of leachate levels |
| 3. | Temporal variation of leachate chemistry |
| 4. | Temporal variation of groundwater levels |
| 5. | Temporal variation of groundwater chemistry |
| 6. | Temporal variation of surface water levels |
| 7. | Temporal variation of surface water chemistry |
| 8. | Spatial distribution of Key Parameters |
| 9. | Record of Landfilled Waste |
| 10. | Results from dust monitoring gauges |
| 11. | Asbestos Monitoring Results |

Executive Summary

Tata Steel UK Limited (Tata) has operated Morfa Hazardous Landfill in accordance with an Environmental Permit since December 2004.

The landfill contains waste that is currently producing a leachate with moderate mineralised content (~4000 microS/cm) meaning that it contains few pollutants. Containment of this leachate within the lining systems is being achieved. Monitoring of the surrounding groundwater quality does, however, reveal that it is impacted by leachate from other unlined areas where made ground is exposed to leaching.

As the landfill accepts asbestos, routine monitoring is coordinated by the landfill operator. This monitoring has failed to detect any asbestos fibres in ambient air.

At the current low rate of filling, the active cell is predicted to have sufficient capacity for many years. Leachate is currently being produced by the percolation of rainfall over the entire cell footprint. This will continue unless measures are taken to reduce the area exposed to rainfall and infiltration.

1 INTRODUCTION

Tata Steel UK Limited (Tata) operates the Morfa Hazardous Landfill (MHL) in accordance with Permit BW2692IM. The Permit was issued by the Environment Agency (now Natural Resources Wales) on 17 December 2004. The Permit only applies to part of the original waste management site, with approximately 40% being closed upon the commencement of adjacent Morfa Non-Hazardous Landfill (MNHL) and MHL. The closed part of the site is referred to as Morfa Closed Landfill (MCL). The location of Morfa Landfill and the relevant position of MHL, MNHL and MCL is shown on Figures 1 and 2.

Tata submits a report to NRW on a three-monthly basis, which compares the monitoring results for leachate, surface and groundwater and air quality monitoring against the relevant Permit criteria. Additionally, a summary review of all monitoring data is required on an annual basis. This report is the summary annual monitoring report for MHL for the period January – December 2020 and is intended to discharge Part (a) of Permit condition 4.2.1.

In accordance with the Permit an annual topographic survey of the landfill has also been undertaken.

Previous annual monitoring reports have also been prepared by Geotechnology and are listed in References. Separate annual monitoring reports describe the monitoring undertaken at MNHL and MCL.

2 REGULATORY FRAMEWORK

2.1 Background

The Permit defines the regulatory emission limits that must be met at MHL. These include leachate limit levels, emission limits to air for particulates and landfill gas, emission limits for surface water and Trigger Levels for emissions into groundwater. Collectively, these limits are referred to as Assessment Criteria in this report.

After the issue of the PPC Permit, Geotechnology presented a revised set of Assessment Criteria for groundwater, surface water and leachate in accordance with the Permit Improvement Conditions. These revised Assessment Criteria were initially presented by Geotechnology following a review of the Hydrogeological Risk Assessment (HRA) (see Geotechnology report 403.1/1/1006 Review of Hydrogeological Risk Assessment) after commencement of landfilling. These criteria were further updated following feedback from NRW (see Geotechnology letter 403/reviewHRA/lt1/BR/kp dated 17 January 2007 to the EA) and in the previous annual monitoring report (see Geotechnology report 528.1/0/0307).

The new Compliance levels for groundwater were incorporated into the Permit Variation Notice (No SP3633MK) which was issued by NRW in May 2007. The Variation Notice wholly superseded the original PPC Permit. The Assessment Criteria for leachate and surface water are not presented in the Variation Notice but are within the reports referenced above.

On 11 June 2008, Tata requested several additional minor changes to the Permit. These were agreed by NRW on 30 July 2008.

During 2008 and 2009, copper (Cu) was detected at several positions which prompted Tata to implement several contingency actions and notifications. The occurrence of Cu was not considered to be related to seepage from MHL and the concentration levels were significantly below the concentration level of the freshwater EQS (0.028 microg/l based on average annual hardness of ~250 mg/l CaCO₃). Consequently, Geotechnology suggested in the 2008 annual monitoring report that the Cu trigger and control levels should be increased. Following submission of the 2008 annual monitoring report to NRW in March 2009, review comments were received in August 2009 (see compliance Assessment Report CAR 2627). In their review comments, NRW requested that the investigation to establish whether the laboratory is the cause of the previously observed elevated levels of Cu should be completed before the trigger levels are increased. The findings of this investigation were reported in the 2009 annual report and concluded that the lab or any other aspect of the monitoring was not the source of the Cu. In response to these findings, NRW accepted the proposed trigger and control levels in CAR 03354 (dated 28 April 2010).

In the 2012 HRA review, new assessment levels were presented for leachate, groundwater and surface water (see Geotechnology report 1178r1v1d0712). These were also consolidated in a letter to NRW from Tata on 4 February 2013. Given the acceptance of these new levels towards the end of 2012, Tata only started implementing the use of these new control and compliance levels in January 2013.

New criteria (compliance levels and control levels) were proposed in the 2017 annual review but NRW did not formally comment upon these until 2020, as summarised in Appendix 1. In the meantime, Tata continued to implement the criteria developed in 2013. Despite these latter criteria being implemented for many years, NRW queried their use during 2020

following the most recent Permit Variation (Variation EPR/BV7311IE/V006). During these discussions it became apparent that there was confusion but Geotechnology understands that this situation has now been clarified and a new Permit Variation application has recently been submitted (January 2021). The intention of the Variation is to consolidate the currently accepted assessment criteria and monitoring regimes. This is set out in a letter from Tata to NRW dated 20 January 2021. A copy of this letter is included in Appendix 1.

In this report, the criteria set out in the Permit Variation application have been used to assess the monitoring results alongside the internal control levels.

Once the new Permit has been issued, this section of next year's annual report will detail the agreed criteria.

2.2 Application of Assessment Criteria

The focus of this annual summary report is to evaluate the data collected against the applicable Assessment Criteria. Time series graphs illustrating data trends have been plotted for most parameters where compliance and control levels apply and where sufficient data is available for graphical plotting. These graphs are presented in Appendices 2 to 7. Time series plots of other key parameters are also presented in the relevant appendices. Where possible, the scale of the y-axis has been modified so that the same range is used on all graphs for the same parameters to enable rapid visual comparison of concentration data between monitoring locations.

Spatial distributions of key parameters across the site are provided in Appendix 8.

2.3 Hydrogeological Risk Assessment Criteria

A four-year review of the initial Hydrogeological Risk Assessment (HRA) was undertaken in 2008 by Geotechnology (see Geotechnology report 712r1v1d0908). A further review was undertaken in 2012 (see Geotechnology report 1178r1v1d0712) as reviews were required every subsequent fourth year, after the fourth anniversary of the granting of the permit. NRW has, however, changed this requirement (for all landfills) to every six years, so a HRA review was completed in 2017 (Geotechnology report 1740r1v1d1217). The next HRA review should be completed in 2023 to ensure that it is 9 to 6 months prior to the 20th anniversary of the Permit, which is in 2024.

One of the objectives of the HRA review was to ensure that the computer simulations used to design the landfill and justify compliance with the Water Framework Directive do not become detached from the reality of landfill construction and operation. Therefore, in addition to evaluating the data against the assessment criteria set out in the Permit, Geotechnology also uses the preparation of the annual report as an opportunity to compare the most recent leachate chemistry with that modelled as part of the most recent HRA. The model input parameters against which the leachate chemistry is compared are summarised in Table 2-1.

Table 2-1 Modelled leachate inventory

	Ammonia	Arsenic	Chloride
	mg/l	mg/l	mg/l
LandSim PDF*	Triangular (0.05, 10, 50)	Triangular (0.005, 0.3, 3)	Log Triangular (1000, 10000, 61000)
*PDF – Probability Density Function used to describe statistical distribution of parameter. Triangular and Log Triangular are the PDFs used in most recent HRA. Values in parenthesis are minimum, most likely and maximum values used in LandSim model			

3 MONITORING NETWORK PERFORMANCE

The full monitoring network available to Tata for all the landfills is shown in Figure 2.

3.1 Monitoring Network Infrastructure

3.1.1 Landfill Leachate

The landfill leachate infrastructure is performing well.

3.1.2 Groundwater Monitoring Network

The integrity of the groundwater monitoring network is inspected monthly. The monitoring network is performing well but clearance of small areas of dense vegetation would make access easier and safer. Minor repairs to some headworks are also required.

3.1.3 Shallow Piezometer Monitoring Network

A series of shallow piezometers have been manually installed into the shallow aquifer along the boundary with Margam Moors, as shown on Figure 2. These have been routinely monitored since 2006. This aspect of the monitoring network would benefit from routine vegetation clearance and measures to reduce the opportunity of livestock damaging piezometers on the edge of Margam Moors.

3.1.4 Surface Water Monitoring Network

The integrity, access and safety of each of the surface monitoring locations are inspected monthly. Installation of hand/rope rails would aid in the safe recovery of surface water samples as would routine vegetation clearance. Dense vegetation is preventing routine safe access.

3.1.5 Gas Monitoring Network

Quarterly gas monitoring is required at internal well GA30 during post closure phase.

3.1.6 Dust Monitoring Network

Dust monitoring is undertaken by Tata Environment Department. Dust monitoring has comprised two types of monitoring:

- Deposition gauges which collect dust (and rainfall) via a bowl which drains into a bottle at four locations. These instruments record the total amount of dust fallen.
- Flexible poles fitted with 'sticky pads'. As the pads collect airborne dust from 360 degrees, dust deposition direction can be evaluated. These were installed November 2005.

Since 2011, only the deposition gauges have been used. The 'sticky pad' poles are not used as this aspect of the monitoring is not a Permit requirement and is now only to be considered during the implementation of the contingency actions documented in the Dust Management Plan for the site.

3.2 Action required

- Small areas of vegetation require routine clearance to facilitate routine safe access to several monitoring locations
- Hand / rope rails should be installed at several surface water monitoring positions
- Site weather stations should be routinely maintained to ensure they continue to operate satisfactorily

4 SITE ACTIVITY

4.1 Hazardous Waste Deposition

A summary of the waste types and tonnages deposited at the landfill as recorded by the landfill operator is regularly submitted to NRW in accordance with the Permit requirements. A graphical record of waste deposition is presented in Appendix 9 and below. In 2019, 207.95 tonnes of waste was deposited. In 2020, this dropped to 46.5 tonnes, the lowest annual total deposited.

At the current low rate of filling the landfill is predicted to have sufficient capacity for many years. As the cell is fully open to the elements, leachate is being produced and treated from rainfall falling over the entire cell footprint. This will continue unless measures are taken to reduce the area exposed to rainfall and infiltration.

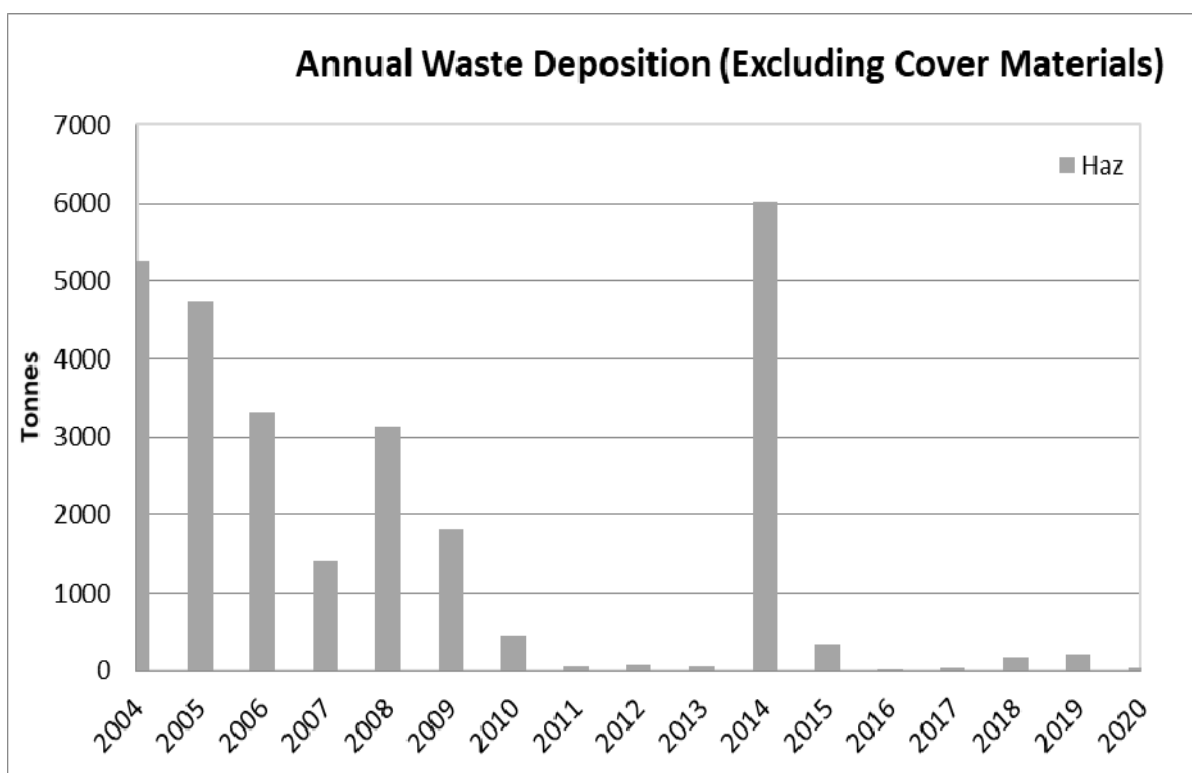


Chart 4-1 Waste deposition at Hazardous Landfill

During March 2014, fire waste containing cement bound asbestos was moved from temporary storage at Cell 2 of MNHL into Cell 2 of MHL. The movement of the waste was, at times, observed by NRW and following completion of the works Geotechnology prepared a Validation Report documenting the works undertaken (see report 1327r1v1d0314).

4.2 Progressive Restoration

Progressive restoration of each cell should occur once it has been filled. This will limit leachate generation and enable better environmental control. At this stage, none of the cells have been restored. Once restoration does take place, the landform will be the same as that described in Section 4.4 for the restored adjacent closed landfill.

4.3 Leachate Management

Until 2019, leachate was collected from the sump by vacuum pumps and tankered away from the landfill using 10m³ or 15m³ road-going tankers. These tankers took the leachate to the wastewater treatment facility at the steel works. This system has now been replaced by a fixed pumped system, discharging directly into the works via a holding / balancing tank facility.

The new system involves pumping leachate from all cells at MNHL and MHL (currently five cells). There are three individual leachate pipe runs, one for the two MNHL bio-cell sumps, one for the two non-hazardous cell sumps and one for the MHL cell sump. The pumping at each cell can be float controlled to ensure that leachate heads are within permitted trigger and maximum limits.

The three individual pipe runs discharge initially into a holding/balancing tank located on the permitted Waste Transfer Station hardstanding (concreted) area near to the DLS offices. The balance tank is also float controlled and combines all leachates for further pumping into the end discharge sump within the main works, located at Morfa Coke Ovens, Gas Holder Deep Sump. Flowmeters are located at each sump location, and at the balance tank, to record individual and cumulative leachate outflows. The use of flowmeters will provide a check on the potential for leakage from any of the three pipes entering the balance tank.

The installation of the leachate pipework system was carried out in accordance with the principles of the Construction Quality Assurance (CQA) Plan and Specification (Geotechnology report 1486r1v2d0917). Validation was documented in Geotechnology report 1486r2v1d0719. A plan of the as-built system is reproduced in Figure 3.

4.4 Restoration of Morfa Closed Landfill (MCL)

Phased restoration of unlined MCL was completed in 2013 having started in 2004. The restoration involved placement of geomembranes which, in combination, provide gas and surface water management as well as providing barriers to precipitation ingress and gas egress. The sympathetic restoration also involves the placement of sand on top of the geomembranes, creating dune morphology like the surrounding land.

As part of the re-profiling to achieve stable restoration surfaces, the opportunity was taken to recover materials for use in the steel making process. During this aspect of the works, wastes were temporarily exposed to weathering and leaching prior to them being reprofiled and capped.

4.5 Construction and Landfilling at Non Hazardous Landfill

Two biodegradable cells (bio cells A and B) and two non-hazardous waste cells (Cells 1 and 2) have been constructed at the adjacent MNHL. During 2020, the biodegradable waste cell was extended into Cell 1, creating additional biodegradable waste capacity.

4.6 Summary of Landfilling and Restoration Activity

The timeline of landfill construction and operation is summarised in Table 4-1.

Table 4-1 Summary of landfilling activity to date

Activity	Start	Finish
Construction of MNHL Cell 1	1 June 2004	19 October 2004
Construction of MHL Cell 1	1 June 2004	19 October 2004
Restoration of MCL	September 2004	8 June 2013
Construction of MNHL Bio Cell A	14 June 2004	8 September 2004
Construction and operation of waste treatment centre	5 December 2006	Ongoing
Construction of MNHL Bio Cell B	August 2007	13 October 2007
Construction of MNHL Cell 2	6 May 2008	31 July 2009
Landfilling of HMS filter cake in MNHL Bio Cell 2	28 October 2008	Ongoing
Construction of MHL Cell 2	October 2011	Ongoing
Temporary storage of fire waste	25 June 2011	14 March 2014
Construction of recharge trench sections A & B	30 Aug 2012	12 Oct 2012
Connection of recharge trenches to ponds and commissioning of system	Ongoing	(partly completed during 2016 but damaged due to vandalism)
Installation and operation of new leachate pumping system	2018	October 2019
Construction of Bio Cell Extension Ci	April 2020	January 2021

5 TOPOGRAPHIC SURVEY AND VOID SPACE

The Permit requires an annual topographic survey to be completed.

5.1 Topographic Survey

A topographic survey of the operational landfill cells was carried out on 10 January 2020 and a repeat survey on 8 January 2021. Following data acquisition, the digital data was imported into a digital terrain model for each of the cells to calculate the available void space.

Since 2013 the surveys have been completed using an unmanned aerial vehicle (UAV) with survey control established using a GPS land-based GR-3 system. The UAV data is then used together with ground control points to create a digital terrain model. This method of surveying collects data points at significantly closer intervals than methods previously used and is therefore able to create a more detailed topographic model, as shown in Figure 4.

5.2 Remaining Void Space

The void space available in the hazardous landfill cell is summarised in Table 5-1 below.

Table 5-1 Cell Volume Capacity

Volumes(m ³)	Hazardous Sub Cell 1	Hazardous Sub Cell 2
Total	24529	37401
Consumed Capacity	24907	23272
Available Capacity	-378	14129
% Available Capacity	-1.54	37.78

6 LEACHATE

6.1 Leachate Level

Based on monitoring undertaken by the landfill operator, the variation of leachate head is illustrated in Appendix 2 and Chart 6-1. In accordance with the Permit conditions, the head of leachate has not exceeded one metre above the base of leachate monitoring point (L17) apart from a few weeks at the start of 2016 and in August 2018.

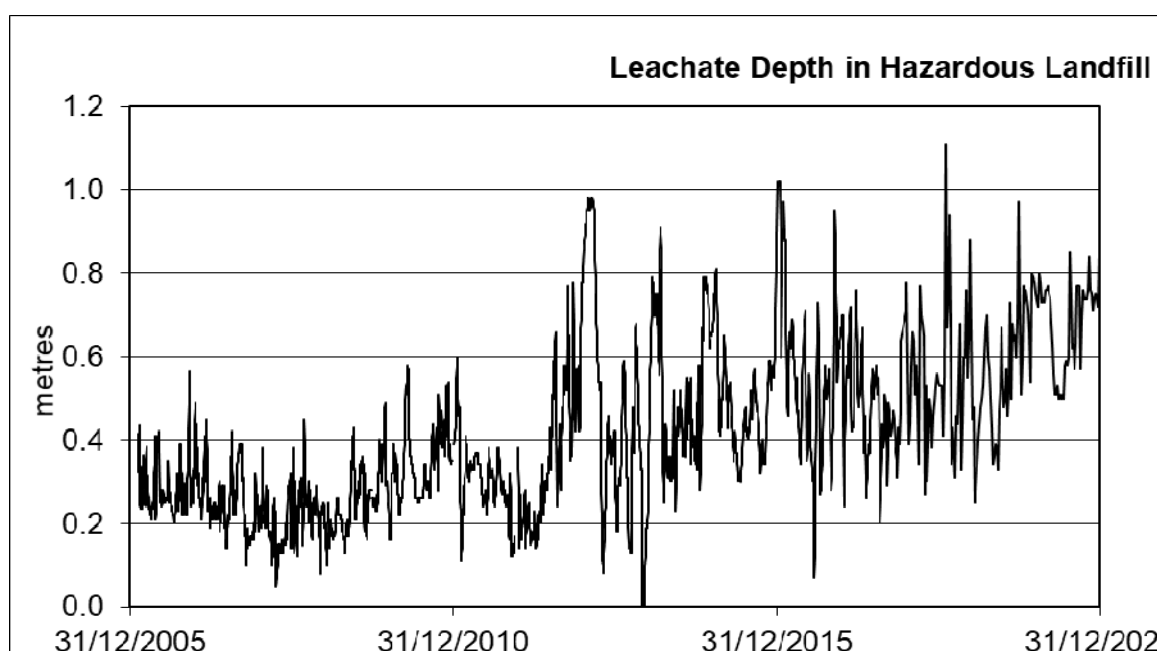


Chart 6-1 Leachate levels in Hazardous Landfill (recorded at sump L17)

To maintain leachate levels within the Permit levels, significant quantities of leachate are extracted and taken back into the steelworks for treatment. Given the large volumes involved, Geotechnology has previously suggested that Tata could consider measures to reduce the volume, such as progressive restoration. As the leachate levels have not been reduced to the same lower levels as previous, and the waste may be close or at its field capacity, leachate levels can be potentially expected to respond quickly in response to rainfall.

6.2 Leachate Chemistry

The temporal variation of leachate chemistry is graphically illustrated in Appendix 3.

As the waste landfilled at MHL does not contain a large degradable component, the evolution of the leachate is not following the same path which is well documented for municipal solid wastes. Rather, the leachate chemistry is being controlled by mostly inorganic processes.

Leachate chemistry is currently characterised by elevated pH (pH 12 – 13) and moderate electrical conductivity (~4000 micros/cm). Over the past five years the concentration of several parameters has typically declined, although mineralisation has increased during

2020, as shown in the graphs in Appendix 3. This appears to be as a consequence of increased alkalinity

Under the highly alkaline conditions, trace metals (including hazardous substances cadmium and mercury) are typically present at low levels or below the level of detection. During 2020, trace metals were once again at low concentrations with cadmium and mercury not being detected.

Due to the nature of the waste streams, very low levels of hydrocarbons, volatile organic compounds (VOC's) and semi VOC's have been detected to date. During 2019 these compounds were not detected.

6.3 Assessment against Control Levels and LandSim Criteria

The low mineralised content of the leachate is reflected in the summary provided in Table 6-1. This shows selected key parameters to be well below the modelled levels from the most recent HRA and Permit control levels.

Table 6-1 Evaluation of Leachate Chemistry

	Ammonia	Arsenic	Chloride
	mg/l	mg/l	mg/l
LandSim PDF*	Triangular (0.05, 10, 50)	Triangular (0.005, 0.3, 3)	Log Triangular (1000, 10000, 61000)
Permit control Levels	70	3	70000
Leachate chemistry 2018			
Maximum 2018 Leachate chemistry (L17)	<0.05	0.0007	72.8
Leachate chemistry 2019			
Maximum 2019 Leachate chemistry (L17)	0.25	0.0586	79.1
Leachate chemistry 2020			
Maximum 2020 Leachate chemistry (L17)	0.62	0.0006	87.1
*PDF – Probability Density Function used to describe statistical distribution of parameter. Triangular and Log Triangular are the PDFs used in most recent HRA. Values in parenthesis are minimum, most likely and maximum values used in LandSim model			

6.4 Contingency Actions Taken

No specific contingency actions were required but Tata has continued to improve operation and management of leachate levels.

7 GROUNDWATER

The results of the groundwater monitoring are presented in Appendix 4 and Appendix 5. Also provided in Appendix 8 are spatial plots of selected groundwater chemistry.

7.1 Groundwater Level and Flow

Groundwater levels and flow around the landfill are like levels previously observed. Levels are shown in Appendix 4 as contour plans and time series charts.

7.2 Groundwater Quality

The water quality monitoring continues to indicate that groundwater within the vicinity of MHL is impacted to a variable extent, particularly in the shallow aquifer around BH12. For most parameters, the concentration in groundwater is higher than that observed in leachate sump L17. This is because the area surrounding the landfill, particularly to the south, contains legacy slag deposits that are open to leaching and the groundwater may also be influenced by seepage from MCL. Similar variations are also observed in other monitoring positions around the landfill cell (BH25 – BH29), although the trend is not as distinct, and the temporal variations are different. Given the proximity of some of the positions to the sea there may also be a saline / tidal influence on groundwater quality and water level. This would appear to be particularly the case at BH27 and BH28, both of which are located on the western seaward side of the landfill. To the northwest of the site, there is also a possibility that activities in the operational yard of the landfill could affect shallow groundwater recharge and seepage.

The characterisation monitoring conducted since the start of monitoring has included the analysis of an extensive list of volatile and semi volatile organic compounds in leachate and groundwater. This data has clearly shown the widespread impact of seepage from MCL and potentially other areas on groundwater, upgradient and downgradient of the landfill. The occurrence of these compounds is not related to MHL, as many of the compounds have not been found in leachate and where the compounds are detected, they are typically found at lower concentration levels. No VOCs or SVOCs have been detected in the groundwater samples analysed by TSW or TDC, since 2009.

The key point to note is that the data continues to indicate that MHL is not having a discernible impact on groundwater.

7.3 Assessment against Permit Compliance Level

As shown by the summary in Table 7-1, have been no persistent breaches of the trigger levels.

As noted previously, increased chloride continues to be observed at BH27S. The concentration levels observed are higher than those found in leachate and the spikey nature of the hydrochemistry suggest that there are localised processes occurring, possibly related to its proximity to the sea.

Table 7-1 Comparison of selected groundwater chemistry with Trigger Levels

		Arsenic	Chloride
		microg/l	mg/l
	Trigger Level	50	200
BH25S	05/02/2020	16.1	91.6
BH25S	15/06/2020	26.8	138
BH25S	20/07/2020	27.4	105
BH25S	04/12/2020	12.9	71.1
BH26S	05/02/2020	3.6	37.65
BH26S	16/06/2020	26.8	50.4
BH26S	20/07/2020	9.6	59.2
BH26S	04/12/2020	9.3	61.1
BH28S	05/02/2020	3	175
BH28S	16/06/2020	2.5	97
BH28S	20/07/2020	3.2	124
BH29S	05/02/2020	11.6	143
BH29S	15/06/2020	4.3	149
BH29S	20/07/2020	8.3	120
BH29S	04/12/2020	5	115
BH27S	05/02/2020	4.7	2170
BH27S	16/06/2020	556	381
BH27S	20/07/2020	30.7	543
BH27S	04/12/2020	12.3	1590
No data available for BH12S due to insufficient groundwater being present at time of sampling			

8 SURFACE WATER

8.1 Surface Water Levels

The results of the surface water monitoring are presented in Appendix 6 and Appendix 7. Spatial variations in selected water chemistry are also provided in Appendix 8.

8.2 Assessment against Permit Control Levels

Surface water immediately northeast of MHL on Margam Moors is already known to be significantly impacted by seepage from MCL, as there is a well-developed highly alkaline springline.

Due to the low risk that MNHL directly poses to surface water under active management control and the historical impact of seepage from MCL, there are no Permit Compliance Limits for surface water. Instead, there are two assessment levels (AL1 and AL2). An evaluation of the 2020 datasets against these levels is presented in Table 8-1. This analysis reveals no persistent breaches.

Table 8-1 Comparison of surface water quality at SW13 with assessment levels

	Arsenic	Chloride
	microg/l	mg/l
Control level 1	35.00	100.00
Control level 2	40.00	150.00
30/06/2020	16.7	115
20/07/2020	21.6	<0.03
27/10/2020	2.9	85.7

Over the past four years, elevated alkalinity has been observed at SW4, particularly during the period May-November. As this monitoring position is upstream of the landfill, the changes are not related to processes occurring at the landfill.

Other surface water sample locations immediately downstream of the landfill (SW13 and SW14) do not show such variations and the chemistry observed during recent years is consistent.

Sample SW15 is taken from pooled water (because of the ground surface intersecting shallow groundwater) to the north of the landfill. This position is close to a slag hardstanding used for vehicle storage and maintenance. The water chemistry observed at this position has also remained relatively consistent, like that at SW13 and SW14, although the alkalinity concentration has been variable since 2015. The cause of these variations is unclear but could be related to variations in pool water level resulting in exposure and subsequent flushing of made ground dominated by slag.

8.3 Contingency Actions Taken

No contingency actions were required.

9 DUST

Tata has been routinely monitoring dust around the Morfa landfills for many years. A previous review of data lead Tata to question the environmental benefit of monitoring at the continued frequency. A full description of the work that has led to this position was set out in the 2017 annual report for MNHL (see Geotechnology report 1761r1v1d0218). Tata has previously requested that NRW considers the results and the cessation or reduction of monitoring, as set out in the Variation application in Appendix 1.

9.1 Assessment against Permit Control Levels

The relative locations of the dust monitoring points are as follows:

- D15 is located at the northern end of the site near the offices and close to the coal stockyards.
- D16 is in the middle of Margam Moors north of MNHL.
- D17 is located east of MNHL near the old landfill bordering the SSSI.
- D18 is located to the southeast of MNHL near the old landfill and rail sidings.
- D19 is located to the west of site near to the beach and road.

The results from the depositional dust monitoring undertaken in 2020 are summarised in Appendix 10. The results are broadly similar to those observed in previous years with elevated levels of particulates found to be highly soluble with low or no detectable iron and elevated carbon. This suggests that the particulates are not coal (given the solubility) but more likely marine or plant matter in origin.

9.2 Contingency Actions Taken

No specific contingency actions have been taken by Tata. The landfill operator routinely deploys a bowser to spray water on all landfill haul roads to minimise the generation of dust in accordance with the air quality management plan for the landfill. The data demonstrates that dust from the landfill cells is not an issue of significant concern.

10 ASBESTOS

10.1 Assessment against Permit Compliance Levels

Asbestos results are reported throughout the year from monitoring undertaken at approximately quarterly intervals from each corner of the landfill (not dust monitoring positions D15, D16 and D19). The monitoring is not always coordinated to coincide with asbestos deposition.

All the 2020 quarterly monitoring results were below the analytical level of detection (0.001 fibres/ml). Consequently, all monitoring results are below the 0.002 fibres/ml Permit Emission Limit over a four-hour monitoring period. The results provided by the landfill operator are included in Appendix 11.

10.2 Contingency Actions Taken

No contingency actions have been required as all asbestos measurements were below the emission limit.

11 SUMMARY AND RECOMMENDATIONS

11.1 Environmental Protection

The initial risk assessments completed as part of the Permit Application indicated the potential of the landfill to emit non-hazardous pollutants substances to groundwater and potentially, surface water. There was also the potential that the landfill could generate dust and asbestos during landfilling activity and associated vehicular movements and earthworks.

Groundwater and surface water within the vicinity are already known to be impacted by other activities not related to the current landfill. Based on the monitoring data gathered to date there is no significant evidence to suggest that the landfill is not behaving as initially predicted. This means that the identified receptors remain protected.

11.2 Regulatory Framework

Relative to the applicable Assessment Criteria, the following key observations are made:

- Leachate chemistry at L17 has become more dilute in the last decade. Leachate chemistry now appears to be dominated by the leaching of alkaline materials, probably mostly cover materials, within the landfill.
- No asbestos fibres have been detected during the quarterly monitoring programme to date.

11.3 Actions Required

Small areas of vegetation require clearance to facilitate safe access to several monitoring locations

References

List of Previous Annual Reports

528.1/0/0307. Annual Review of Landfill Monitoring Results for Morfa Non-Hazardous and Hazardous Landfills. March 2007.

621.1/0/0108. Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. January 2008.

765r1v1d0209. 2008 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2009.

908r1v1d0310. 2009 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. March 2010.

1046r1v1d0211. 2010 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2011.

1129r1v1d0412. 2011 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. April 2012.

1210r1v1d0313 2012 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. March 2013

1292r1v1d0314 2013 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. March 2014

1393r1v1d0215 2014 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2015

1503r1v1d0316 2015 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. March 2016

1618r1v1d0217 2016 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2017

1762r1v1d0218 2017 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2018

1866r1v1d0219 2018 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2019

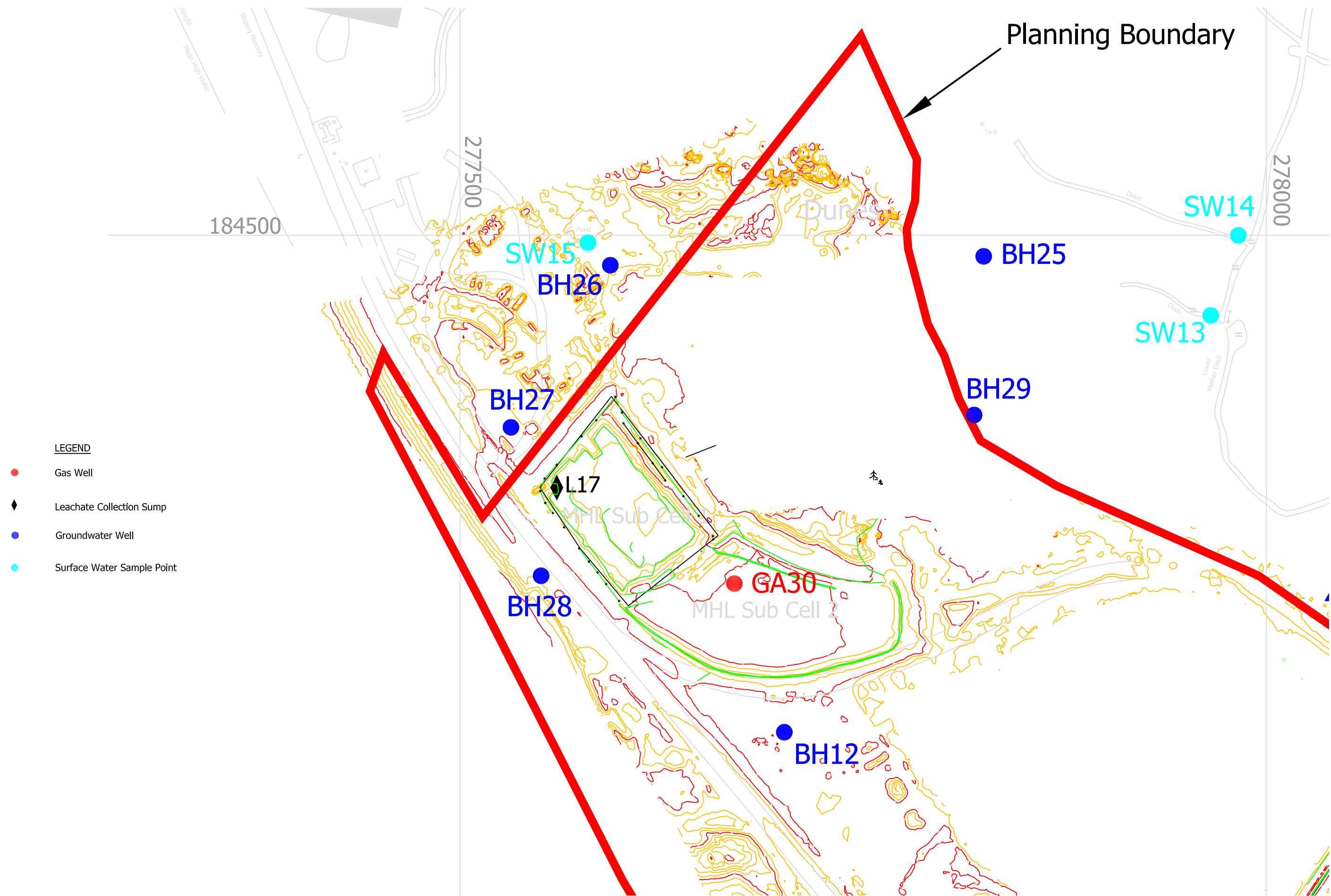
1966r1v1d0120 Annual Review of Landfill Monitoring Results for Morfa Hazardous Landfill. February 2020

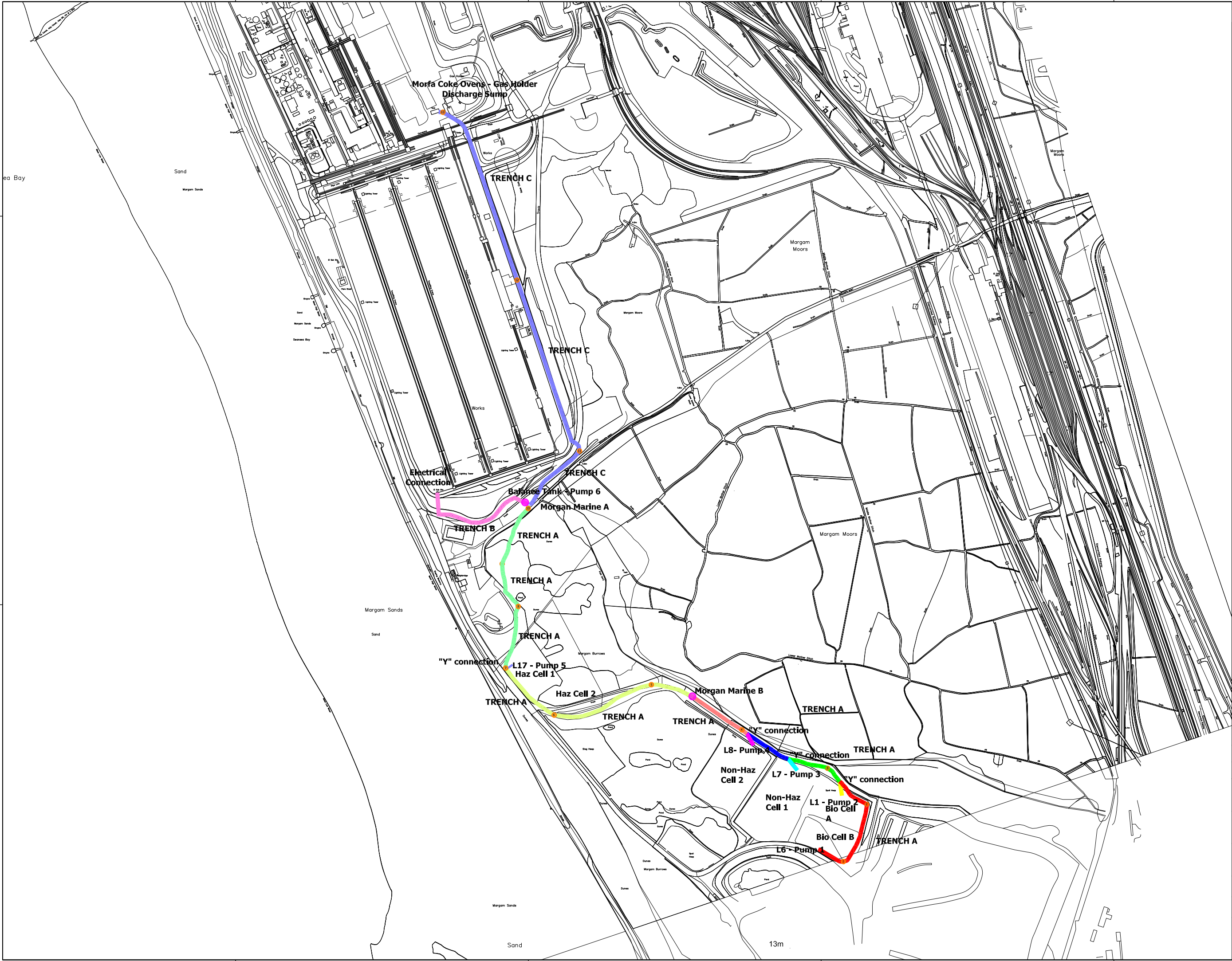
Figure 1 Site Location Plan



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 Available Monitoring Network





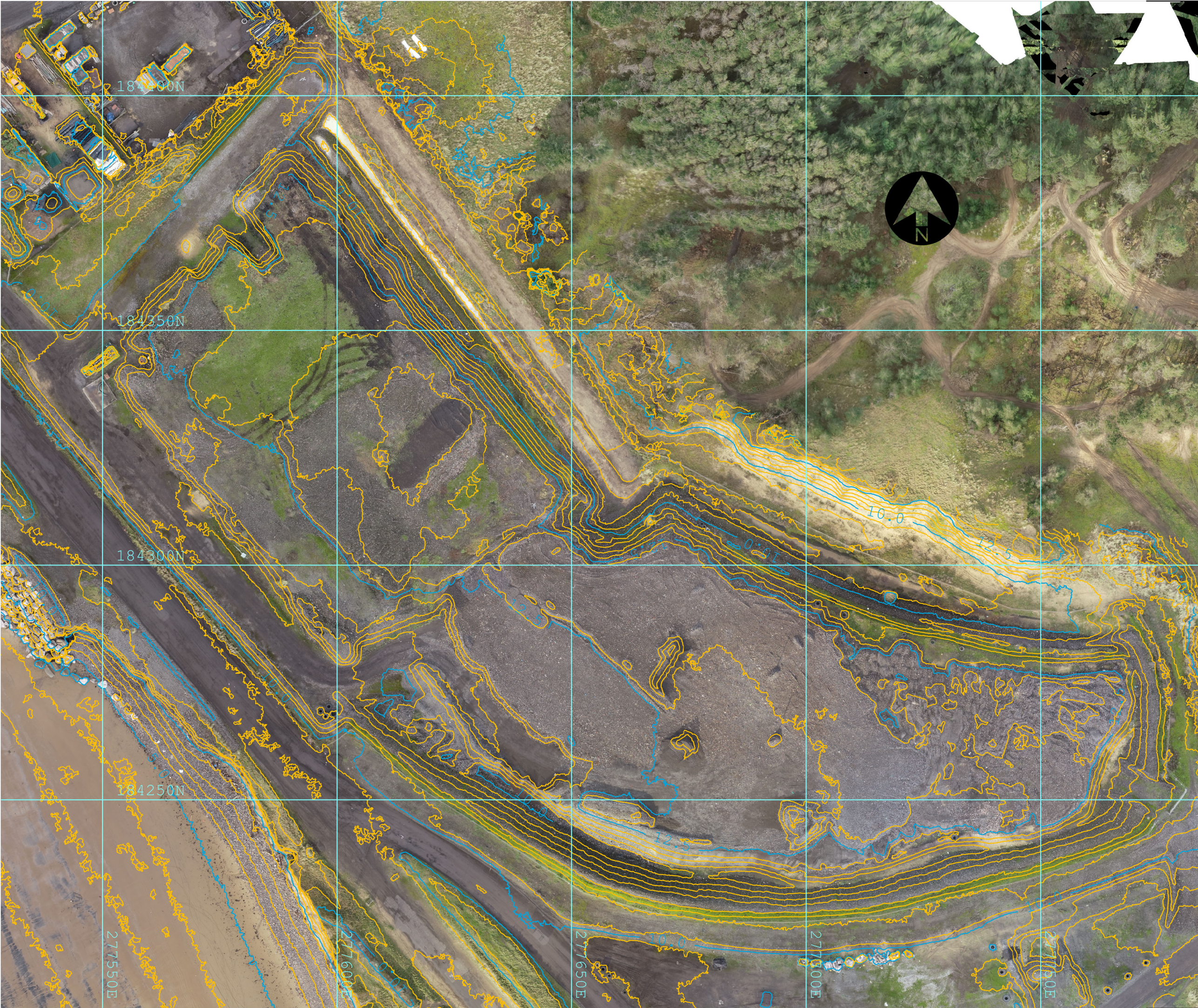
Drawing Number 2093/3

Legend

- Sump Number
- Survey Check Point (see Table 7-1)
- Location of Electrical Control Panel - Morgan Marine A or B
- Chainage A
- Chainage B
- Chainage C
- Chainage D
- Chainage E
- Chainage F
- Chainage G
- Chainage H
- Chainage I
- Chainage J
- Chainage K
- Chainage L

NOTE

Rev	Date	Status/Amendments
CLIENT		
TATA STEEL (UK) Ltd.		
PROJECT		
MORFA HAZARDOUS LANDFILL PORT TALBOT		
TITLE		
LEACHATE PIPE ROUTE		
DRAWING NUMBER		REVISION
2093/3		0
SCALE AT A1	DATE	DRAWN
1:4000	01.20	AJ/KT
		CHECKED



Drawing Number 2093/4

Legend

Prominent Contour (2.5m)

Normal Contour (0.5m)

Notes

Digital survey model generated using Pix4D image processing software.

Imagery acquired by DJI Phantom 4 pro RTK photogrammetry survey on 08 January 2021.

Survey control installed using Topcon Hiper SR dGPS Network Rover.

OS Grid spacing at 50m

Rev	Date	Status/Ammendments

CLIENT

Tata Steel UK Limited

PROJECT

Morfa Hazardous Landfill

TITLE

2020 Annual Review of Monitoring Results

DRAWING NUMBER		REVISION	
2093/4		0	
DATE	DRAWN	CHECKED	SCALE AT A3
01.21	KJT		1:750

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

**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 1
Correspondence with
NRW**

Report Number 2093r1v1d0221

Yeliz Marshall
Lead Environmental Engineer
Safety, Health and Environment
Tata Steel UK Limited
Port Talbot Works
Port Talbot
SA13 2NG

Ein Cyf/Our ref: BW2692IM
Eich Cyf/Your ref:

Date: 6th April 2020

Dear Yeliz

Morfa Hazardous Landfill - Hydrogeological Risk Assessment Review – 2017 and 2017 Annual Monitoring Report¹

As you are aware it recently came to light that the 2017 review of the site's hydrogeological risk assessment (HRA), which was submitted by Tata in 2018, has not been assessed by NRW. The HRA review also referred to the 2017 annual monitoring report, which proposed a revision to some of the control levels and compliance limits.

I have since asked our Geoscience team to review these submissions and in general NRW is satisfied with the HRA, but we need to clarify a few points before we can formally accept the submissions. Firstly, there are some general points which are similar for both the hydrogeological risk assessment and annual report; these have been put together for ease of reference. These are either points to note, corrections or questions to answer. Secondly there are comments on the proposed changes to permitted compliance points, control levels, compliance limits and monitoring frequencies. These are also discussed.

General comments

1. Groundwater Regulations 1998 (and 2009) – these no longer exist as they are now part of Environmental Permitting Regulations 2018 under Schedule 22.
2. Reference to CCW (post Apr 2013) was made in the HRA this should be changed to NRW in future submissions.

¹ Morfa Hazardous Landfill Environmental Permit BW2692IM – Review of Hydrogeological Risk Assessment. Geotechnology Limited, Report Number 1740r1v1d1217, December 2017.

Morfa Hazardous Landfill Permit BW2692IM – 2017 Annual Review of Environmental Monitoring Results. Geotechnology Limited, Report Number 1762r1v1d0218, February 2018.

3. For future reference any proposed changes to groundwater and leachate chemistry control levels, compliance limits and points and monitoring frequency should be included within the HRA and not in the annual reports.
4. Hazardous substances have been screened out of the hazardous landfill assessment. Although we note that hazardous substances are either not found or at very low levels in groundwater (i.e. at discernible levels), the waste stream has not changed (albeit now a reduced volume) and leachate more diluted (due to more infiltration), we disagree with screening out hazardous substances and recommend that hazardous substance are considered in greater detail.
5. Trend analysis was suggested for consideration during 2018 with the development of a tool to help undertake this work. Has a trend analysis tool been development and is it in use at the site? If so, what success has there been since 2018?
6. We note that the site has been used for landfill of steel works waste prior to any permits or licences for the site. Can you expand on the comments about slag material around the site – is it in pockets of defined areas or is it generally found around the site. We note it is used for temporary capping.

Proposed changes to permit*

7. Table 12.1 remove COD, TOC and P, but add K, Mo, Se, V, B, Na, Cd and F to quarterly monitoring – we have no objection to this change.
8. Please expand in the proposed use of alternating Quarter 2 and Quarter 4 for annual sampling. Potentially this could lead to no monitoring for up to 18 months – we would prefer annual monitoring to be complete in the same quarter each consecutive year.
9. Table 11.2 leachate control levels – why are the control levels for ammoniacal nitrogen and chloride a lot higher than the maximum concentration observed? And the opposite for arsenic which has a control level much lower than the maximum concentration observed?
10. Table 11.6 proposed control and compliance levels (for groundwater) – there are control levels only for mercury, cadmium, ammonia and pH and compliance limits for chloride and arsenic, but previously these included copper – why is copper not included in the control levels and compliance limits table?
11. Table 11.7 proposed surface water assessments levels – the report main text states that there is already assessment points for SW2 and SW4 being used, but the table details SW13 as the assessment point. Does this mean that SW2 and SW4 will

continue to be the assessment point and you are added SW13 or are going to only use SW13 instead of SW2 and SW4? This is not clear, please confirm.

***Once the questions above have been addressed to our satisfaction, Tata will need to apply to vary their permit to ensure that the permit reflect these proposed changes.**

If you wish to discuss the letter, please feel free to contact me by email.

Yours sincerely

Neil Herbert

Arbenigwr Arweiniol - Rheoleiddio Diwidiant a Gwastraff
Lead Specialist – Industry & Waste Regulation

Tîm Rheoleiddio Diwydiant a Gwastraff - De-Orllewin Cymru /
South West Wales Industry & Waste Regulation Team

Cyfoeth Naturiol Cymru / Natural Resources Wales
E-bost/E-mail: neil.herbert@cyfoethnaturiolcymru.gov.uk

Note: Novel Coronavirus (COVID -19)

The escalation in the threat posed by the novel coronavirus (COVID – 19) pandemic, has resulted in the imposition of several stringent measures across the United Kingdom.

These measures to control and reduce the spread and impact of the disease are having an impact on both NRW's and the operator's normal operating practices. At the time of writing all routine regulatory visits and meetings have been suspended by the regulator. The situation is dynamic and extremely fluid however these restrictions are expected to remain in place for several weeks if not longer. During this pandemic there will be a continued expectation that operators continue to meet the conditions of their permits. Where the operator has identified an issue that is likely to result in permit non-compliance or increased environmental risk, the operator is expected to speak to the regulator at the earliest opportunity.

From: Marshall, Yeliz

Sent: Tuesday, April 14, 2020 1:06 PM

To: Herbert, Neil <Neil.Herbert@cyfoethnaturiolcymru.gov.uk>

Cc: Grainger, Claire <claire.grainger@tatasteeleurope.com>

Subject: FW: Morfa Hazardous Landfill - Hydrogeological Risk Assessment Review – 2017 and 2017 Annual Monitoring Report

Hi Neil,

Please see below our response to the comments on the attached.

General comments

1– 3. Understood. Many thanks.

4. Understood.

5. Trend analysis is reviewed during the annual reports but has not yet progressed as hoped due to continued changes in background water chemistry. This is presumably related to the success of the capping of MCL resulting in changes to water quality.

6. The site has been used for landfill of steel works waste prior to any permits or licences at the site. The comment relating to slag material around the site refers to this material. As far as we are aware, this material is largely constrained to the central and southern areas of the undeveloped areas – close to the northern edge of MCL and southern / south western edge of MNHL.

Proposed changes to permit

7. Understood.

8. Understood. Suggested alternating sampling frequency to be removed.

9. This is a typographical error. Apologies. The arsenic concentrations presented in Table 11.5 are microg/l rather than mg/l. All concentrations in Table 11.6 are mg/l. The higher control levels are reflective of the leachate inventory in the Landsim model i.e. the leachate chemistry is far below the leachate chemistry PDF

10. This is not clear in the report. Apologies. It would appear that copper is excluded as the analysis in Table 11.1 indicates that the concentration in leachate is lower than the EAL. Copper was also not included in the leachate inventory used in the HRA.

11. This meant that SW2 and SW4 are downgradient of MNHL and SW13 is downgradient of MHL. In this context, it is meant that SW13 could be used in reference to MHL (rather than SW2 and SW4) and SW2 and SW4 would be used in reference to MNHL.

Met vriendelijke groet / Kind regards,

Yeliz Marshall

Lead Environmental Engineer
Safety, Health and Environment

Tata Steel

T: +44 (0)1639606571

E: yeliz.marshall@tatasteeleurope.com
www.tatasteeleurope.com

Follow us:



Compliance Assessment Report

Report ID: CAR_NRW0036307

This form will report compliance with your permit as determined by an NRW officer

Site	Morfa Hazardous Landfill	Permit Ref	BW2692IM
Operator/Permit holder	Tata Steel UK Limited		
Regime	Installations		
Date	7 th February 2020 (followed by revisions on receipt of 2019 annual report)		
Assessment type	Report/ Data Review		
Parts of the permit assessed	2019 Q1 to Q4 quarterly monitoring reports, comment on 2019 annual report (and 2017 HRA review)		
Lead officer's name	Neil Herbert	Accompanied by	N/A
Recipient's name/position	Yeliz Marshall - Lead Environmental Engineer TATA Safety, Health and Environment	Date issued	26 th March 2020

Section 1 – Compliance Assessment Summary

This is based on the requirements of the permit under the Environmental Permitting Regulations. A detailed explanation is captured in "Compliance Assessment Report Detail" (Section 2) and any actions you may need to take are given in the "Action(s)" (Section 4). This summary details where we believe any non-compliance with the permit has occurred, the relevant condition and how the non-compliance has been categorised using our Compliance Classification Scheme (CCS). CCS Scores can be consolidated or suspended where appropriate, to reflect the impact of some non-compliances more accurately. For more details of our CCS scheme, contact your local office.

Permit conditions and compliance summary	CCS Category	Condition(s) breached
A1 - Specified by permit	A	
B1 - Infrastructure - Engineering for prevention and control of emissions	N	
B2 - Infrastructure - Closure and decommissioning	N	
B3 - Infrastructure - Site drainage engineering (clean and foul)	N	
B4 - Infrastructure - Containment of stored materials	N	
B4 - Infrastructure – Plant and equipment	N	
C1 - General Management - Staff competency/training	N	
C2 - General Management - Management system and operating procedures	N	
C3 - General Management - Materials acceptance	N	
C4 - General Management - Storage, handling labelling, labelling and Segregation	N	
D1 - Incident Management - Site security	N	
D2 - Incident Management - accidents, emergency and incident planning	N	
E1 - Emissions - Air	N	
E2 - Emissions - Land and groundwater	3 (x3)	3.2.3 x 3
E3 - Emissions - Surface water	N	
E4 - Emissions - Sewer	N	
E5 - Emissions - Waste	N	
F1 - Amenity - Odour	N	
F2 - Amenity - Noise	N	
F3 - Amenity - Dust/ fibres/ particulates/ litter	N	
F4 - Amenity - Pests/birds/scavengers	N	
F5 - Amenity - Deposits on road	N	
G1 - Monitoring and Records, Maintenance and Reporting - Monitoring of emissions and environment	3	3.6.1(b)
G2 - Monitoring and Records, Maintenance and Reporting - Records of activity, site diary/journal/events	N	
G3 - Monitoring and Records, Maintenance and Reporting - Maintenance records	N	
G4 - Monitoring and Records, Maintenance and Reporting - Reporting and notification to Natural Resources Wales	N	
H1 - Resource Efficiency - Efficient use of raw materials	N	
H2 - Resource Efficiency - Energy efficiency	N	

KEY: See Section 4 for breach categories, suspended scores will be indicated as such.
A = Assessed or assessed in part (no evidence of non-compliance), **N** = Not Assessed

Number of breaches recorded	4	Total compliance score (see section 5 for scoring scheme)	16
-----------------------------	---	--	----

If the number of breaches recorded is greater than zero, please see Section 3 for our proposed enforcement response

Introduction

NRW have undertaken a partial¹ review of quarterly monitoring reports submitted over the 2019 period. It should be noted that in undertaking this assessment it has become apparent that there is some confusion over the monitoring requirements relating to this permit (including the monitoring for the adjacent Morfa landfills (Closed and Non-Hazardous)). This has been communicated already to the operator and a meeting has been scheduled for the end of March. The main issue appears to be discrepancies in the monitoring requirements and more importantly emission limits specified in the landfill permits versus the current monitoring programme adopted by the operator. It appears that this situation has arisen for a number of reasons, including the adoption of some monitoring changes without the requisite permit variation (to reflect the changes) being undertaken. In other cases, it is unclear why changes have been adopted where there is no acceptance or approval. It has therefore been particularly difficult to undertake a compliance assessment of the 2019 monitoring submissions. Our review was initially limited to groundwater results for those locations with a specified emission limit (as identified in table SS4.2 of the permit)). It is believed that the Environment Agency did agree to changes to the groundwater emission limits, monitoring locations and parameters in response to the 2012 Hydrogeological Risk Assessment review. However, this was never formalised. Therefore, in order to consider the 2019 GW results we have reviewed them against the limits proposed in the 2012 HRA review (table 8-8).

We have also undertaken a review of leachate level compliance as part of this work. Any compliance scores relating to this assessment will not be suspended as this compliance measure is unaffected by the matters discussed above.

Please find attached comments and observations on aspects of the following submitted reports:

Quarterly Monitoring Reports - Q1 (Jan – March 2019); Q2 (Apr-Jun 2019); Q3 (Jul – Sep 2019) & Q4 (Oct – Dec 2019)

Q1 – Groundwater.

Assessment of emission points with set emission limits.

- BH3S - All required parameters were sampled and were below their respective emission limits
- BH25S - All required parameters were sampled and were below their respective emission limits
- BH26S - All required parameters were sampled and were below their respective emission limits
- BH27S - All required parameters were sampled and were below their respective emission limits
- BH28S - All required parameters were sampled and were below their respective emission limits
- BH29S - All required parameters were sampled and were below their respective emission limits

Q2 - Groundwater

Assessment of emission points with set emission limits.

- BH3S - All required parameters were sampled and were below their respective emission limits
- BH25S - All required parameters were sampled and were below their respective emission limits
- BH26S - All required parameters were sampled and were below their respective emission limits
- BH27S - All required parameters were sampled and were below their respective emission limits
- BH28S - All required parameters were sampled but the results for chloride and Ammonia were above their respective limits (450 mg/l & 2 mg/l)
- BH29S - All required parameters were sampled and were below their respective emission limits

Compliance – Q2 Emission Limits: The breach of the chloride and ammonia emission limit at BH28S is contrary to condition 3.2.3 of the permit. However, in accordance with CCS scoring guidance we have consolidated these breaches into one compliance breach covering the Quarter 2 monitoring period. Condition 3.2.3 (e2) – Quarter 2 – CCS 3

Q3 – Groundwater

Assessment of emission points with set emission limits.

- BH3S - All required parameters were sampled and were below their respective emission limits
- BH25S – No results were submitted for this quarter.
- BH26S - All required parameters were sampled and were below their respective emission limits
- BH27S - All required parameters were sampled and were below their respective emission limits
- BH28S - All required parameters were sampled and were below their respective emission limits
- BH29S - All required parameters were sampled but the result for alkalinity was above the limit (450 mg/l).

¹ Primarily groundwater requirements set out in Table S3.3 and leachate levels.

Compliance – Q3 Emission Limits: The breach of the alkalinity emission limit at BH29S is contrary to condition 3.2.3 of the permit. A compliance score of 3 has been attributed to this breach covering the Quarter 3 monitoring period. Condition 3.2.3 (e2) – Quarter 3 – CCS 3

Compliance – Q3 Monitoring: The failure to monitor all the parameters required by the permit is a breach of condition 3.6.1b of the permit. A CCS score of 3 have been attributed to this breach (g1 compliance heading) - Quarter 3 monitoring period. Condition 3.6.1b (g1) – Quarter 3 – CCS 3

Q4 - Groundwater

Assessment of emission points with set emission limits.

- BH3S - All required parameters were sampled and were below their respective emission limits
- BH25S - All required parameters were sampled and were below their respective emission limits
- BH26S - All required parameters were sampled and were below their respective emission limits
- BH27S - All required parameters were sampled but the result for chloride was above the limit (250 mg/l).
- BH28S - All required parameters were sampled and were below their respective emission limits
- BH29S -. All required parameters were sampled but the result for chloride was above the limit (300 mg/l).

Compliance – Q4 Emission Limits: The breach of the chloride emission limits at BH27S and BH29S is contrary to condition 3.2.3 of the permit. However, in accordance with of CCS scoring guidance we have consolidated these breaches into one compliance breach covering the Quarter 4 monitoring period. Condition 3.2.3 (e2) – Quarter 4 – CCS 3

Leachate Levels Q1

Assessment against requirements of Table S4.1 of the permit.

- Leachate Level monitoring was undertaken in January to March to the frequencies required by the permit.
- Leachate Levels were compliant over the duration.
- No leachate level data was available for cell 2 for this quarter.

Leachate Levels Q2

Assessment against requirements of Table S4.1 of the permit.

- Leachate Level monitoring was undertaken in April to March to the frequencies required by the permit.
- Leachate Levels were compliant over the duration.
- No leachate level data was available for cell 2 for this quarter.

Leachate Levels Q3

Assessment against requirements of Table S4.1 of the permit.

- Leachate Level monitoring was undertaken in July to Sep to the frequencies required by the permit.
- Leachate Levels were compliant over the duration.
- No leachate level data was available for cell 2 for this quarter.

Leachate Levels Q4

Assessment against requirements of Table S4.1 of the permit.

- Leachate Level monitoring was undertaken in Oct to Dec to the frequencies required by the permit.
- Leachate Levels were compliant over the duration.
- No leachate level data was available for cell 2 for this quarter.

Reporting

It appears that there are some deficiencies in the quarterly returns which need to be addressed.

These include:

- inconsistent or differing monitoring point identifications – please where possible use the identification used in the permit and please ensure they are applied consistently over each quarter;
- the sampling date is not included on the reports, the full date need to be included;
- data is missing for some locations;
- where there has been an emission limit failure the operator should undertake a repeat test immediately (if the sample is still available) and schedule a re-sampling exercise (you should not be waiting for the next monitoring period);
- the operator is repeatedly failing to submit schedule 5 notifications for emission limit exceedances (although we have been receiving S5 leachate level notifications since January 2020).

Conclusion

As noted previously, it is increasingly apparent that the current monitoring framework set out in Schedule 4 of this permit (and the equivalent schedules in the sister landfills) need to be reviewed and updated. The operator has been asked to submit a permit application to vary all three permits to update or revise the permit's monitoring schedule. NRW and TATA have scheduled a meeting at the end of March to start discussions on the scope of this work.

2019 Annual Monitoring Report

Whilst this CAR report was being compiled, the operator submitted the 2019 monitoring interpretation report (received February 2020²). We have undertaken a cursory review of this submission.

The report provides a detailed and thorough assessment and trending of the 2019 data collected for the hazardous landfill. The report make the following recommendation:

- *Small areas of vegetation require clearance to facilitate safe access to several monitoring locations*

NRW comment: The permit requires that all monitoring infrastructure is maintained and if damaged repaired or replaced promptly. Safe access to all monitoring points must always be maintained. These need to be actioned immediately.

The 2019 Annual report also refers to a previous annual report (2017), which included proposed changes to some of the permit's emission monitoring frequencies, parameters and in some cases emission limits.

These have not been accepted by NRW and any changes will need to be addressed and agreed as part of the forthcoming permit variation exercise.

2017 Hydrogeological Risk Assessment (HRA) review

It has come to light that the 2017 HRA review for the hazardous landfill has not been assessed by NRW. I have therefore asked NRW's geoscience team to start an assessment shortly and will provide feedback as soon as possible to the operator.

Permit variation – consolidation

As noted above, the deficiencies in this and the other landfill permits³ can only be satisfactorily addressed through a revision and update of all three landfill permits. As part of these variation applications the operator is invited to now consider whether this would be an opportune moment to consolidate the permits.

End of section 2

Note: Novel Coronavirus (COVID -19)

During the compiling of this report an escalation in the threat posed by the novel coronavirus (COVID – 19) pandemic, has resulted in the imposition of several stringent measures across the United Kingdom. These measures to control and reduce the spread and impact of the disease are having an impact on both NRW's and the operator's normal operating practices. At the time of writing all routine regulatory visits have been suspended by the regulator. The situation is dynamic and extremely fluid however these restrictions are expected to remain in place for several weeks if not longer. During this pandemic there will be a continued expectation that operators continue to meet the conditions of their permits. Where the operator has identified an issue that is likely to result in permit non-compliance or increased environmental risk, the operator is expected to speak to the regulator at the earliest opportunity.

² Extension previously agreed with the operator

³ Morfa Closed Landfill (AP3292LT) – Morfa Non-Hazardous Landfill (BV7311IE) - Morfa Hazardous Landfill (BW2692IM)

Compliance Assessment Report

Report ID: CAR_NRW0036307

This form will report compliance with your permit as determined by an NRW officer

Site	Morfa Hazardous Landfill	Permit Ref	BW2692IM
Operator/Permit holder	Tata Steel UK Limited	Date	7 th February 2020

Section 3 – Enforcement Response

Only one box should be ticked

You must take immediate action to rectify any non-compliance and prevent repetition.

Non-compliance with your permit conditions constitutes an offence and can result in criminal prosecutions and/or suspension or revocation of a permit. Please read the detailed assessment in Section 2 and the steps you need to take in Section 4 below.

Other than the provision of advice and guidance, at present we do not intend to take further enforcement action in respect of the non-compliance identified above. This does not preclude us from taking enforcement action if further relevant information comes to light or advice isn't followed.

In respect of the above non-compliance you have been issued with a warning. At present we do not intend to take further enforcement action. This does not preclude us from taking additional enforcement action if further relevant information comes to light or offences continue.

x

We will now consider what enforcement action is appropriate and notify you, referencing this form.

Section 4 – Action(s)

This section summarises the actions identified during the assessment along with the timescales for when they will need to be completed.

Criteria Ref.	CCS Category	Action required/ advised	Due Date
See Section 1 above			
e2 & g1	3	Action ref 1.0036307 Consolidate and update permit monitoring tables and submit application to vary permit.	No deadline specified at present. Timetables to be discussed at TATA/NRW skype meeting - March.
		Action ref 2.0036307 TATA to ensure that all future monitoring submissions: - use correct and consistent monitoring identification - specify the sampling date - submit data for all monitoring points Action ref 3.0036307 TATA to ensure that: - where there has been an emission limit failure the operator should undertake a repeat test immediately (if the sample is still available) and schedule a re-sampling exercise; - schedule 5 notifications are submitted in accordance with the permit.	Immediate (i.e. Quarter 2 (Apr 2020) onwards)
		Action ref 4.0036307 Tata to provide missing Q3 data for BH6s	Within 14 days of the issue of this report
		Action ref 5.0036307 Vegetation near several sampling points requires routine clearance to enable continual safe access.	Prior to next scheduled sampling exercise and ongoing thereafter.

If you are unable to meet these deadlines, please contact your inspector immediately to discuss the possibility of extensions.

Section 5 – Compliance notes for the Operator

To ensure you correct actual or potential non-compliance we may

- Advise on corrective actions verbally or in writing
- Require you to take specific actions verbally or in writing
- Issue a notice
- Require you to review your procedures or management system
- Change some of the conditions of your permit
- Decide to undertake a full review of your permit

Any breach of a permit condition is an offence and we may take legal action against you

- We will normally provide advice and guidance to assist you to come back into compliance either after an offence is committed or where we consider that an offence is likely to be committed. This is without prejudice to any other enforcement response that we consider may be required.
- Enforcement action can include the issue of a formal caution, prosecution, the service of a notice and/or suspension or revocation of the permit.

See our Enforcement and Civil Sanctions guidance for further information

Non-compliance scores and categories

CCS category	Description	Score
C1	A non-compliance that could have a major environmental effect	60
C2	A non-compliance which could have a significant environmental effect	31
C3	A non-compliance which could have a minor environmental effect	4
C4	A non-compliance which has no potential environmental effect	0.1

Operational Risk Appraisal (Opra) - Compliance assessment findings may affect your Opra score and/or your charges. This score influences the resource we use to assess permit compliance.

Section 6 – General information

Data protection notice

The information on this form will be processed by the Natural Resources Wales (NRW) to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s). The NRW may also use and/or disclose it in connection with:

- Offering/providing you with its literature/services relating to environmental matters
- Consulting with the public, public bodies and other organisations (e.g. Health and Safety Executive, local authorities) on environmental issues
- Carrying out statistical analysis, research and development on environmental issues
- Providing public register information to enquirers
- Investigating possible breaches of environmental law
- Assessing customer service satisfaction and improving its service
- Freedom of Information Act/Environmental Regulations request

The NRW may pass it on to its agents/representatives to do these things on its behalf. You should ensure that any persons named on this form are informed of the contents of this data protection notice.

Disclosure of information

The NRW will provide a copy of this report to the public register(s). However, if you consider that any information contained in this reports should not be released to the public register(s) on the grounds of commercial confidentiality, you must write to your local area office within twenty working days of receipt of this form indicating which information it concerns and why it should not be released, giving your reasons in full.

Customer charter

What can I do if I disagree with this compliance assessment report?

If you are unable to resolve the issue with your site officer, you should firstly discuss the matter with officer's line managers using the informal appeals procedure. If you wish to raise your dispute further through our official Complaints and Commendations procedure, phone our general enquiry number 0300 065 3000 (Mon to Fri 08.00 – 18.00) and ask for the Customer Contact team or send an email to enquiries@naturalresourceswales.gov.uk. If you are still dissatisfied you can make a complaint to the Public Services Ombudsman for Wales. For advice on how to complain to the Ombudsman phone their helpline on 0845 607 0987.

Welsh Language

If you would like this form in Welsh please contact your Regulatory Officer.

National Permitting Team
Natural Resources Wales

Date: 20 January 2021
Subject: Variation of Morfa Hazardous Permit (EPR/BW2692IM)

Tata Steel wishes to vary its Hazardous landfill permit with the primary goal of creating a consolidated permit that has up to date information on monitoring frequencies, locations, analytical suites and to update some of the language in the permit to ensure on-going compliance. Over the years of operation that have been several small changes made in discussion with the regulator in order to make sampling more practical or to eliminate unnecessary monitoring due to trends or experience from operating the landfill. We also wish to add three new EWC codes to the permit to allow for the landfilling of refractories.

Tata steel have discussed these changes with the local area officer, Neil Herbert, and have worked in conjunction to produce Schedules that accurately represent what monitoring should be conducted across all monitoring points. Some of the emission limits have been altered but these were first suggested to NRW in 2017 as part of the HRA and annual monitoring report. There are groundwater limits for both Chloride and Arsenic but some of the old limits have been removed as they are not representative of there being an issue with the landfill.

Tata Steel has requirements to monitor the surface emissions of methane in Table S4.3. We wish to ask that the wording of this requirement be examined. As mentioned previously, the site is currently not capped but will begin to be in the near future and therefore this monitoring is not currently undertaken. However, as written it is not possible to comply with this requirement using conventional technique or incurring significant cost. The standard technique for a survey of this kind is a gazmat survey, which allow for specific detection of methane emitted from the surface of the landfill. The output of this time of survey gives a number of reading across the site in ppm of methane. It does not however give a flux value e.g. ppm per m2 per second as required by the permit. The only way to do this is via flux box monitoring, which is antiquated form of monitoring and when conducted as per the guidance is a very expensive operation give the number of samples and time required to do each test. Tata steel wish to conduct a Gazmat/FID walkover as suggested in the text but wish to find a method where the results would be valid in the permit. Either by removal of flux values or a methodology that allows the calculation of flux from a FID walkover, which is the industry standard.

Tata Steel UK Ltd SHE Department

Port Talbot Steel Works, Port Talbot, SA13 2NG

T: +44 (0) 114 204 3007 (direct) robert.naylor@tatasteeleurope.com

Tata Steel UK Limited • 30 Millbank • London SW1 4WY • Registered in England No. 2280000

Table S3.6 has been removed in discussion with the local officer, which details additional monitoring requirements in the internal landfill cells. The final table has also removed which detailed the dust deposition monitoring. This was because the dust deposition could not be linked directly to the landfill. The site is located in a very sandy area and there a multi sources of dust. It has been decided that this monitoring does not provide any useful information and has been discontinued.

The quarterly monitoring suite has been updated primarily to move some parameters from the annual suite into the quarterly suite to concentrate on the most important chemical parameters. This affects groundwater, leachate and surface water monitoring suites. Some monitoring wells were on the original permit plan but were never installed and therefore the monitoring points have been updated to reflect the existing monitoring network.

Finally, Tata Steel would like to add the following EWC codes to the permit:

16 11 01* carbon-based linings and refractories from metallurgical processes containing hazardous substances

16 11 03* other linings and refractories from metallurgical processes containing hazardous substances

16 11 05* linings and refractories from non-metallurgical processes containing hazardous substances

The primary use of these codes would be the landfilling of silica based refractories from the relining of both metallurgical furnaces and other non-metallurgical sources, such as boilers. Once fired these refractories comprise crystalline silica, which is a potential carcinogen when inhaled. Due to the nature of the refractories, once they are removed from the furnaces there will be a percentage of the total mass in dust form that could exhibit this hazard. The hazardous landfill primarily accepts asbestos containing materials, which have similar hazardous properties if inhaled. The operator of the landfill has procedures for the landfilling of these types of material including the immediate covering of the material to prevent dust lift-off. A method statement for the safe landfilling of this material has been included at the end of this submission entitled DISPOSAL OF HAZARDOUS REFRACTORY WASTE PRODUCTS AT PORT TALBOT WORKS.

Table S4.1 Leachate level limits and monitoring requirements

Monitoring point reference/ Description	Limit	Monitoring frequency	Monitoring method
L17 and GA30 as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020" and all subsequent new monitoring points installed within cells	1m above base of leachate monitoring point	Weekly (reducing to monthly when landfill is fully capped)	- Accurate to ± 0.01m relative to Ordnance Datum. - Unless otherwise agreed in writing with Natural Resources Wales, monitoring methods used shall be in accordance with Environment Agency document 'Guidance on monitoring of landfill leachate, groundwater and surface water (LFTGN02).

Table S4.2: Trigger levels for emissions into groundwater

Monitoring point reference (as shown on MHL Monitoring Network)	Parameter	Limit (including unit)	Reference Period	Monitoring frequency
BH12S, BH25S, BH26S, BH28S, BH29S (Shallow Aquifer) as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020"	Chloride	250 (mg/l)	Spot Sample	Quarterly
	Arsenic	50 (ug/l)		

Table S4.3 Landfill gas from capped surfaces – limits and monitoring requirements

Monitoring point Ref. /description	Parameter	Limit (including unit)	Monitoring frequency	Monitoring Standard or method
Permanently capped zone	Average methane flux and total methane emission	Average zone emission rate of 0.001 mg/m ² /second	Annually	Flame ionisation detector walkover, flux box or as otherwise agreed in writing with Natural Resources Wales. Alternatively as per LFTGN 07 Version 2, March 2011
Temporarily capped zone	Average methane flux and total methane emission	Average zone emission rate of 0.1 mg/m ² /second	Annually ¹	Flame ionisation detector walkover, flux box or as otherwise agreed in writing with Natural Resources Wales.. Alternatively as per LFTGN 07 Version 2, March 2011

Note: If a cap has previously been shown compliant and there have been no significant physical changes in the gas management during the year, a detailed walkover survey with an FID can be used to demonstrate that the surface emissions are under control. If this survey shows no change in the pattern of methane emission, it may be used as the annual survey. The values for flux and total methane emissions measured in the previous year may be reported and a fresh flux box survey is not necessary. If the zone remains stable, the results of a full walkover survey may be accepted as the site report for a period of four years before a further quantitative flux box survey is required.

Table S4.4 Landfill gas – other monitoring requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method
L17 and GA30 as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020" and all subsequent new monitoring points installed within cells	Methane	Quarterly during post closure phase	Unless otherwise agreed in writing with the Natural Resources Wales monitoring methods used shall be in accordance with Agency guidance document 'Guidance on the management of landfill gas' (LFTGN03)
	Carbon Dioxide		
	Oxygen		
	Hydrogen Sulphide		
	Atmospheric pressure		
	Differential pressure		
	Meteorological Data		
	Gas Flow		
	Gas Volume		

Table S4.5 Leachate– other monitoring requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method
L17 as shown on Drawing “2111r1v1d1220 MHL Monitoring Network December 2020”	Temperature	Quarterly	Unless otherwise agreed in writing with Natural Resources Wales. Monitoring methods used shall be in accordance with Environment Agency document ‘Guidance on monitoring of landfill leachate, groundwater and surface water’ (LFTGN02)
	pH		
	Electrical Conductivity		
	Ammoniacal Nitrogen		
	Arsenic		
	Boron		
	Copper		
	Phosphorous		
	Vanadium		
	Calcium		
	Nitrate		
	Nitrite		
	Sodium		
	Fluoride		
	Potassium		
	Phosphate		
	Total Alkalinity		
	Chloride		
	Cadmium		
	Molybdenum		
	Selenium		
	Iron	Annual	
	Lead		
	Magnesium		
	Mercury		
	Organohalogens (Volatile Organic Compounds)		
	Semi-volatile Organic Compounds		
	Sulphate		
	Total Chromium		
	Zinc		

Table S4.6 Surface water – other monitoring requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method
SW13, SW14 and SW15 as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020"	Temperature	Quarterly	Unless otherwise agreed in writing with Natural Resources Wales. Monitoring methods used shall be in accordance with Environment Agency document 'Guidance on monitoring of landfill leachate, groundwater and surface water' (LFTGN02)
	pH		
	Electrical Conductivity		
	Ammoniacal Nitrogen		
	Arsenic		
	Boron		
	Copper		
	Phosphorous		
	Vanadium		
	Calcium		
	Nitrate		
	Nitrite		
	Sodium		
	Fluoride		
	Potassium		
	Phosphate		
	Total Alkalinity		
	Chloride		
	Cadmium		
	Molybdenum		
	Selenium		
	Iron	Annual	
	Lead		
	Magnesium		
	Mercury		
	Organohalogens (Volatile Organic Compounds)		
	Semi-volatile Organic Compounds		
	Sulphate		
	Total Chromium		
	Water Level.		Monthly

Table S4.7 Groundwater – other monitoring requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method		
BH12S, BH25S, BH26S, BH27S, BH28S, BH29S (Shallow Aquifer) as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020"	Temperature	Quarterly	Unless otherwise agreed in writing with Natural Resources Wales. Monitoring methods used shall be in accordance with Environment Agency document 'Guidance on monitoring of landfill leachate, groundwater and surface water' (LFTGN02)		
	pH				
	Electrical Conductivity				
	Ammoniacal Nitrogen				
	Arsenic				
	Boron				
	Copper				
	Phosphorous				
	Vanadium				
	Calcium				
	Nitrate				
	Nitrite				
	Sodium				
	Fluoride				
	Potassium				
	Phosphate				
	Total Alkalinity				
Chloride					
Cadmium					
BH12S, BH12D, BH25S, BH25D, BH26S, BH26D, BH27S, BH27D, BH28S, BH28D, BH29S, BH29D Shallow and Deep Aquifer as shown on Drawing "2111r1v1d1220 MHL Monitoring Network December 2020"	Molybdenum	Annual			
	Selenium				
	Iron				
	Lead				
	Magnesium				
	Mercury				
	Organohalogens (Volatile Organic Compounds)				
	Semi-volatile Organic Compounds				
	Sulphate				
	Total Chromium				
	Water Level			Monthly	

- i. Pre-Notification, WHITE and YELLOW copies are to be retained by Landfill Site Office. The BLUE copy is to be retained by the Haulier. The PINK copy is to be retained by the Originator.
- ii. Records are to be used to evaluate figures for the returns on asbestos disposal

[signature]

**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

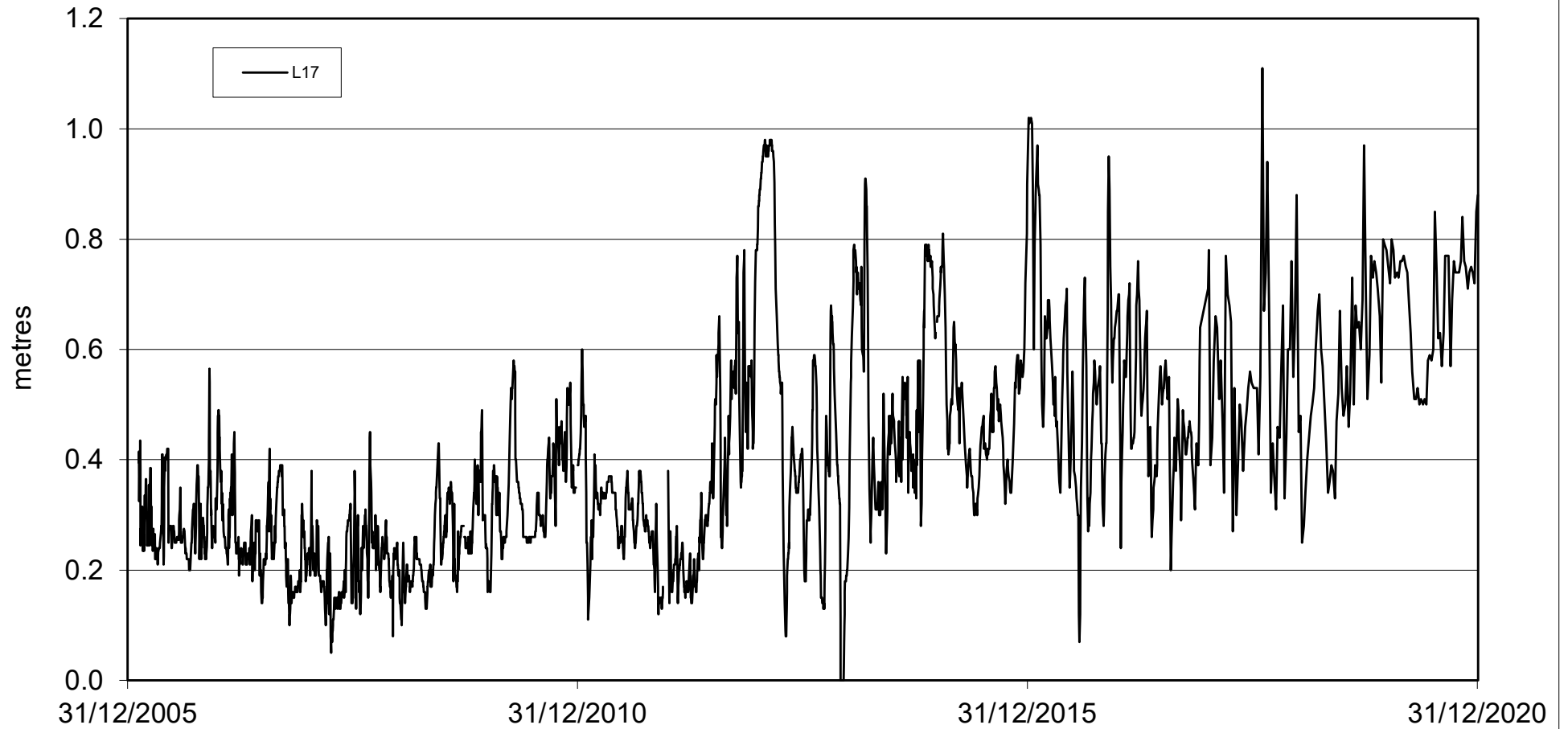
PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 2
Temporal Variation of
Leachate Levels and
Volume Extracted**

Report Number 2093r1v1d0221

Leachate Depth in Hazardous Landfill



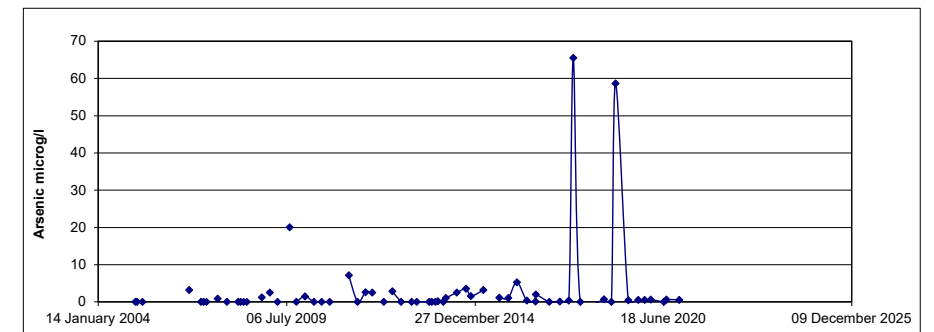
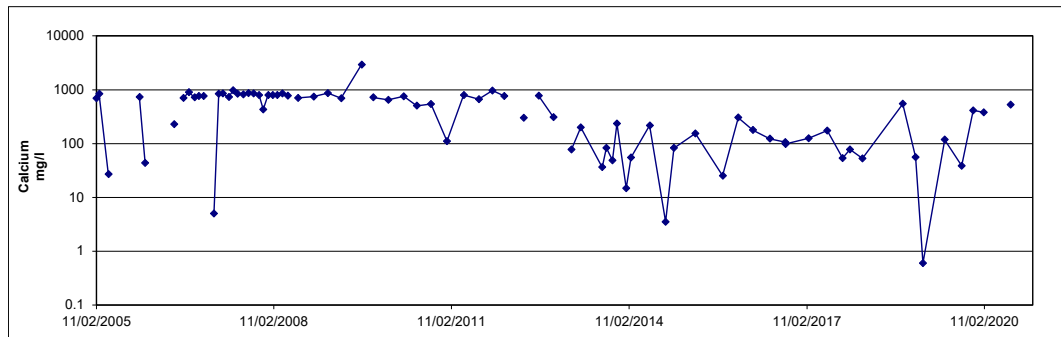
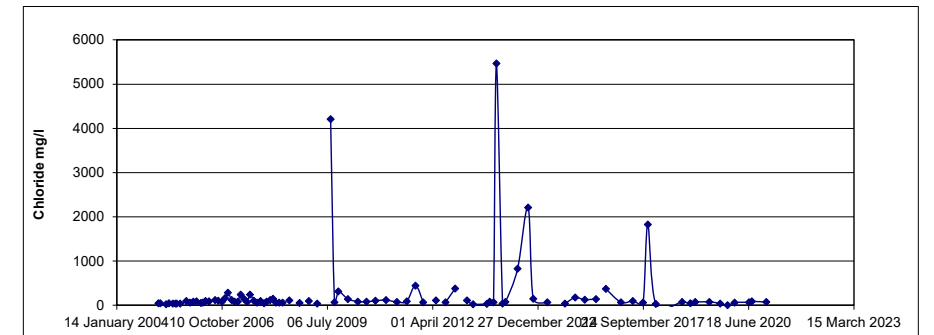
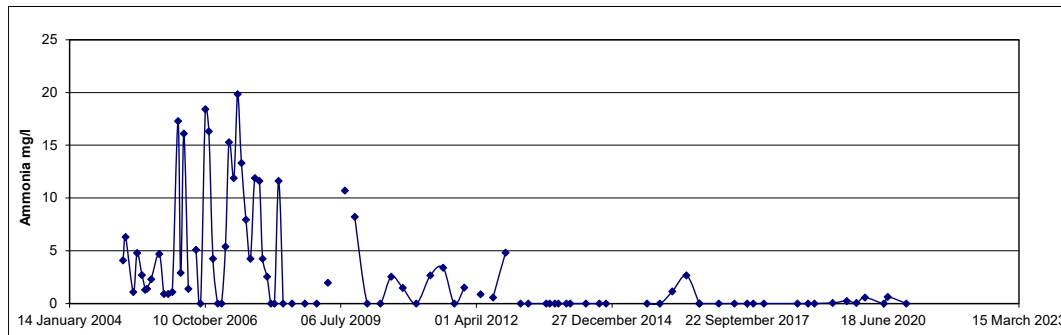
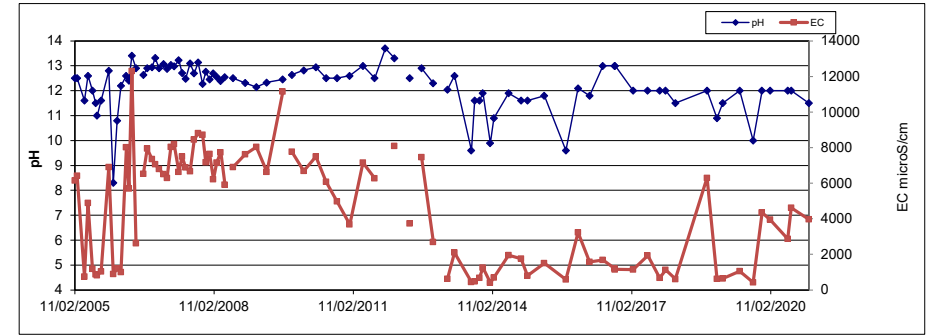
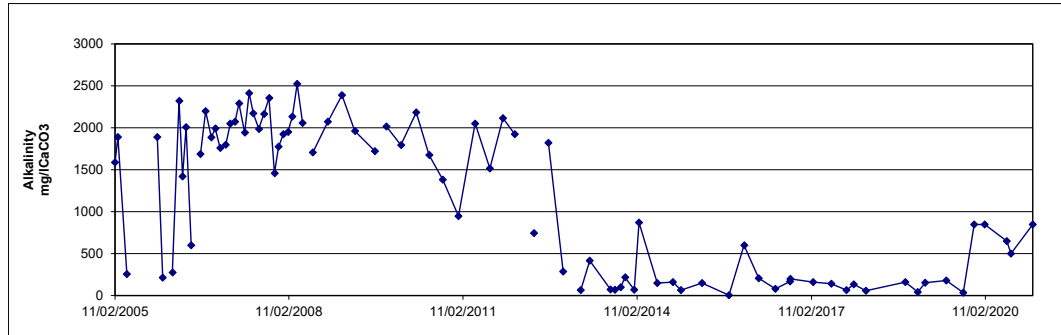
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

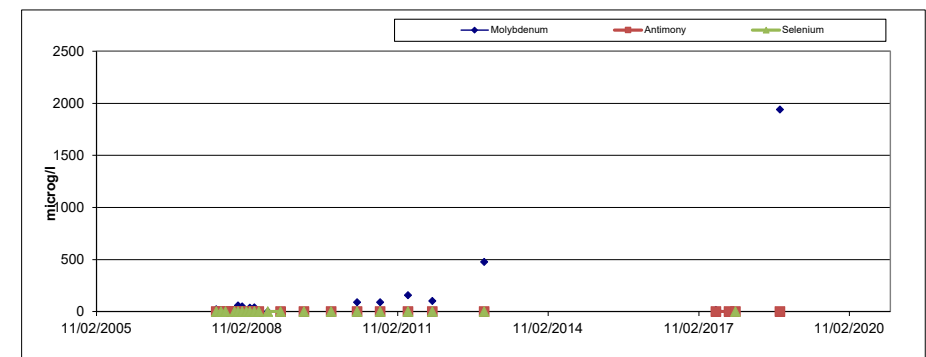
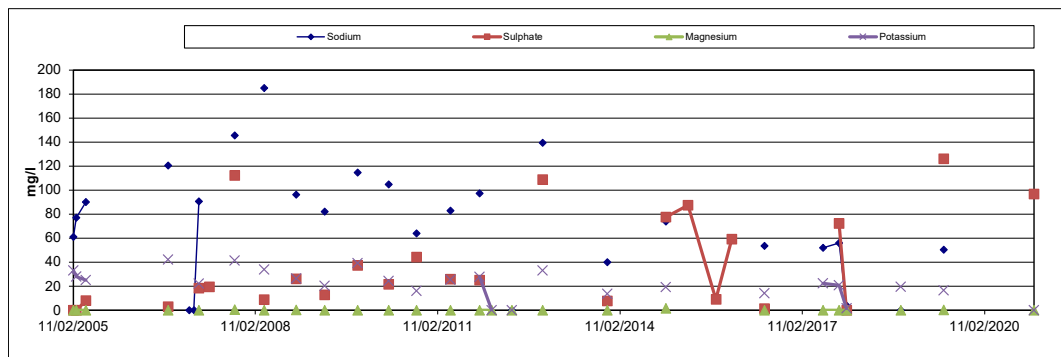
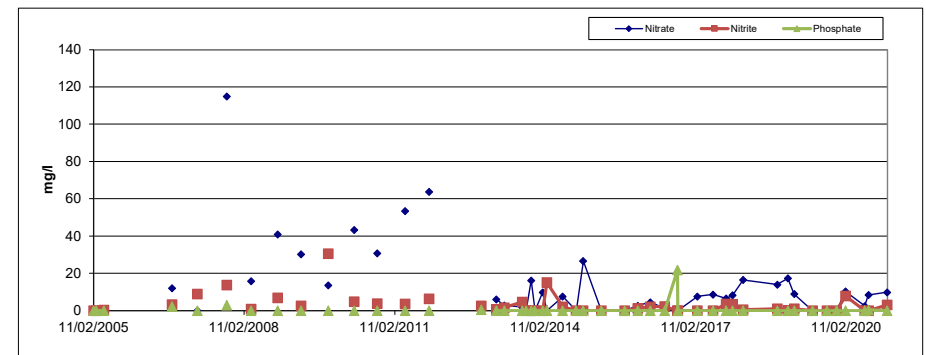
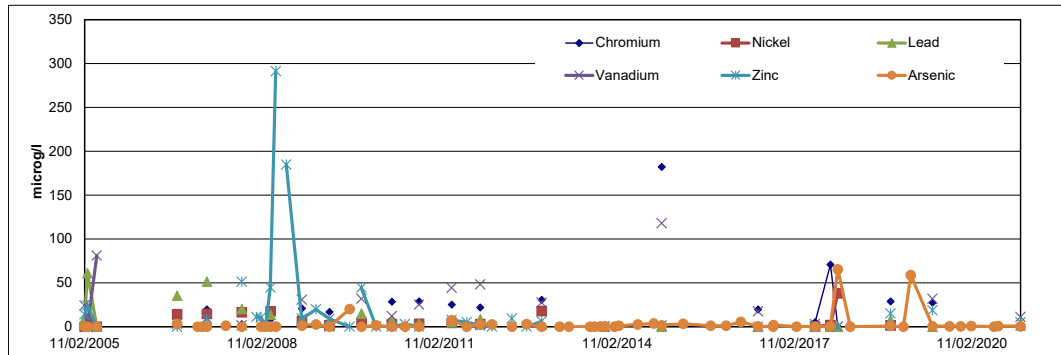
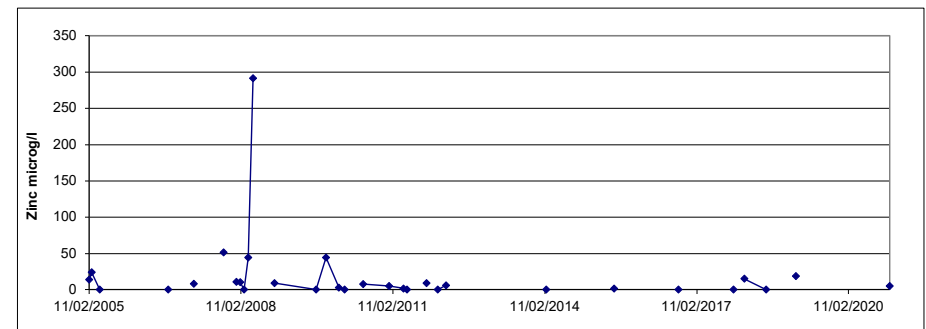
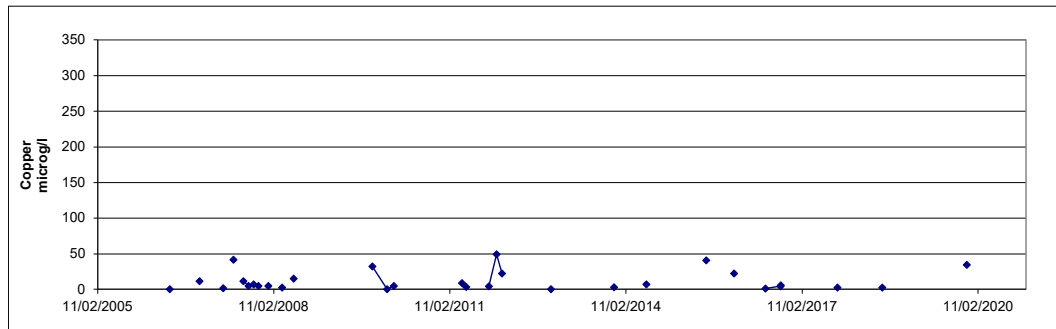
PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 3
Temporal Variation of
Leachate Chemistry**

Report Number 2093r1v1d0221





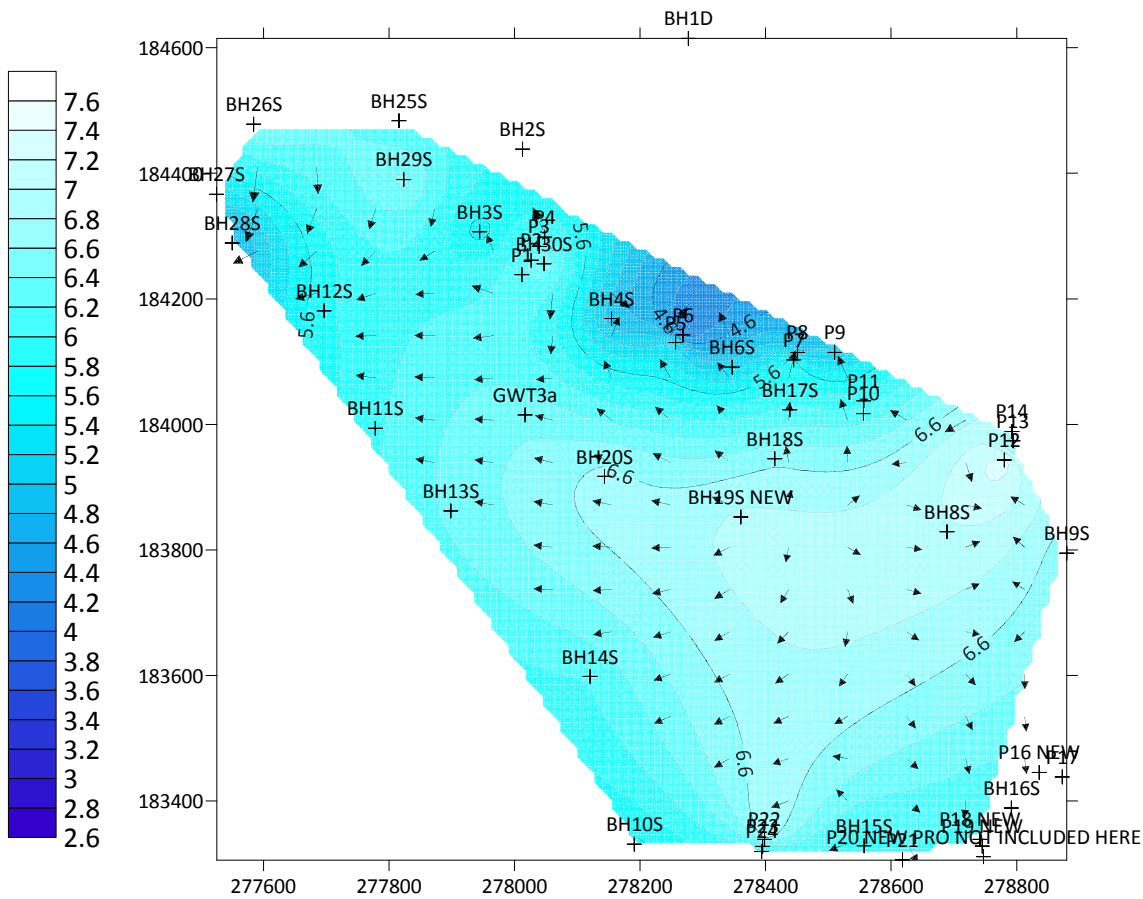
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

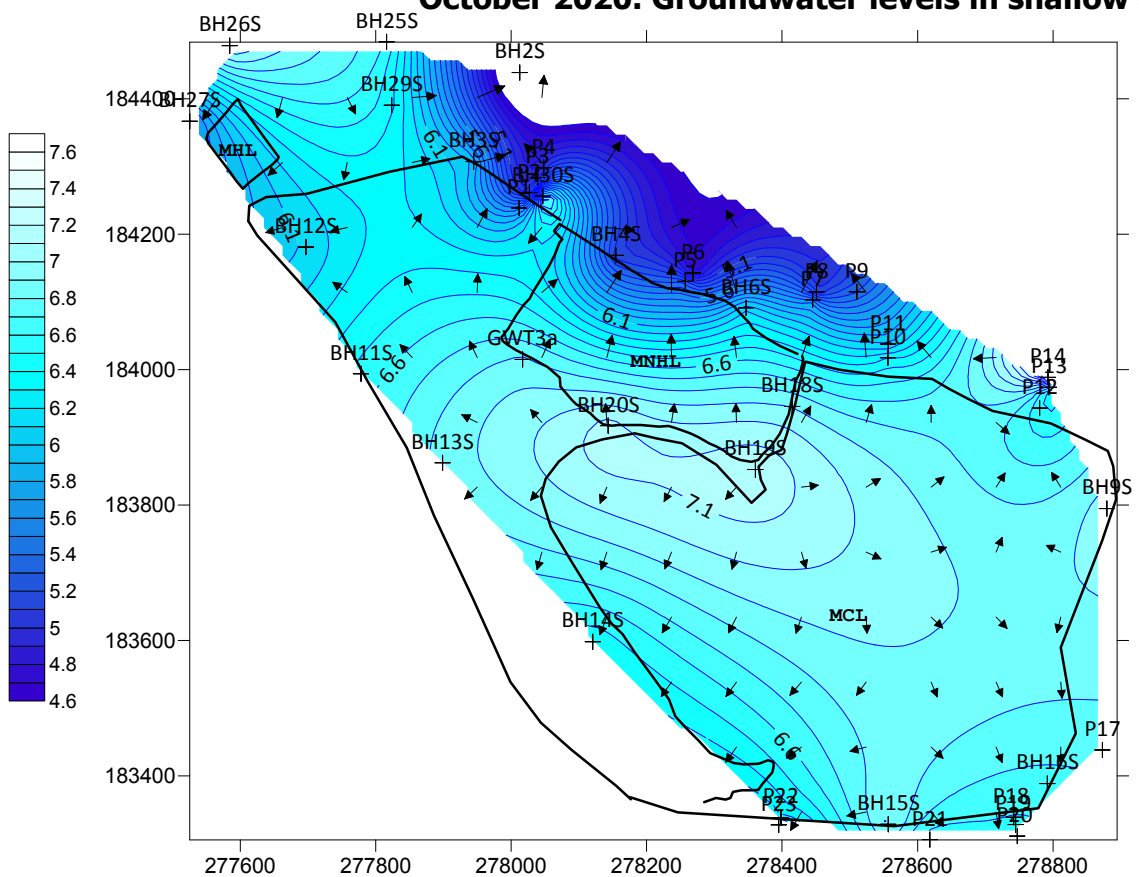
**Appendix 4
Temporal Variation of
Groundwater Levels**

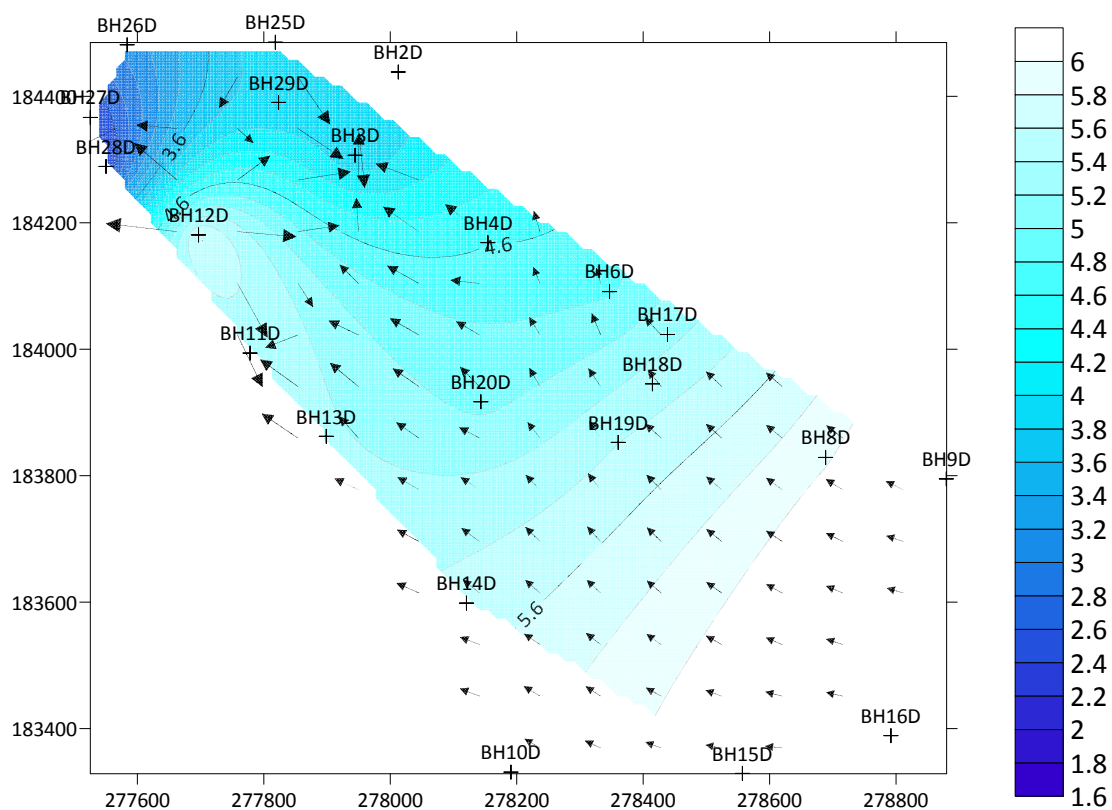
Report Number 2093r1v1d0221



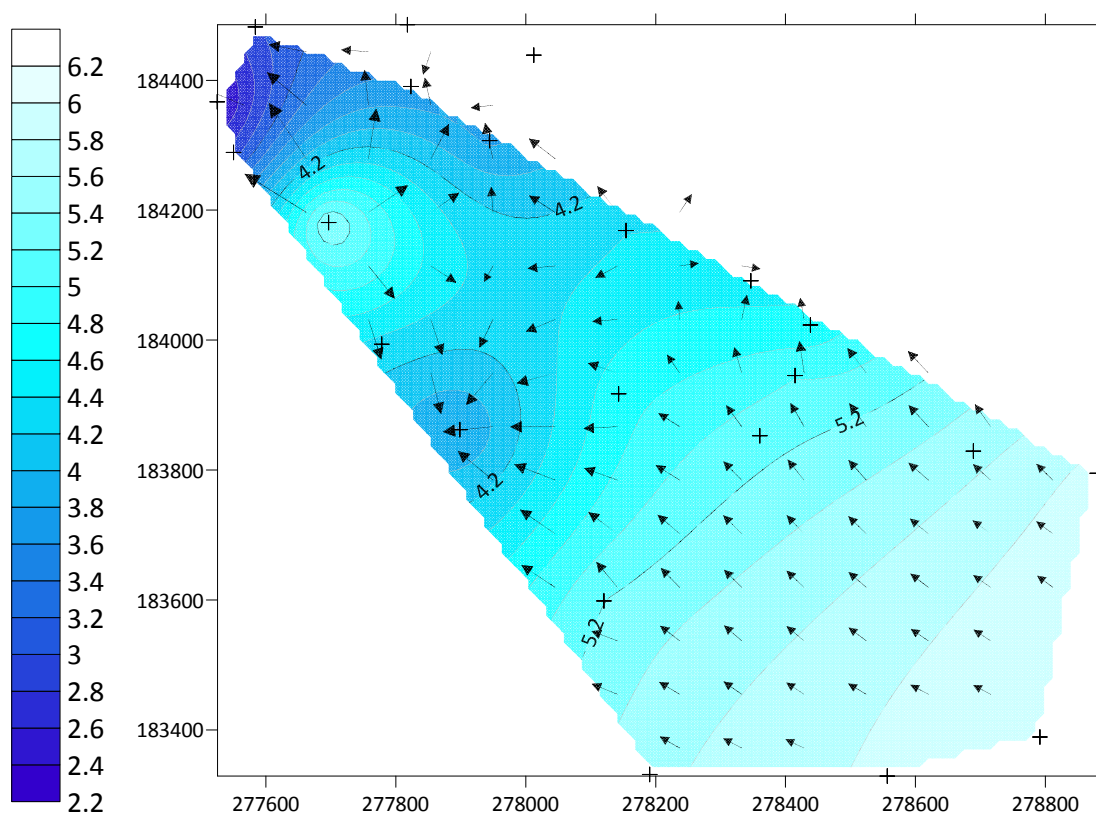
Shallow Groundwater Contours, June 2019

October 2020. Groundwater levels in shallow aquifer

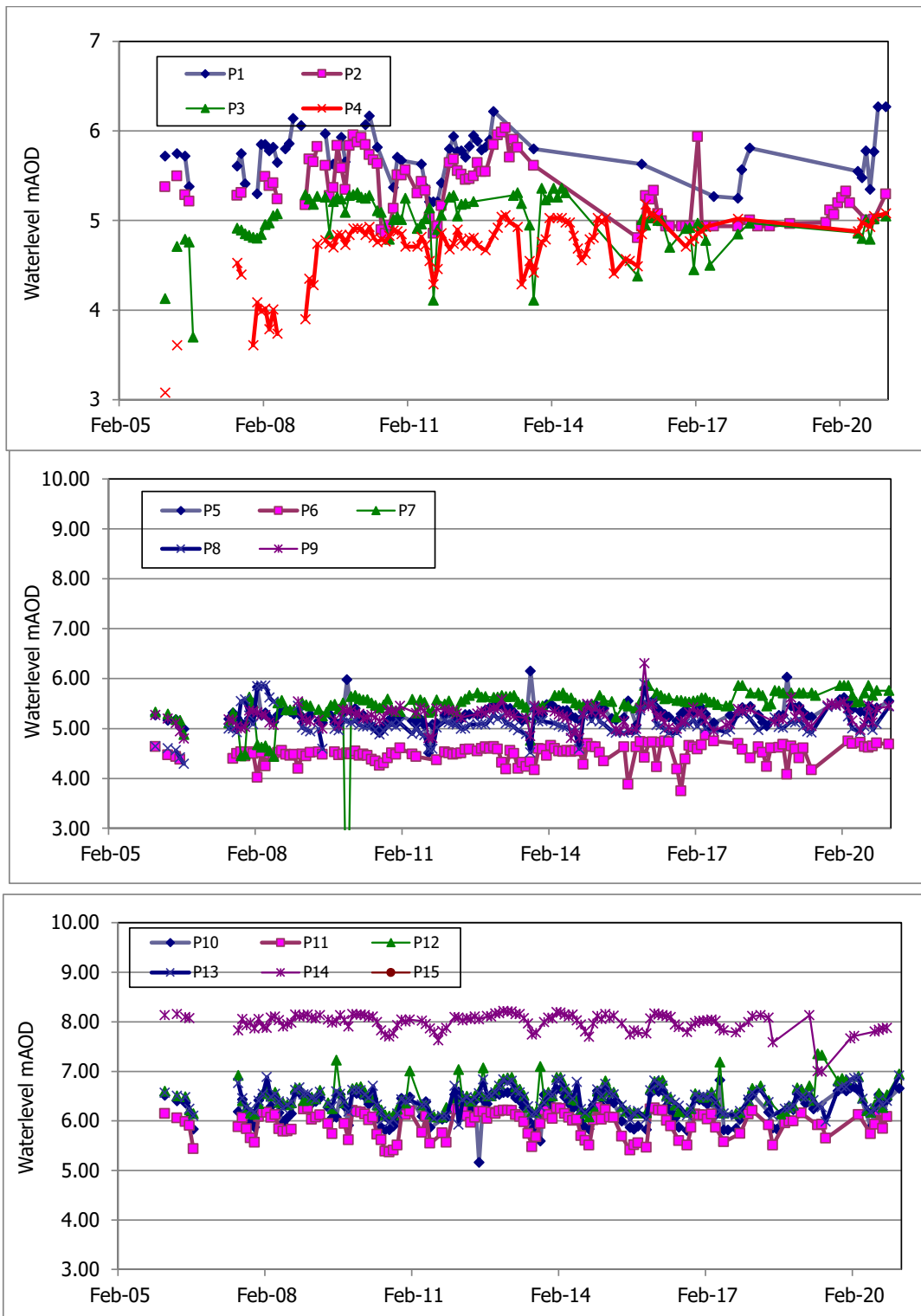


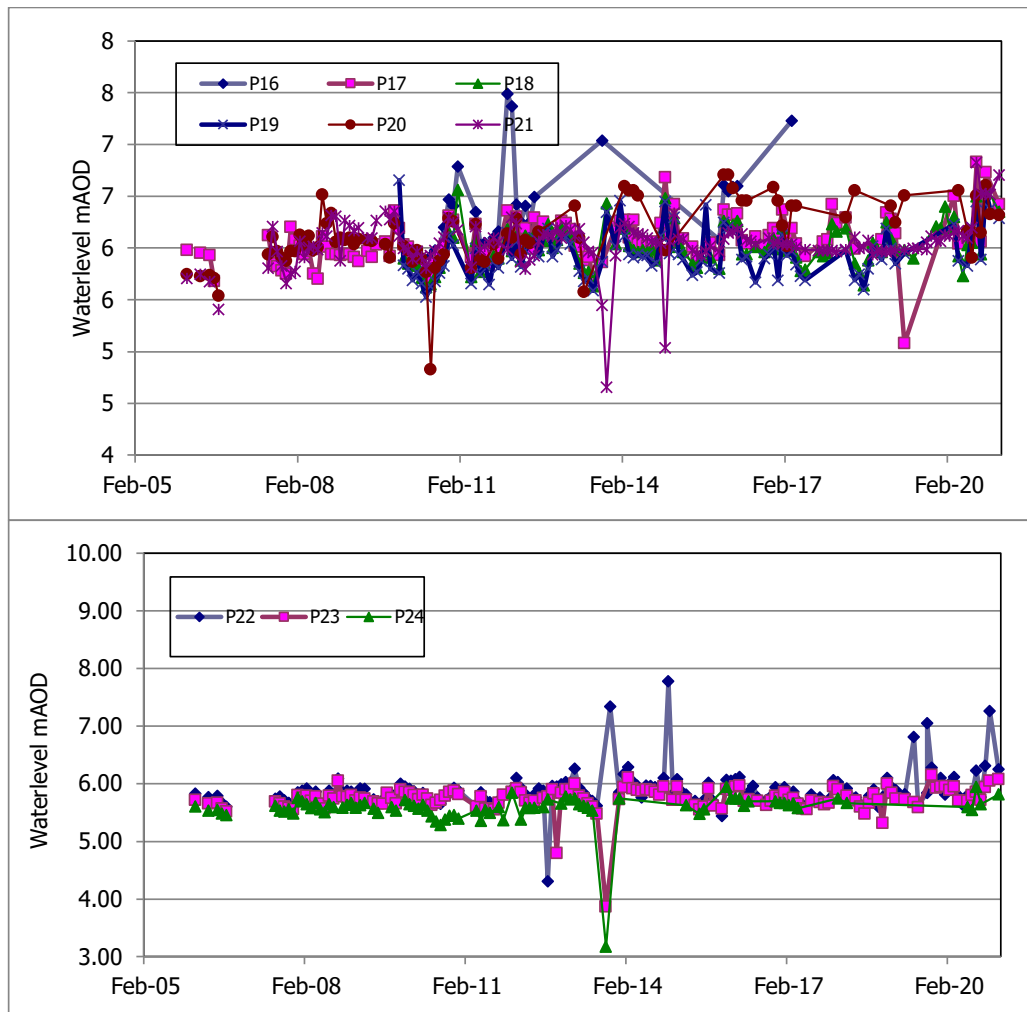


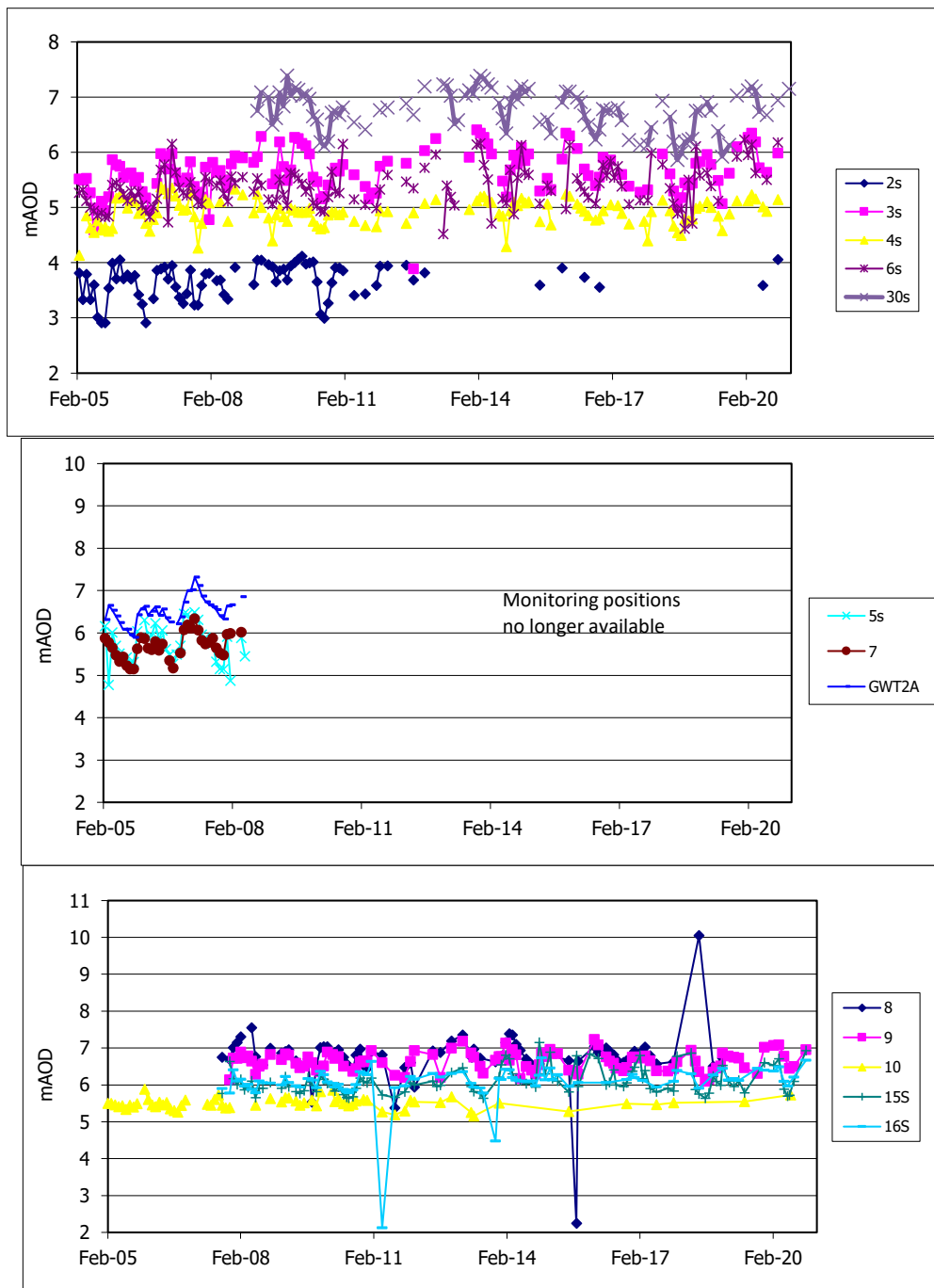
Deep Groundwater Levels, December 2018

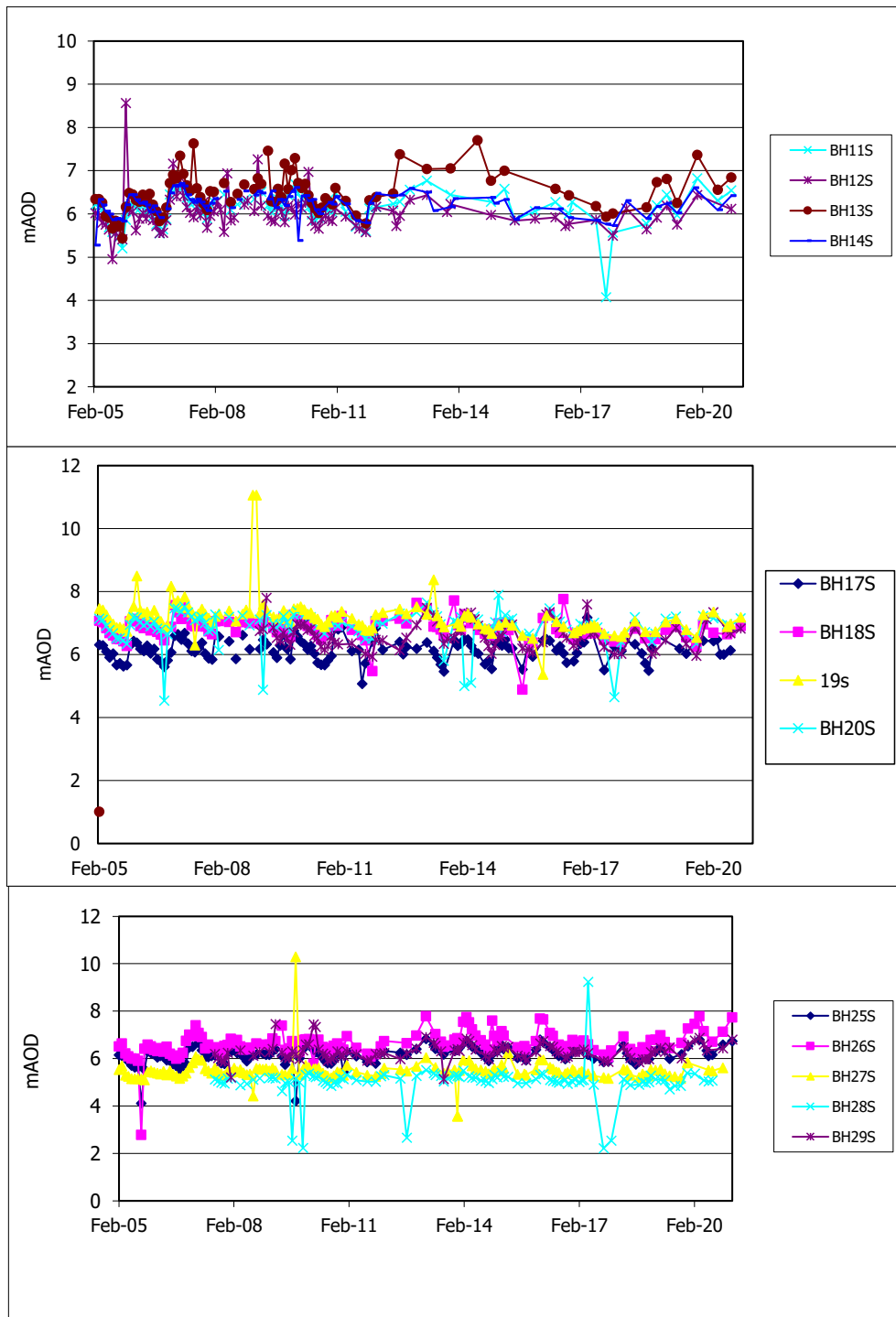


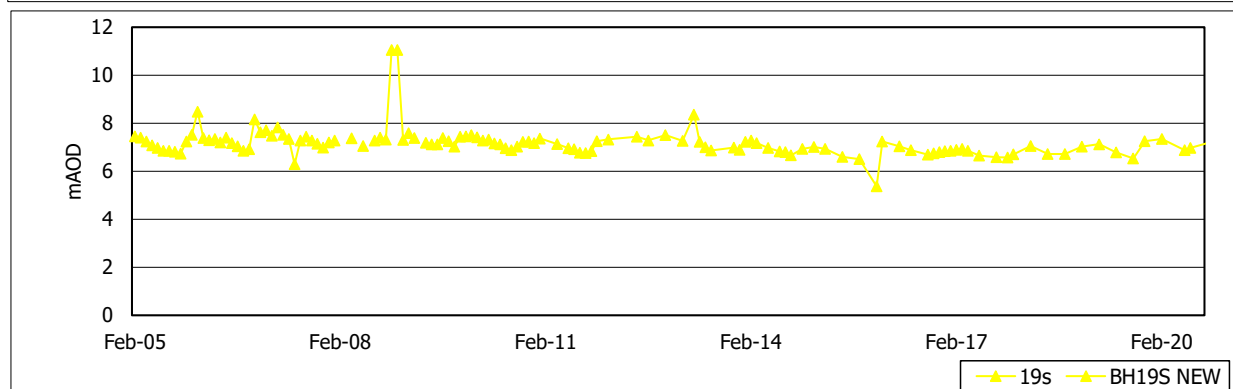
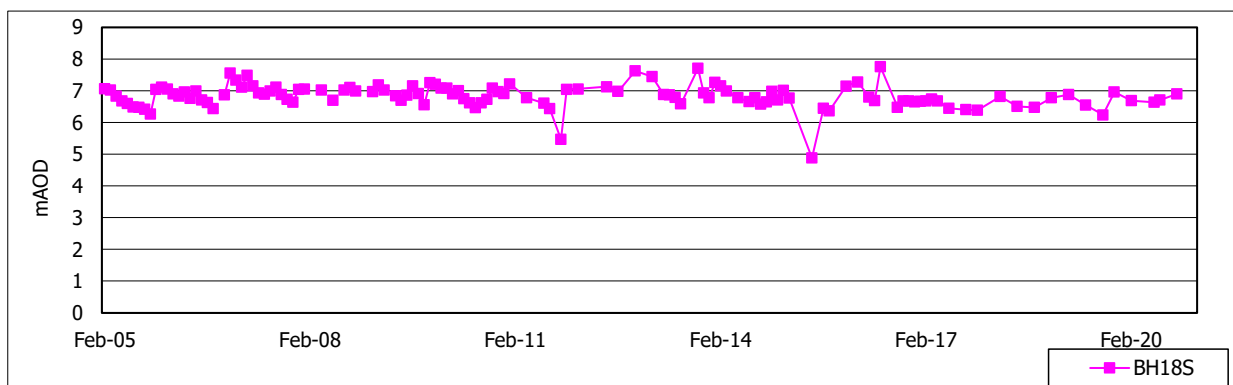
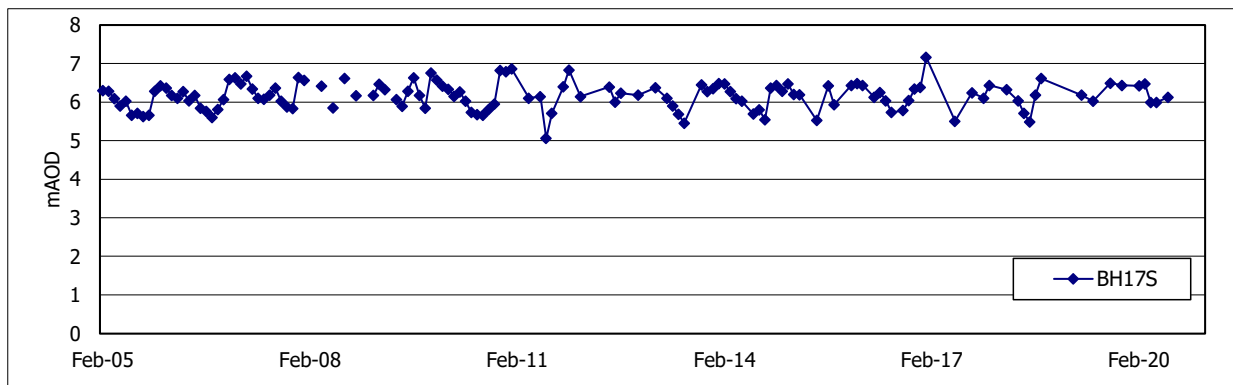
Deep Groundwater Levels, June 2019

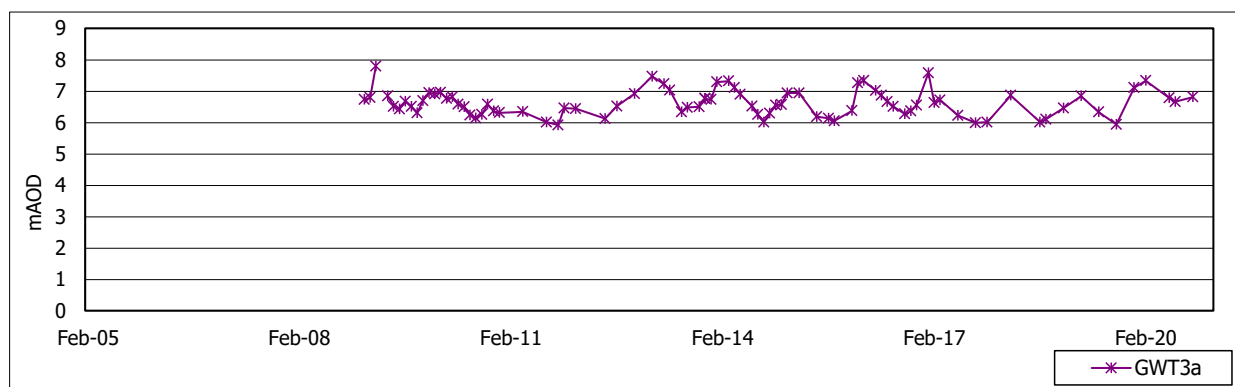
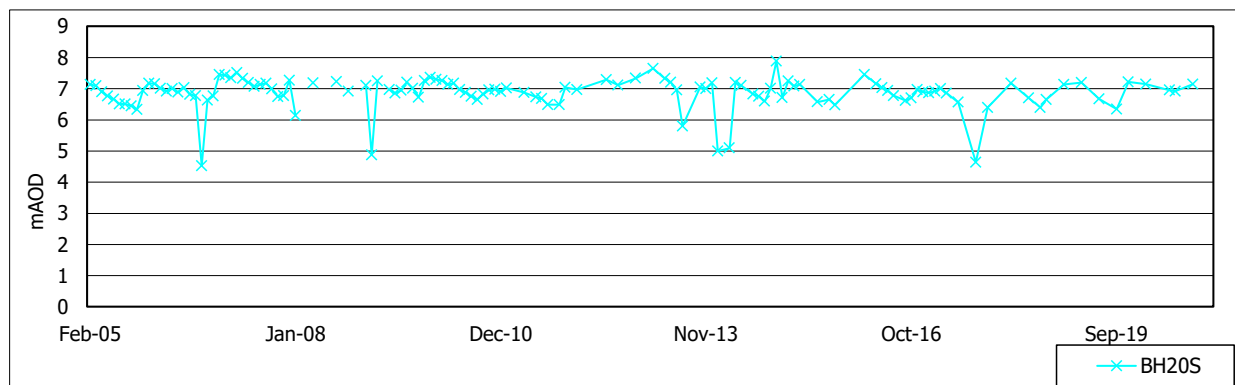


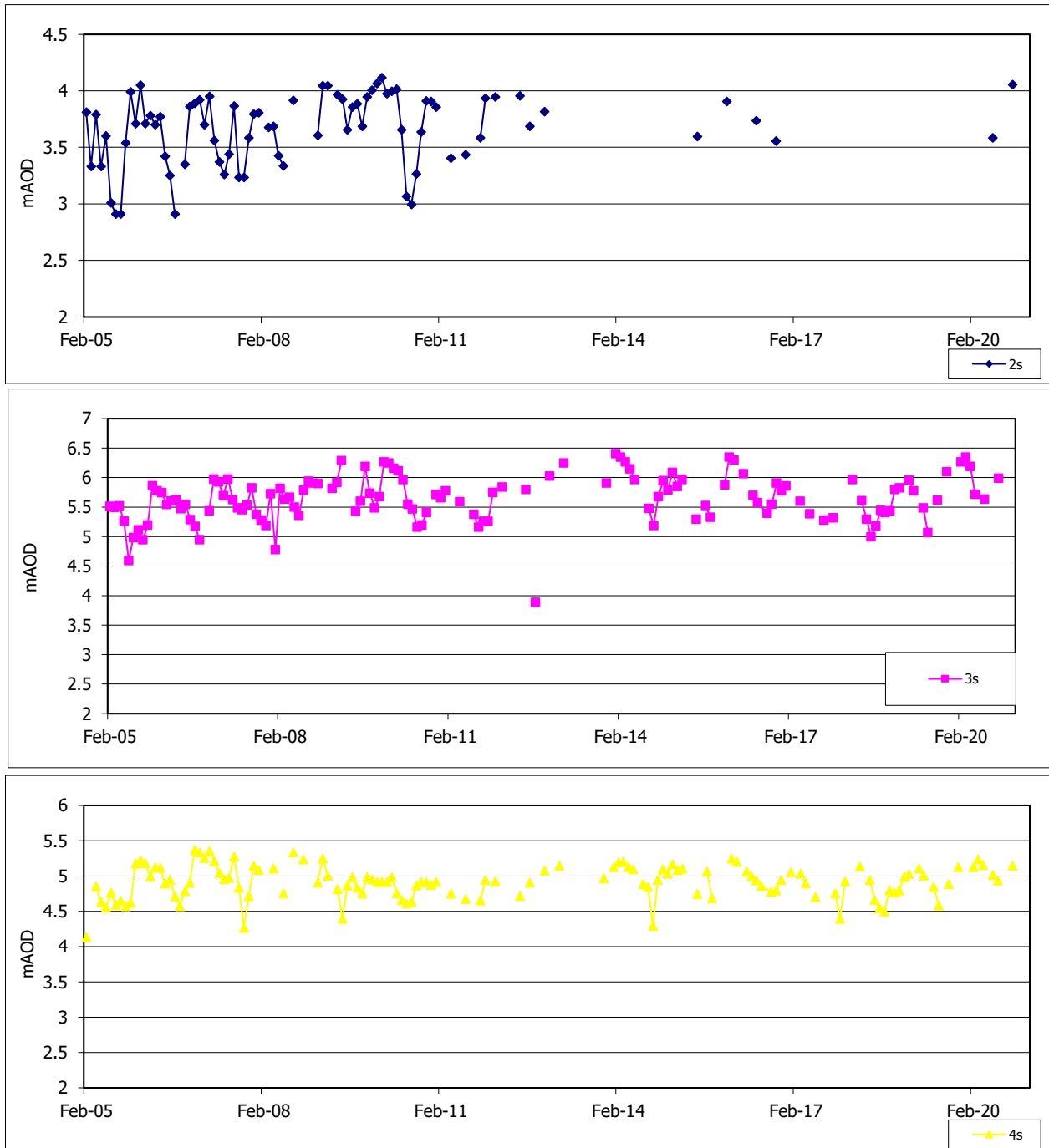


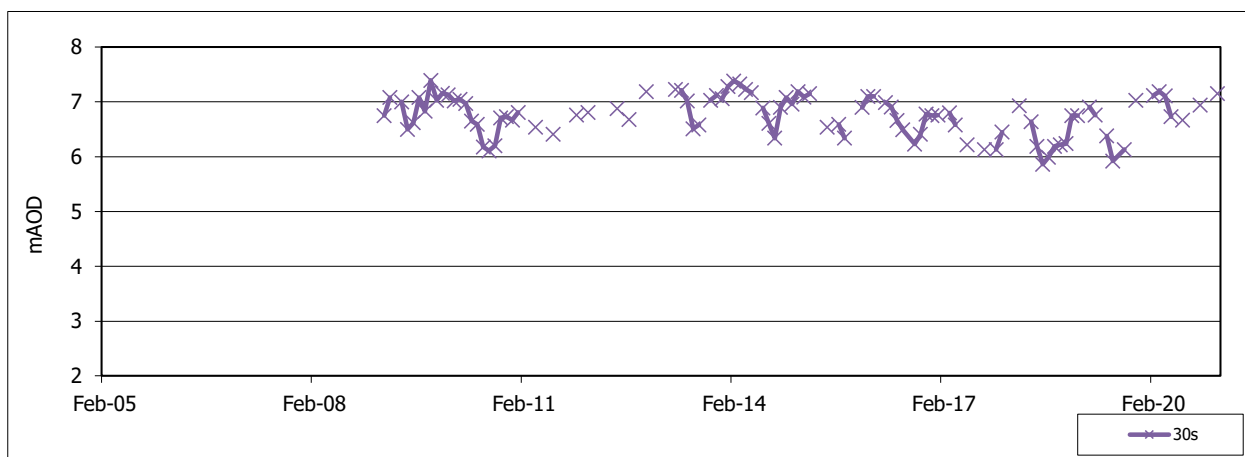
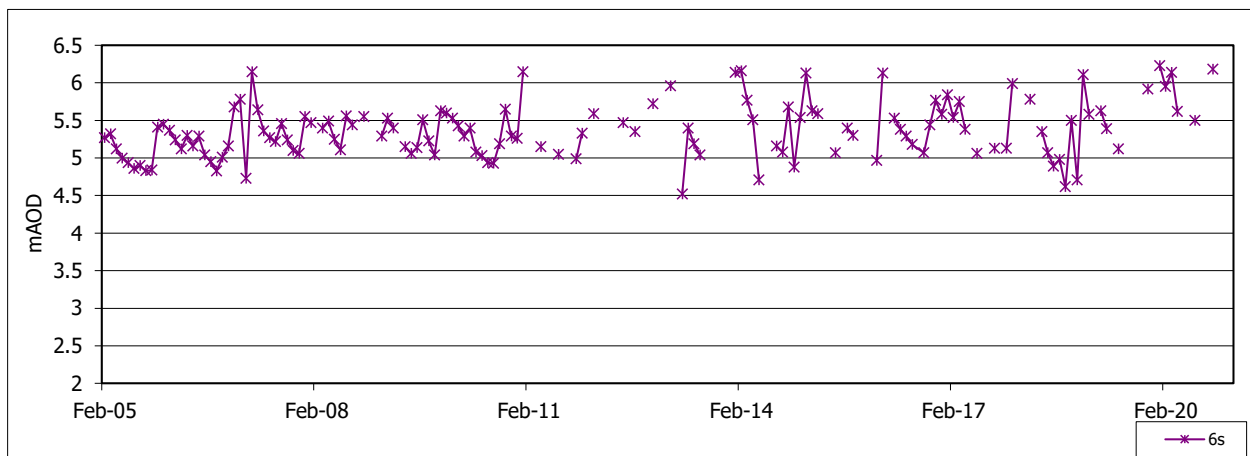


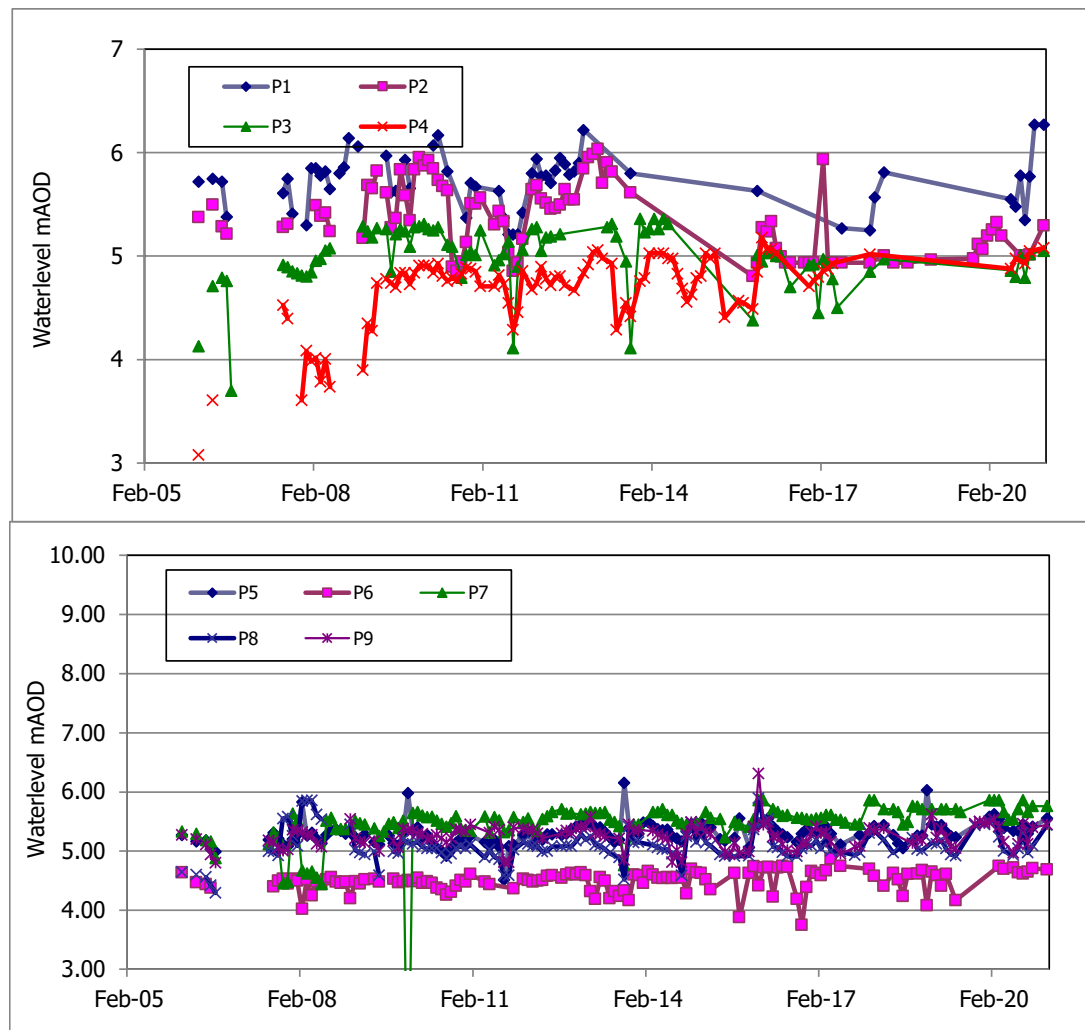


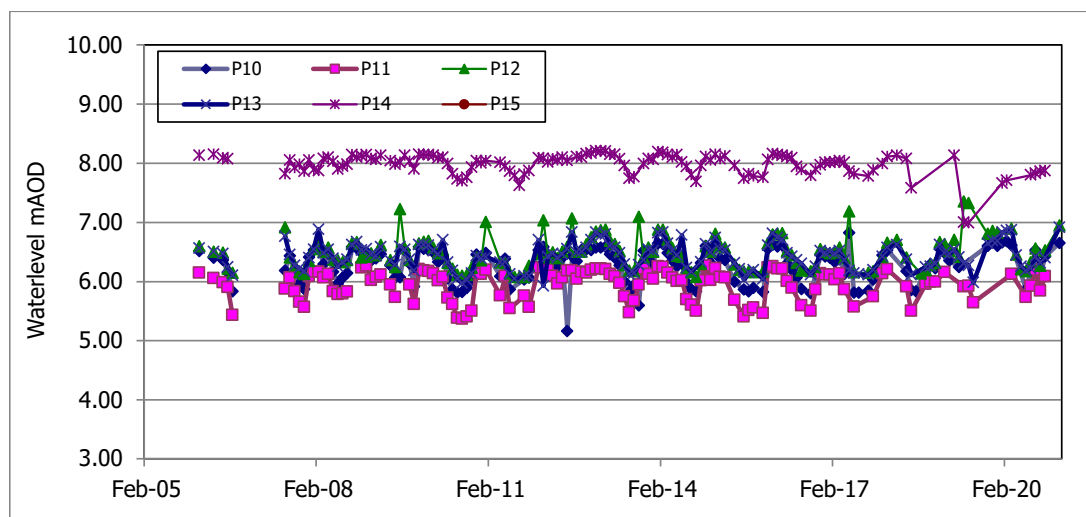


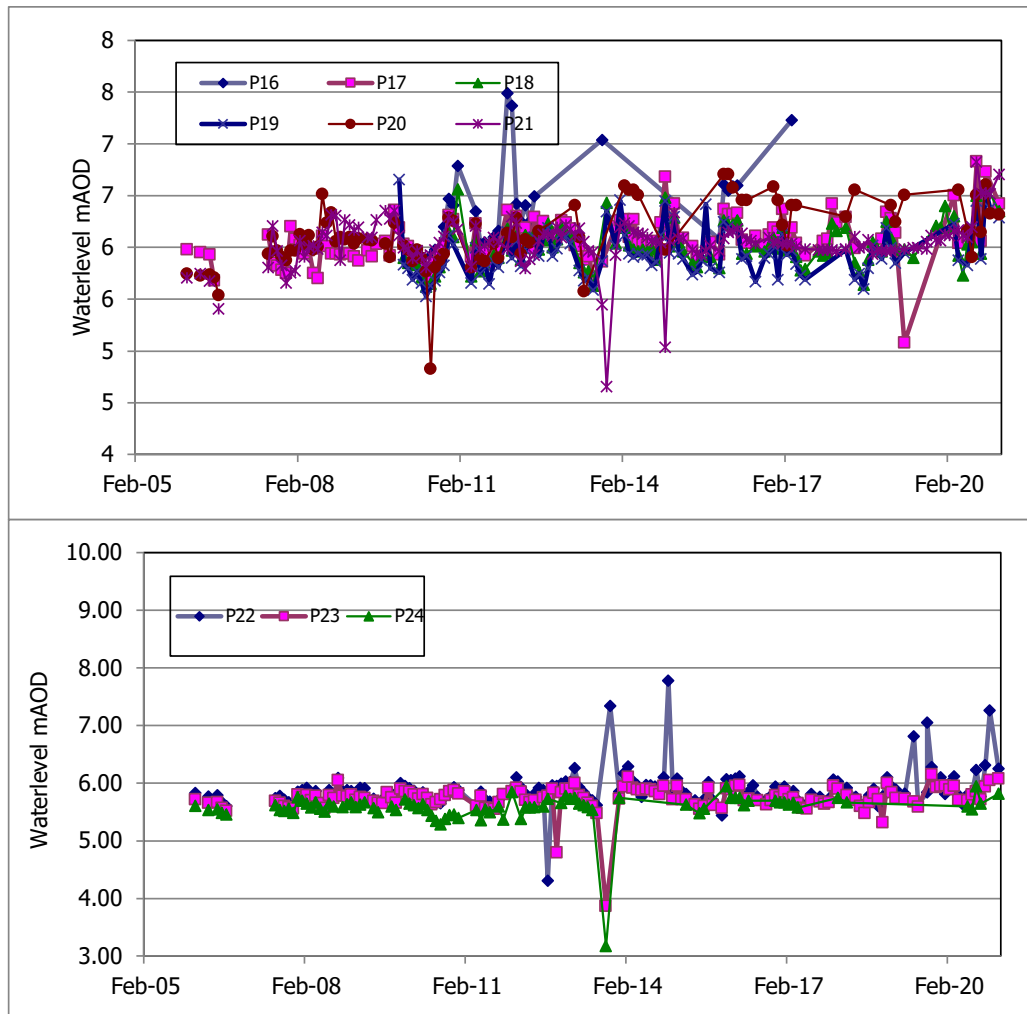


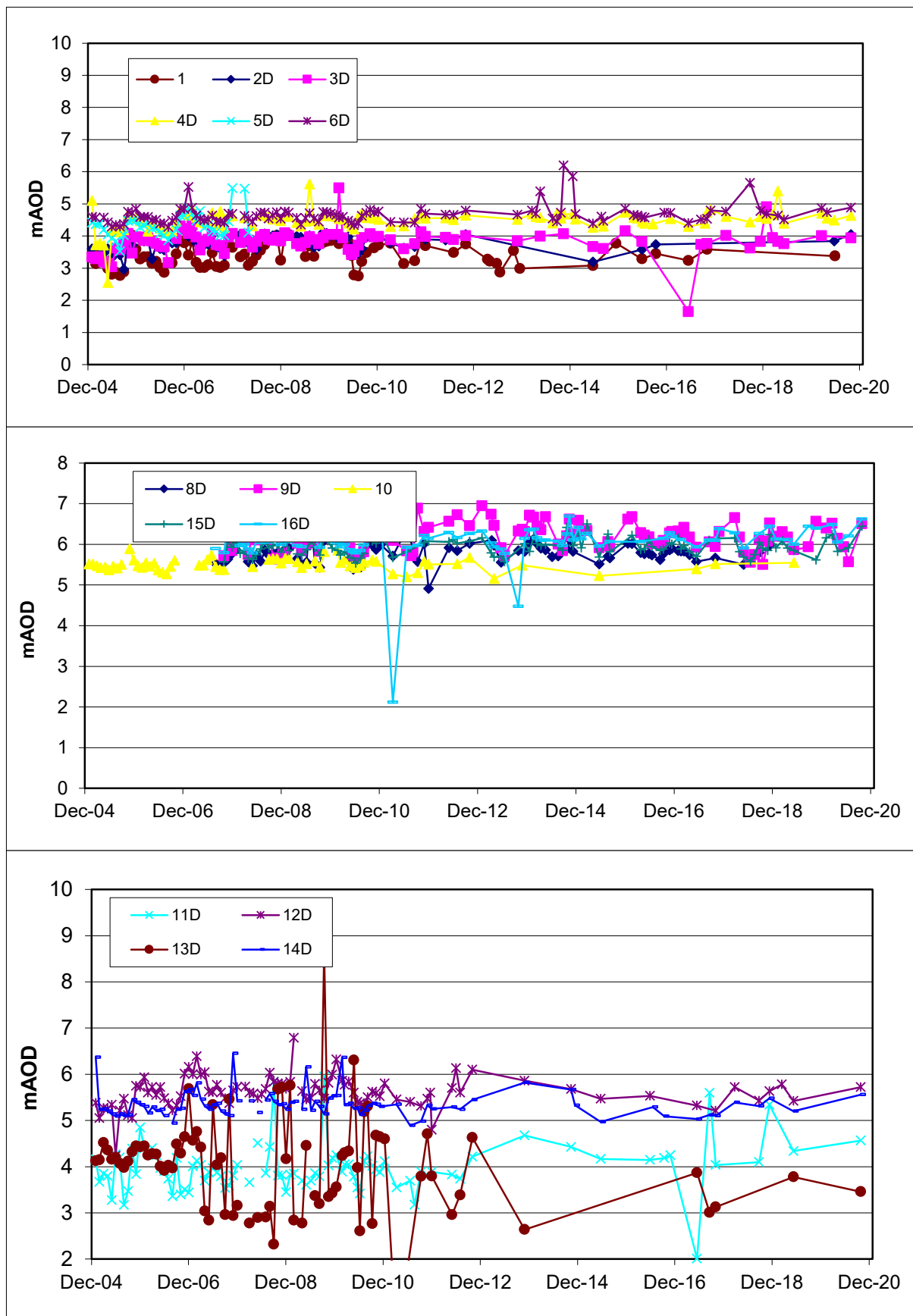


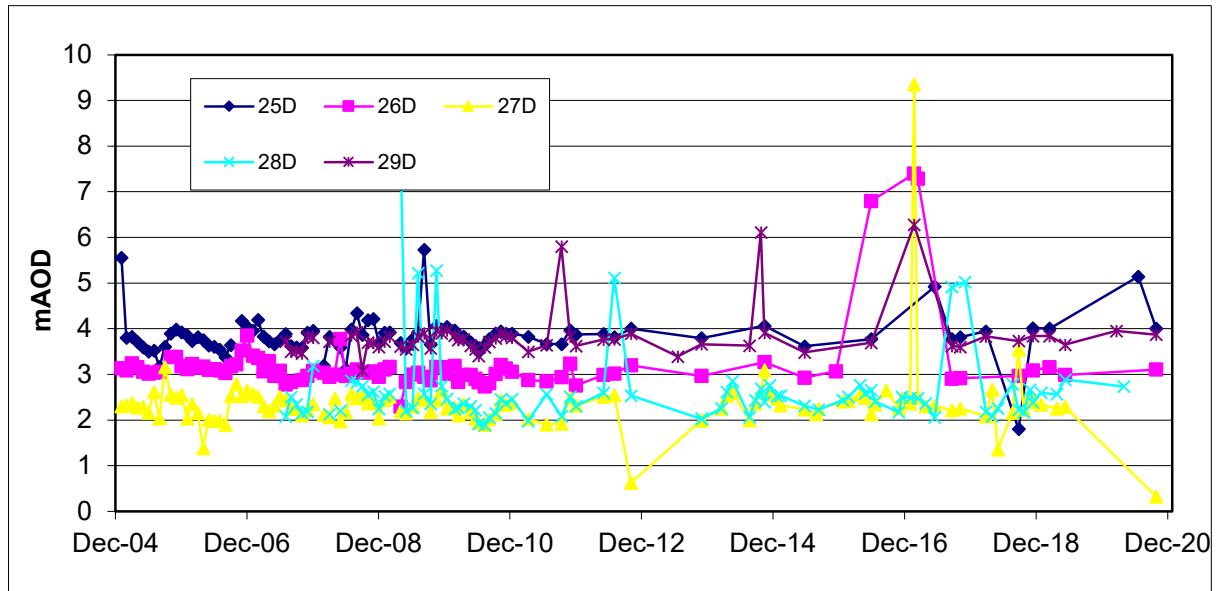
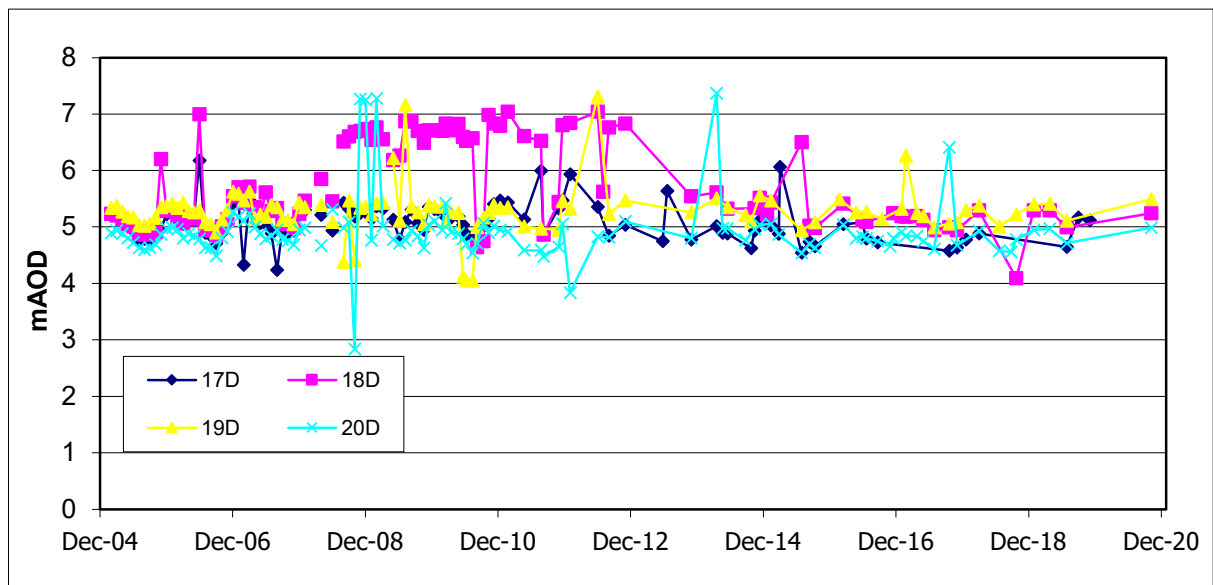












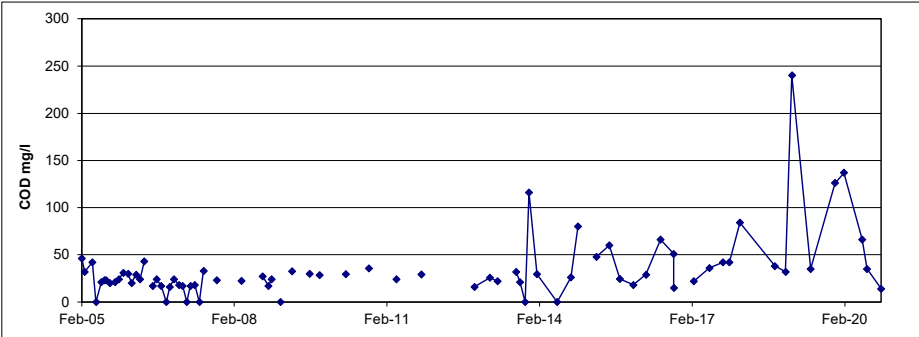
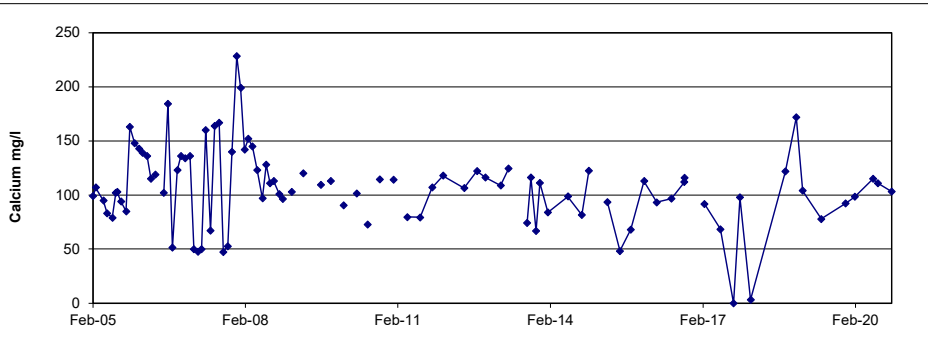
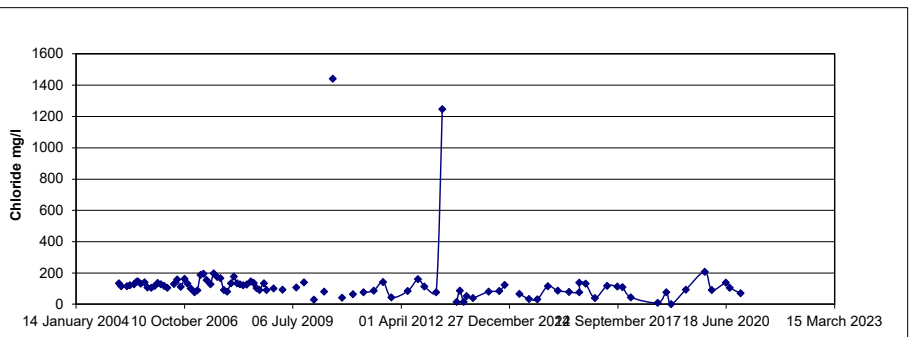
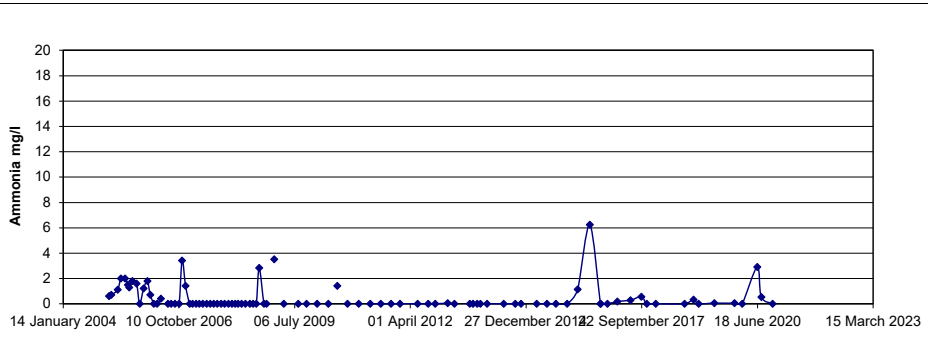
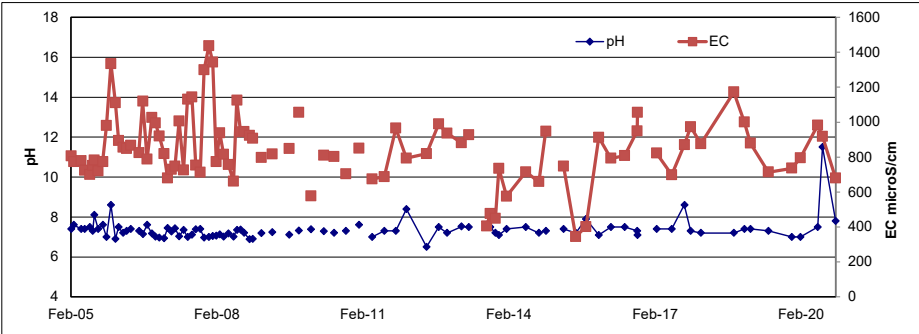
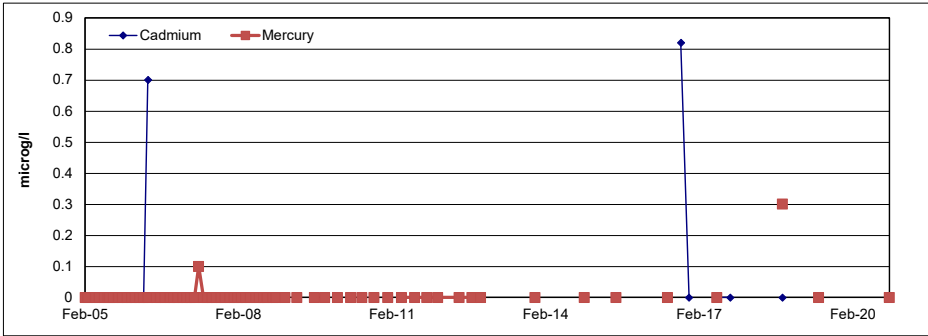
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

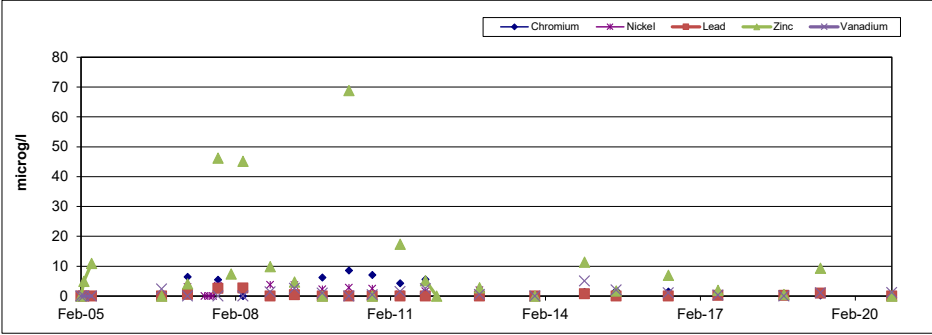
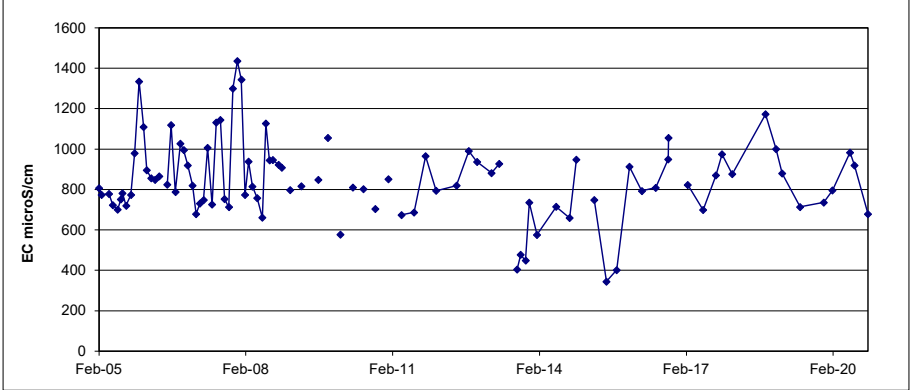
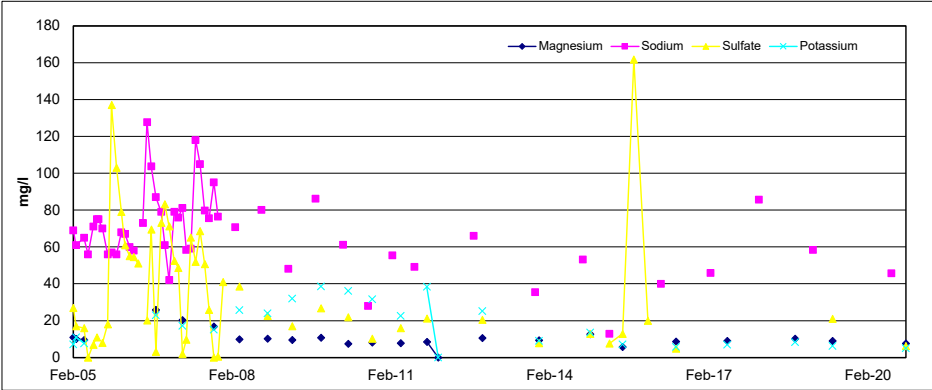
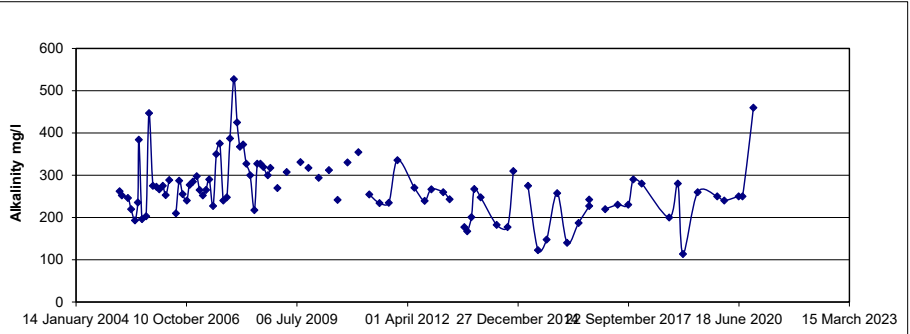
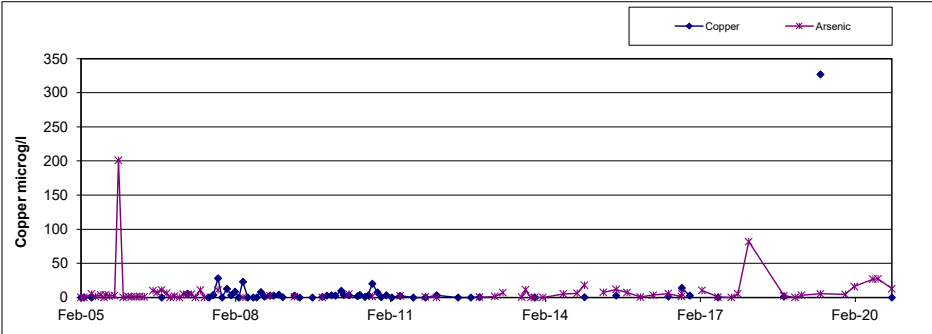
PERMIT BW2692IM

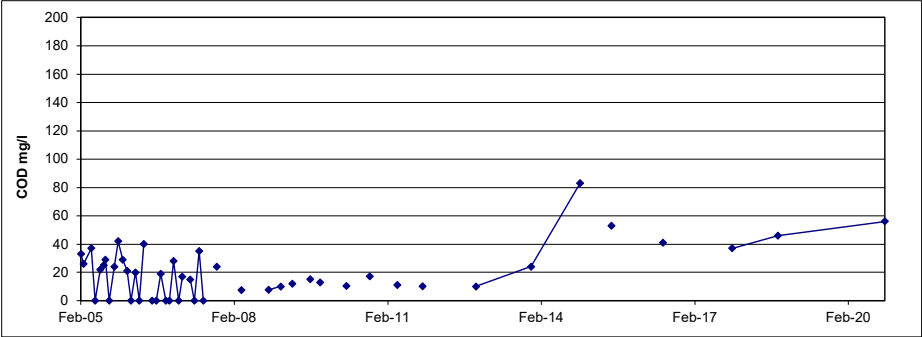
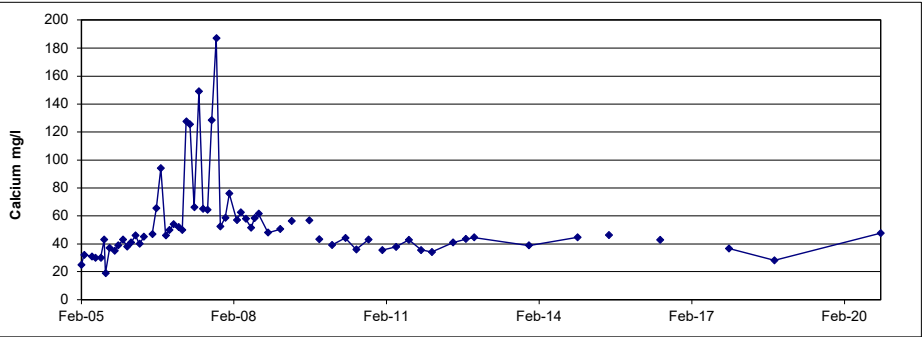
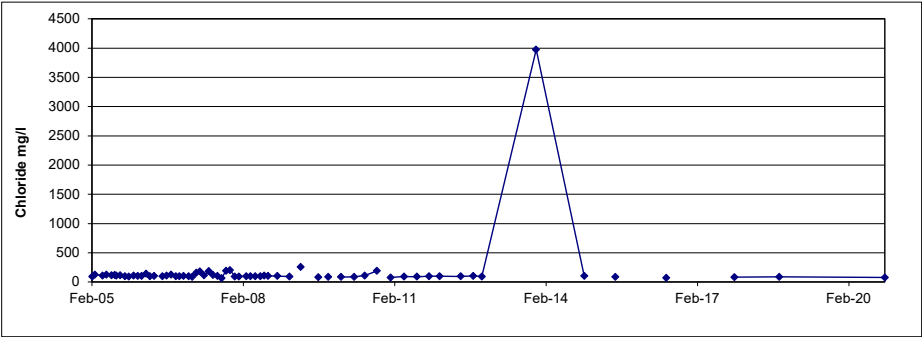
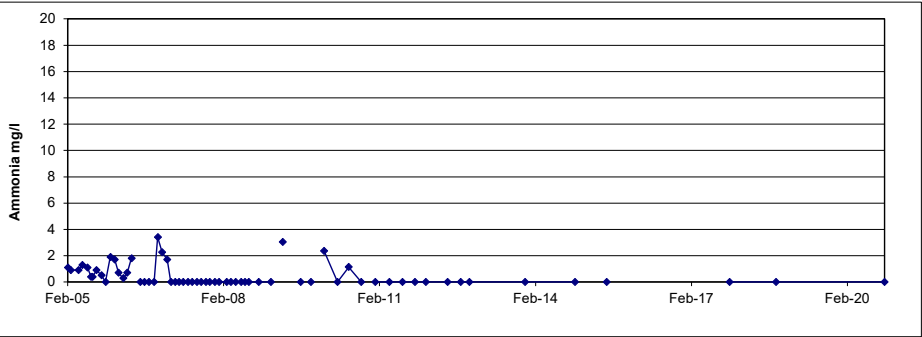
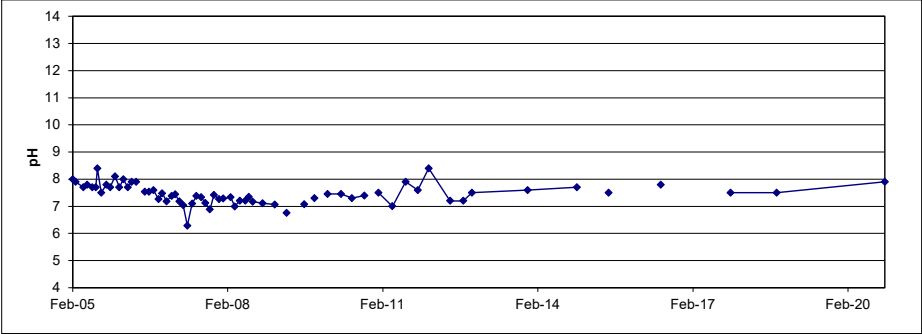
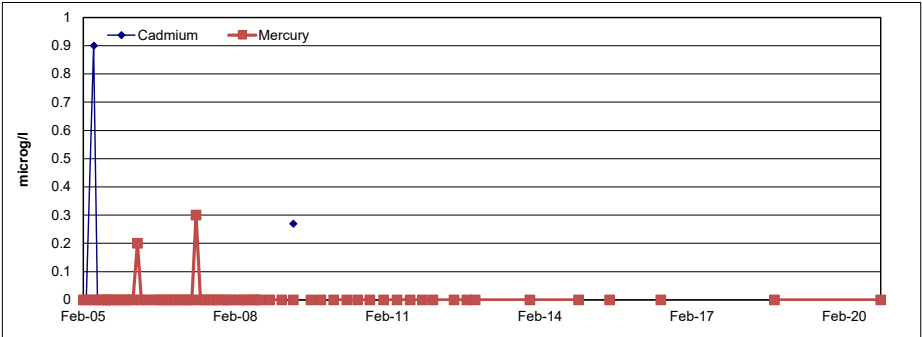
**2020 Annual Review of
Environmental
Monitoring Results**

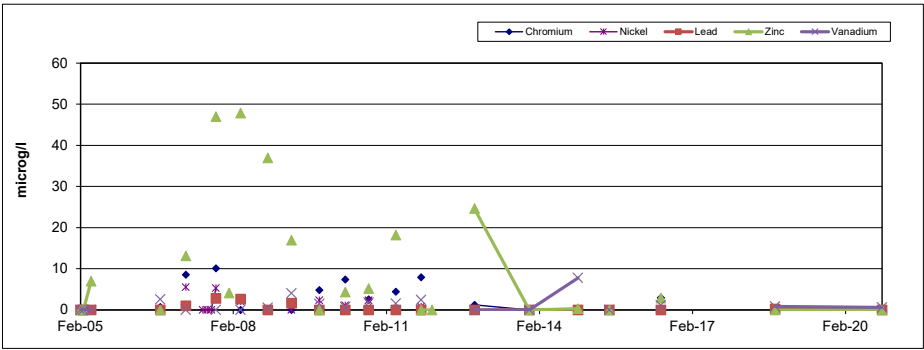
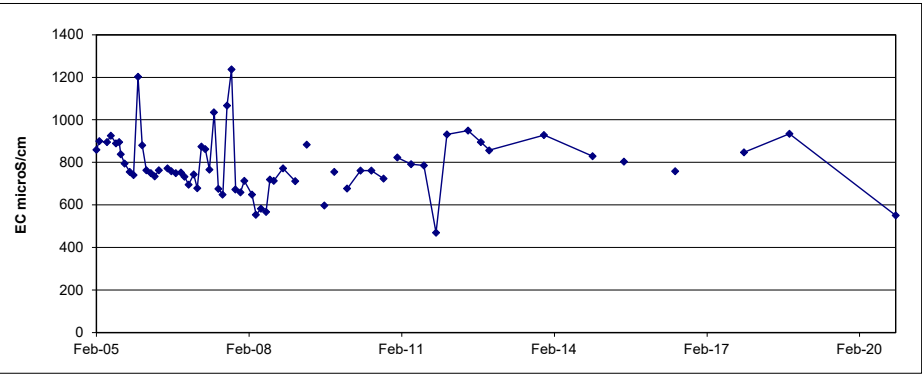
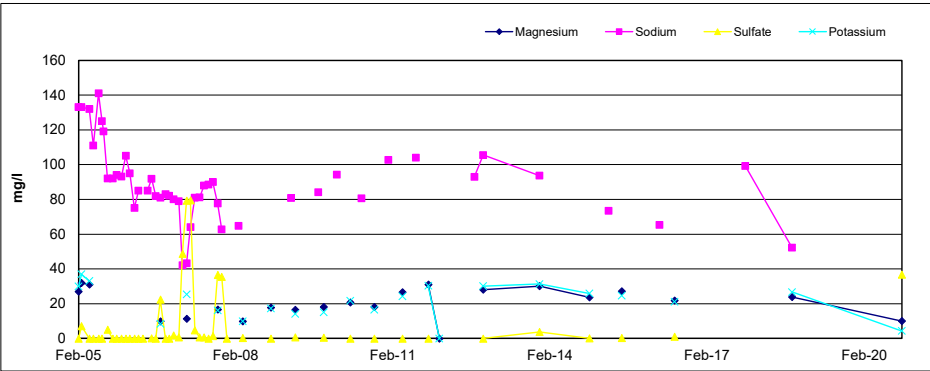
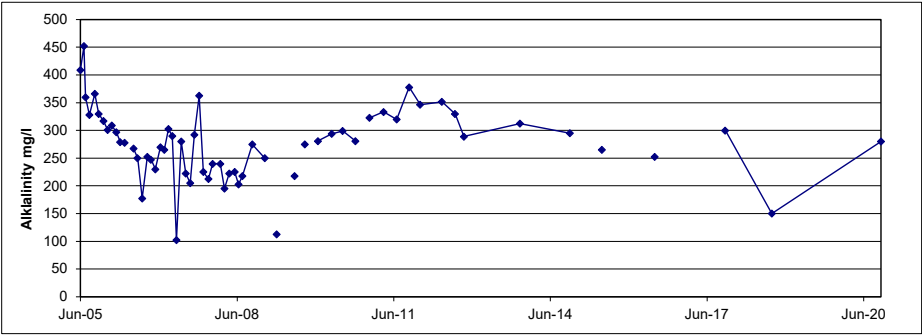
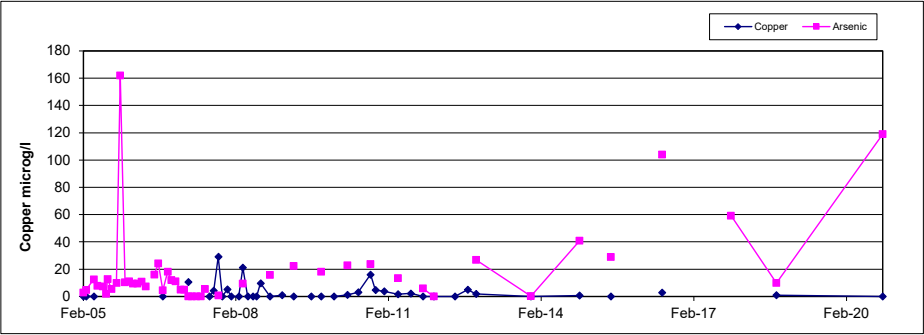
**Appendix 5
Temporal Variation of
Groundwater
Chemistry**

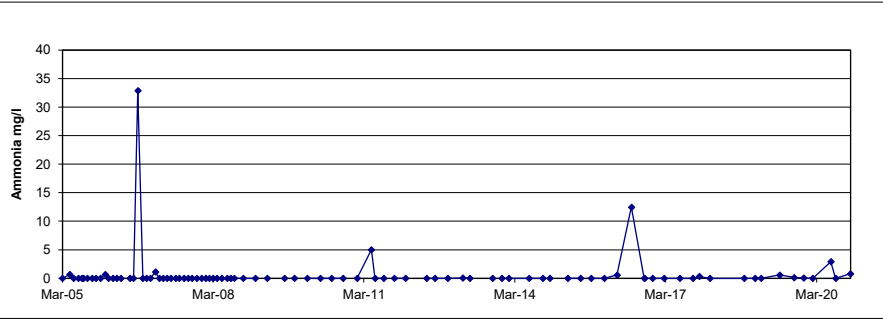
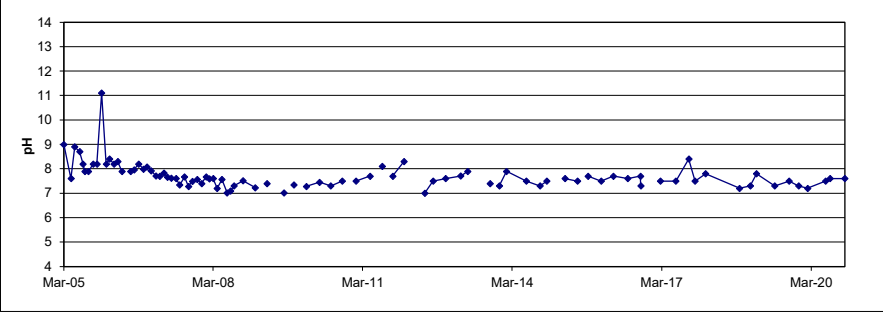
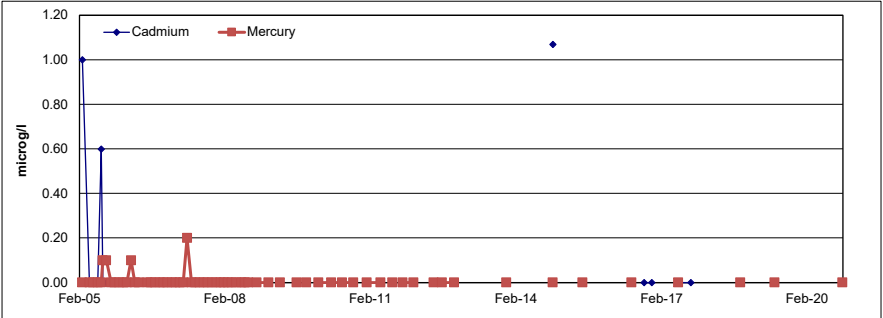
Report Number 2093r1v1d0221

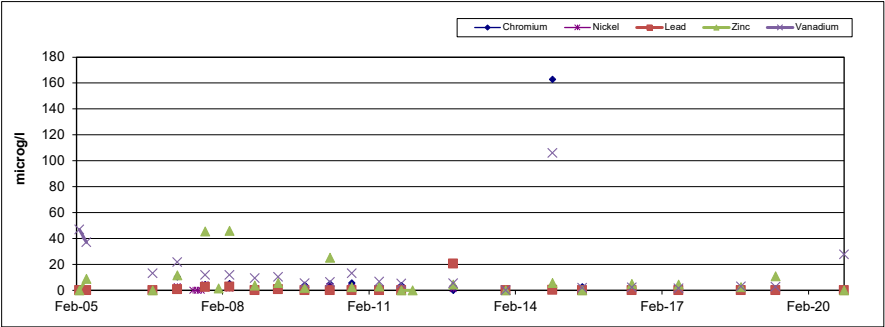
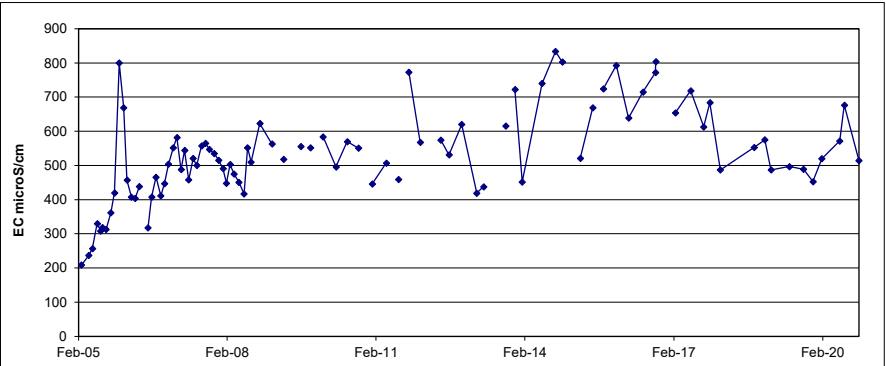
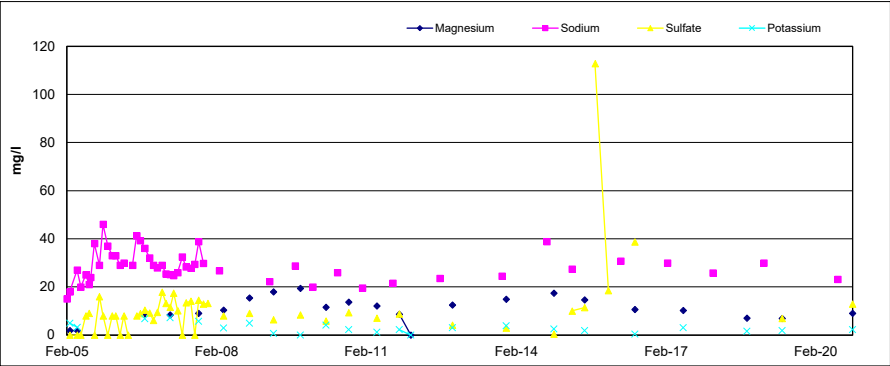
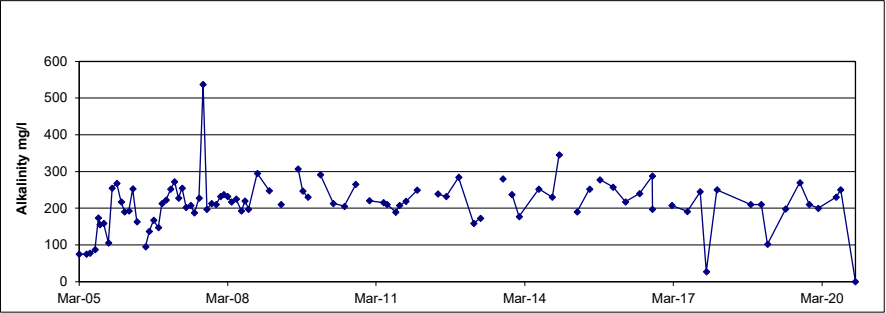
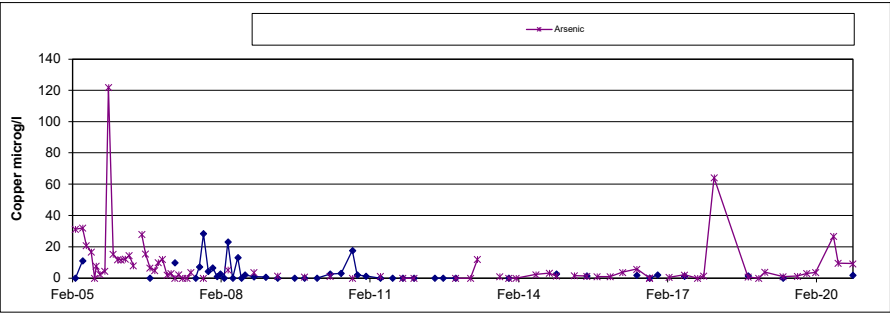


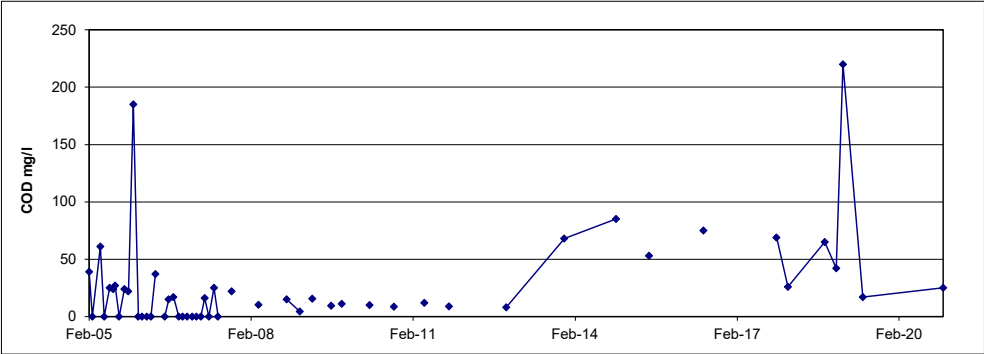
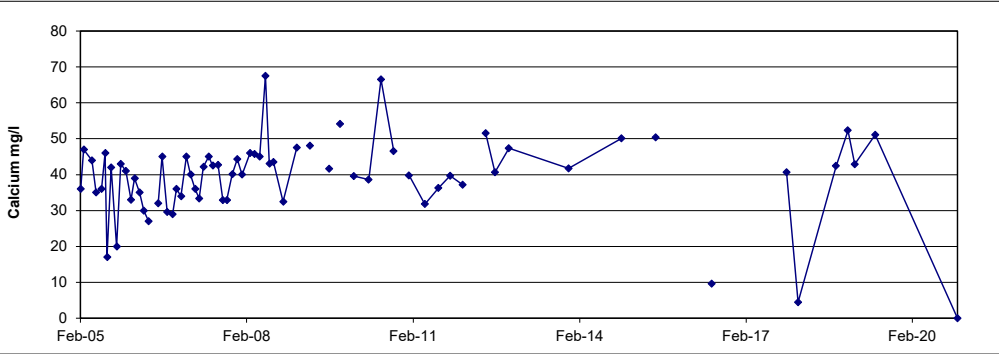
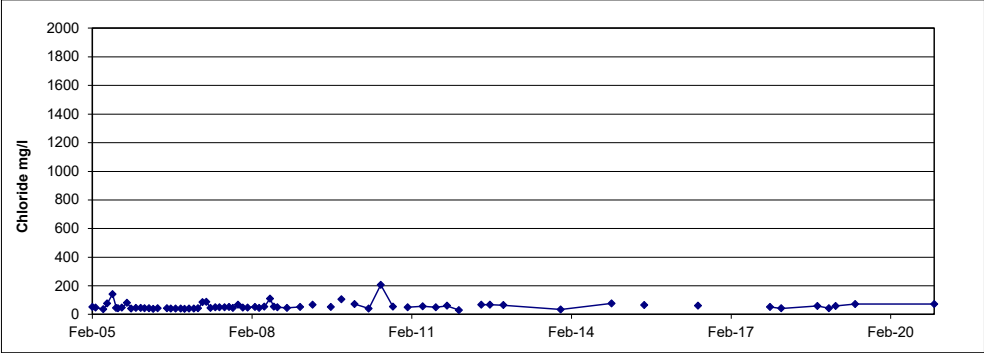
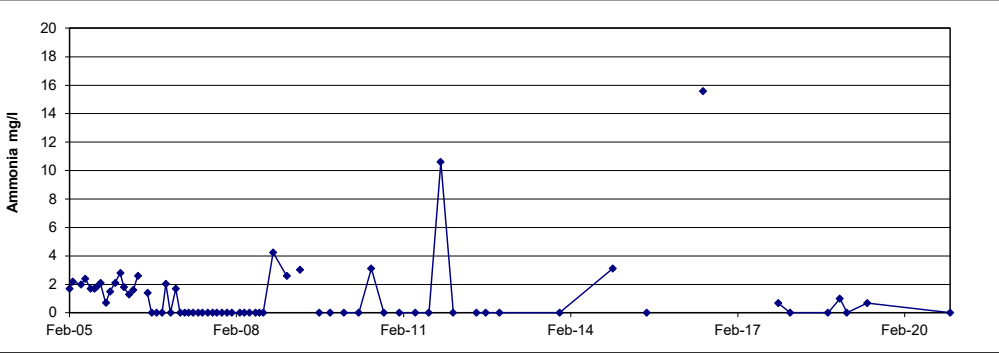
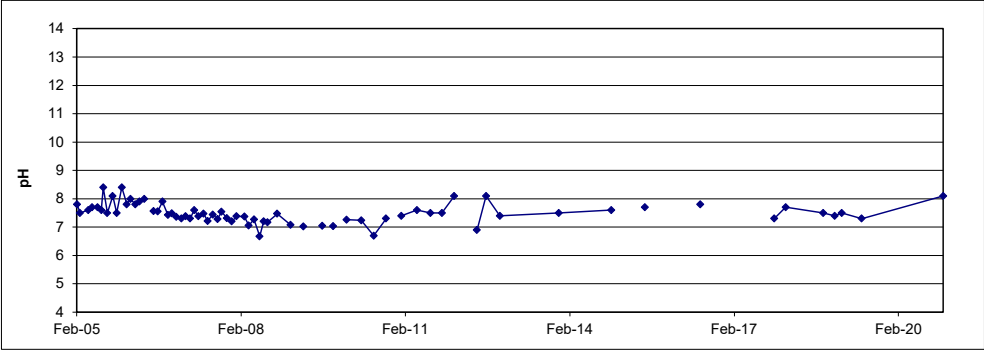
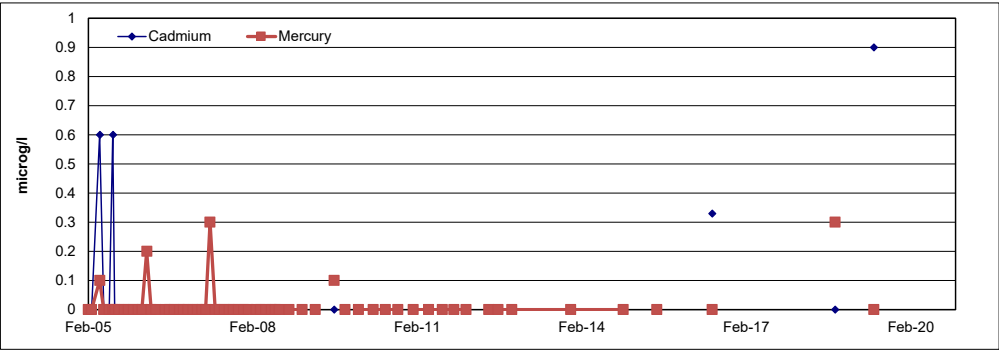


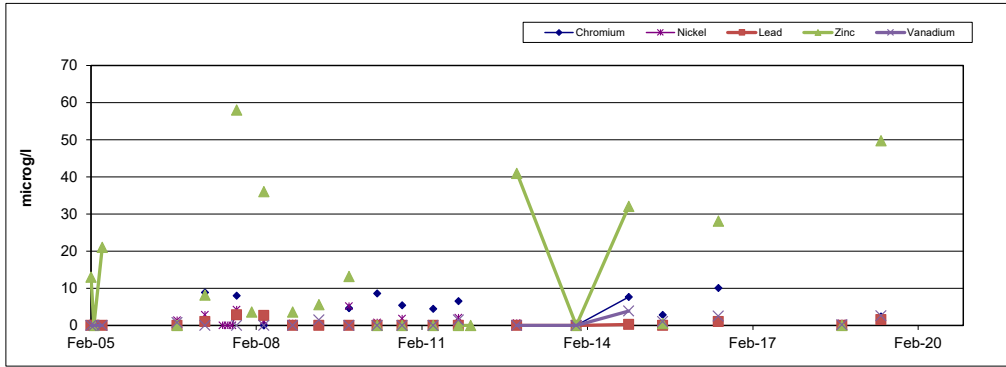
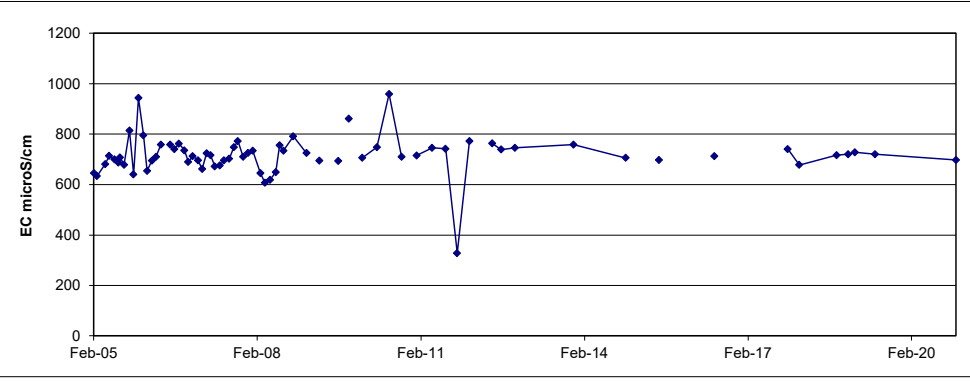
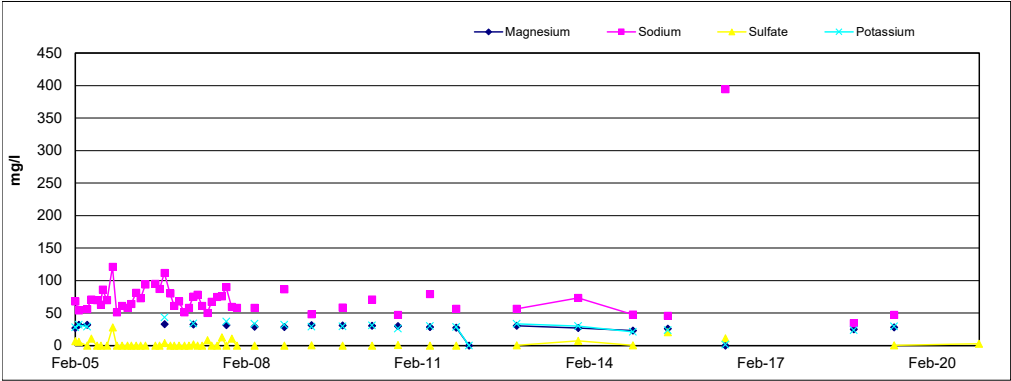
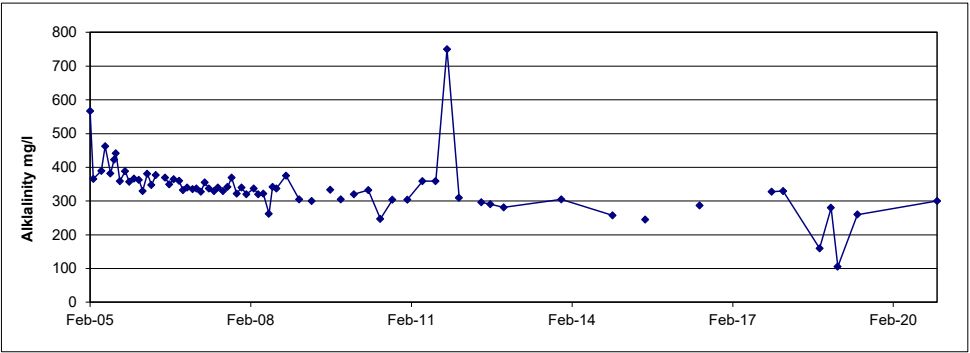
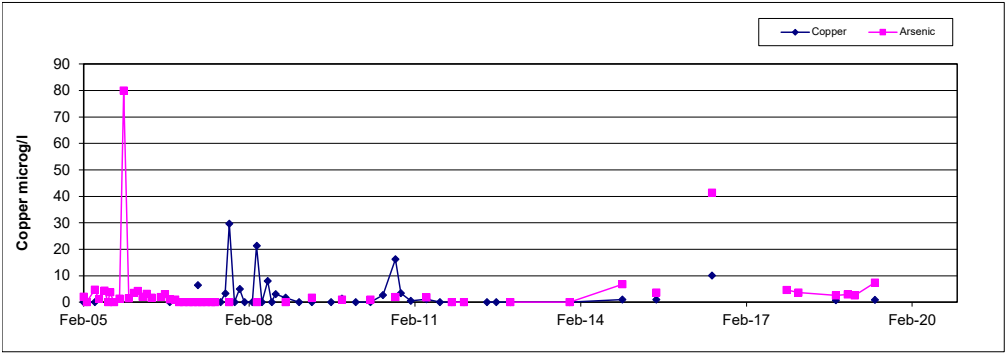


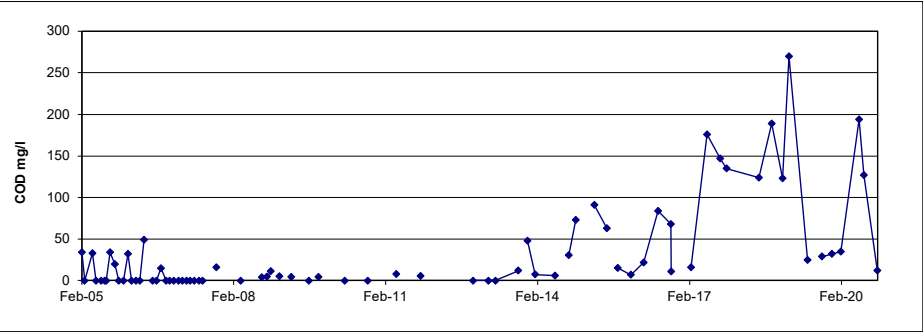
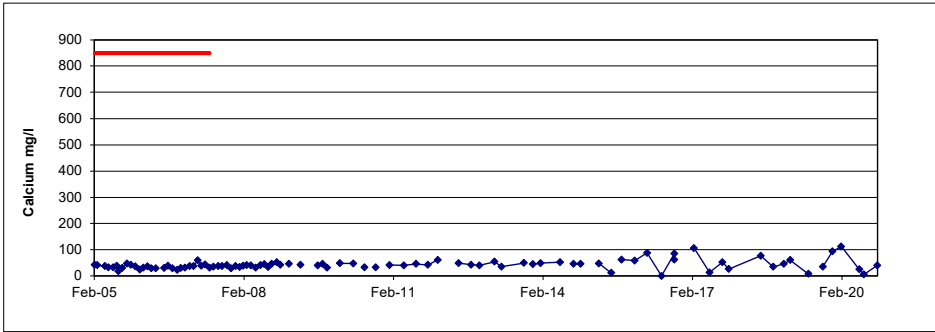
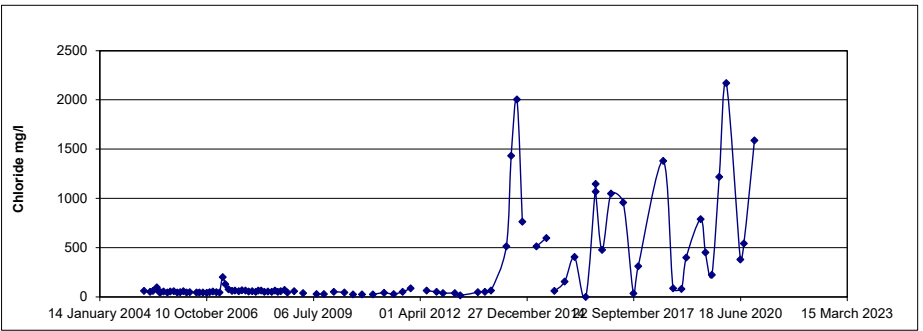
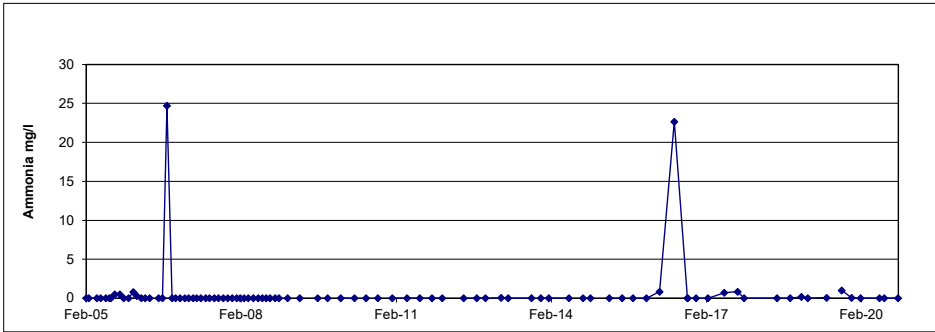
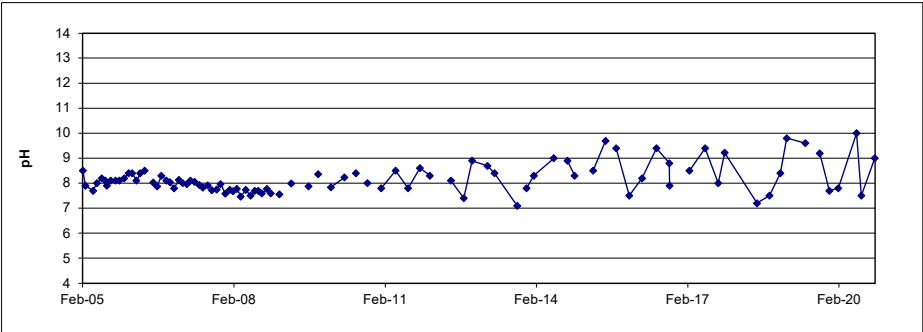
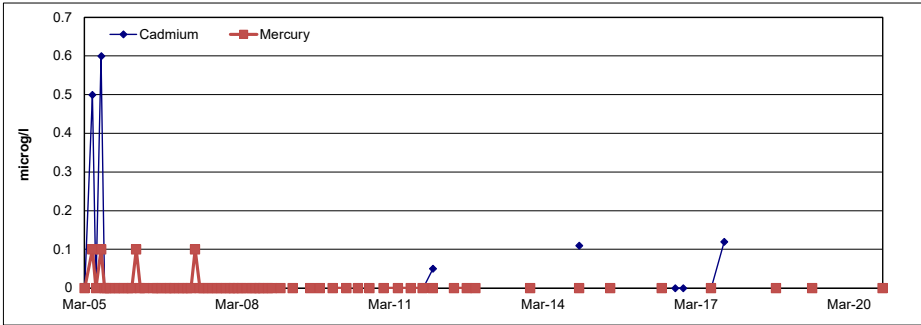


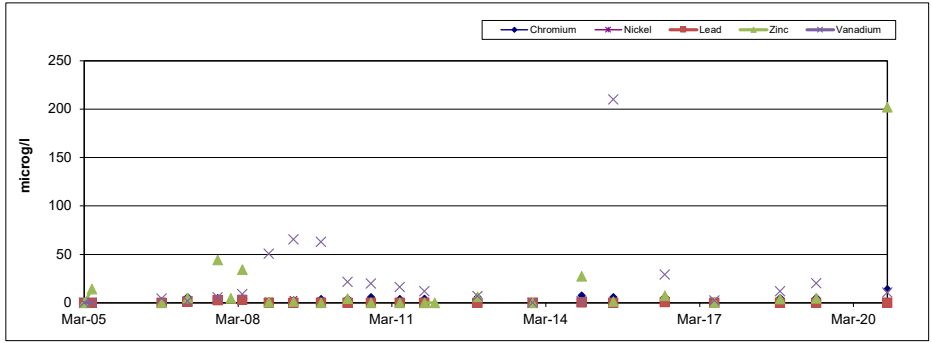
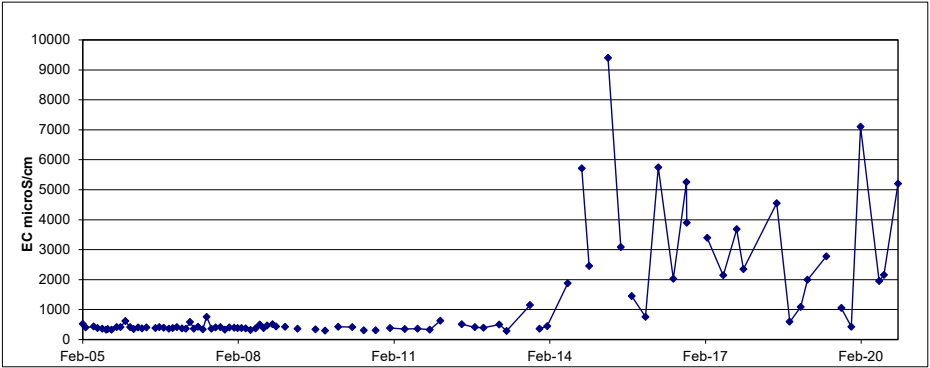
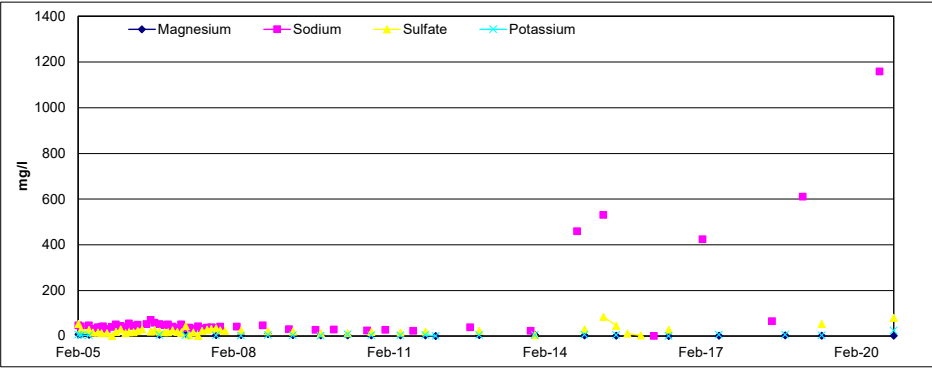
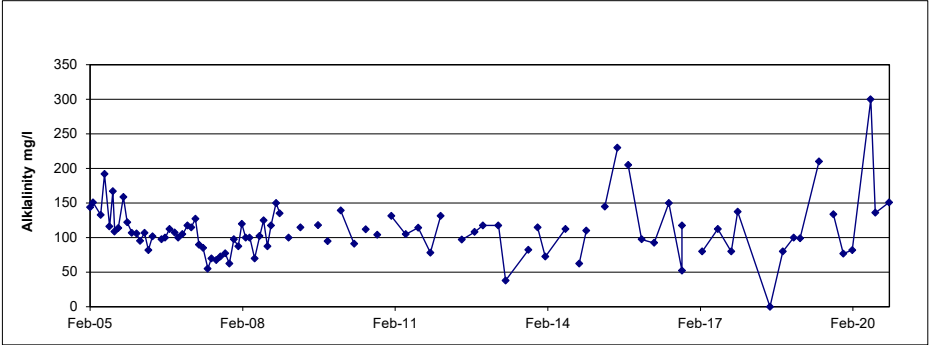
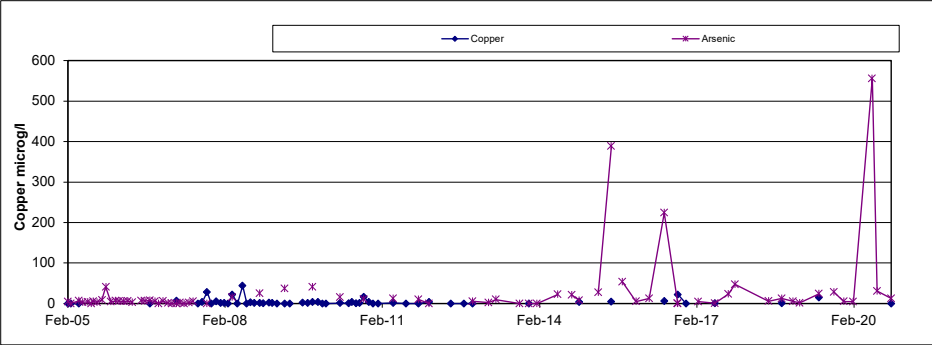


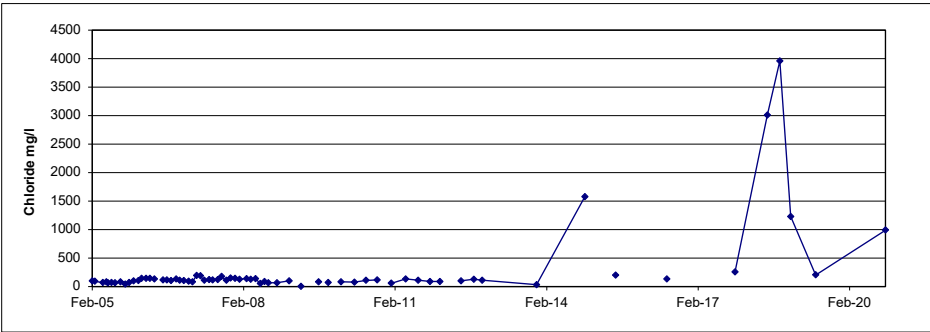
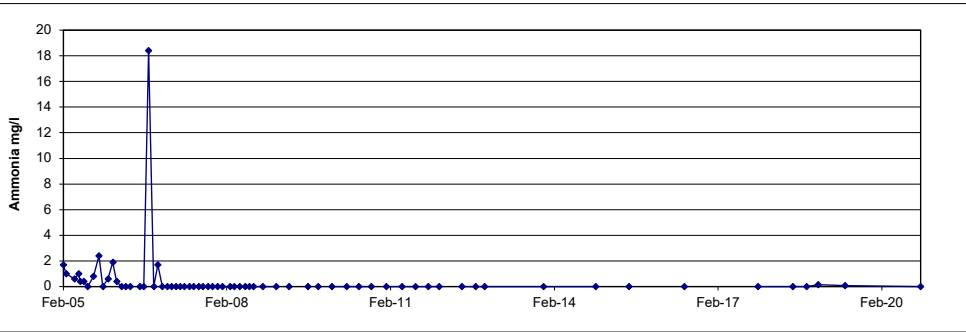
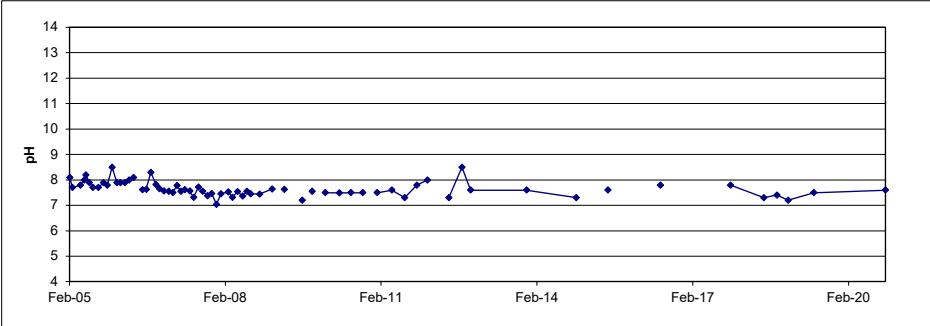
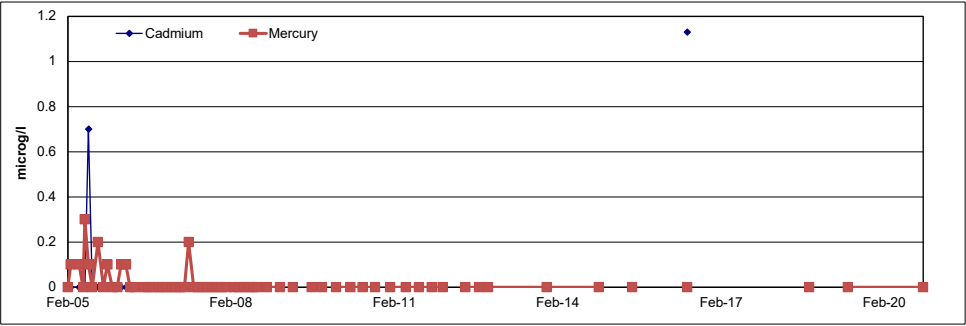


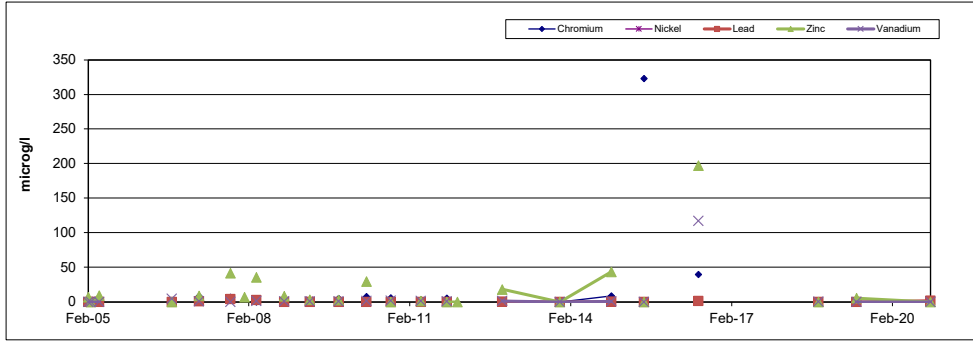
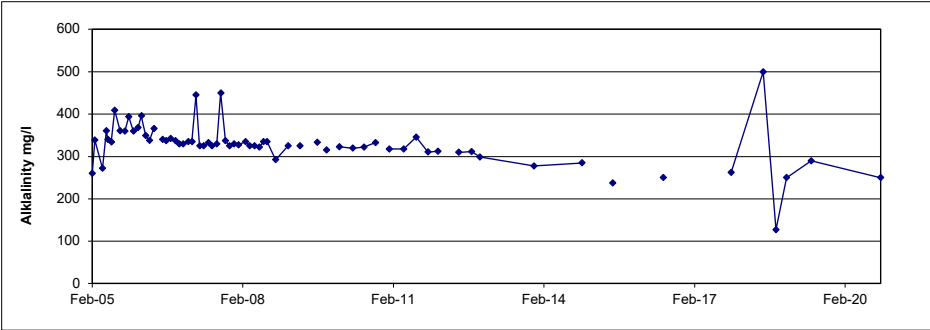
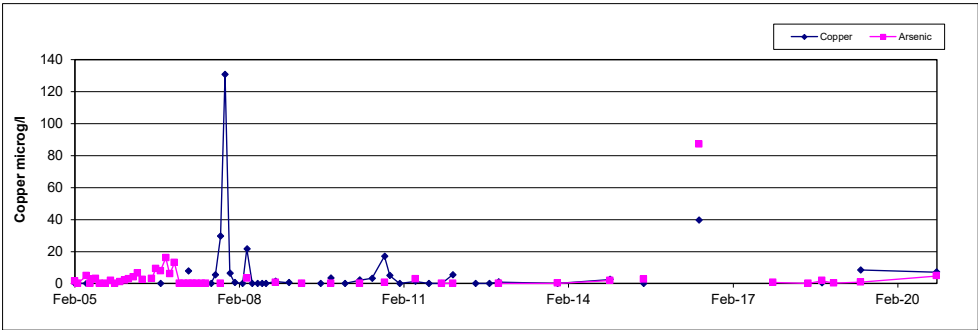
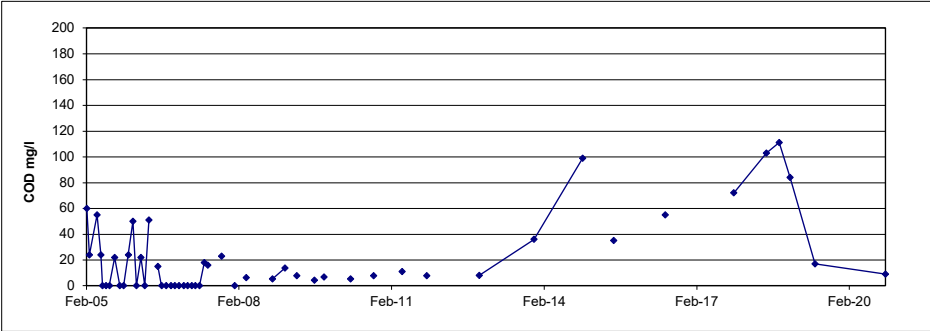
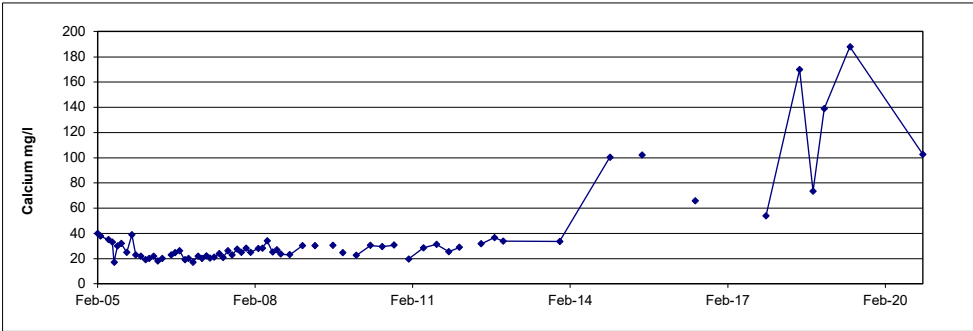


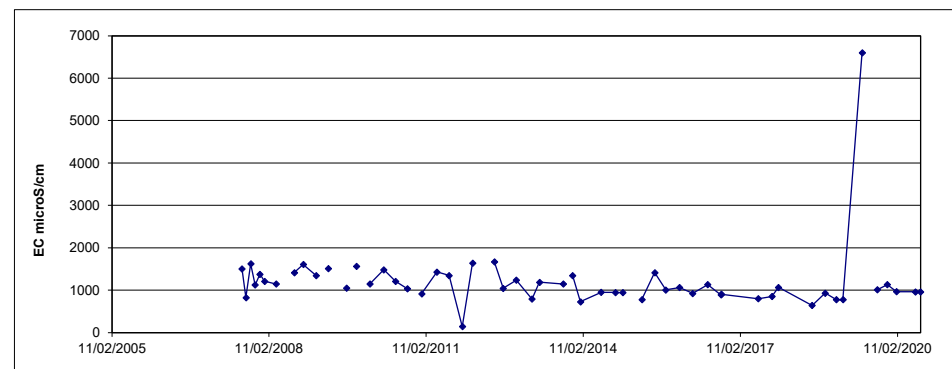
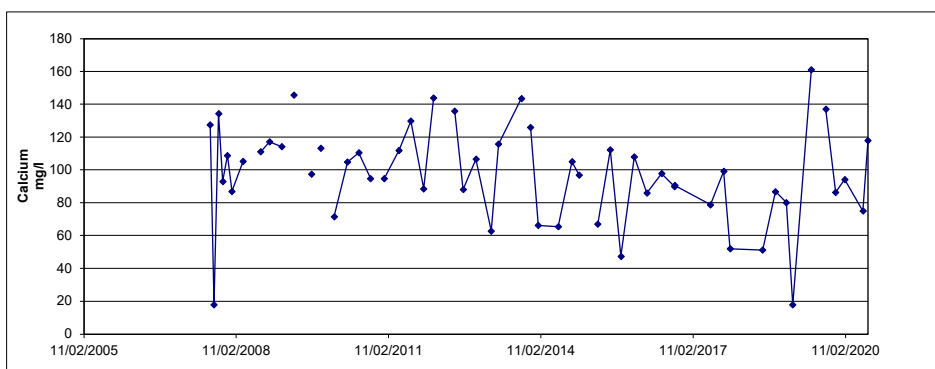
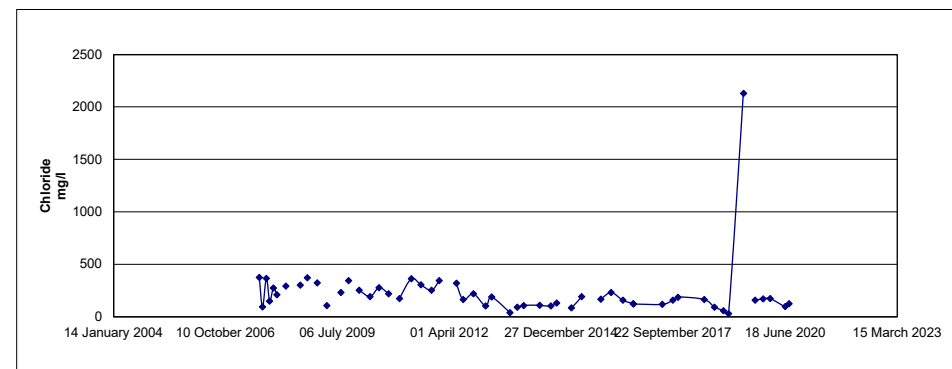
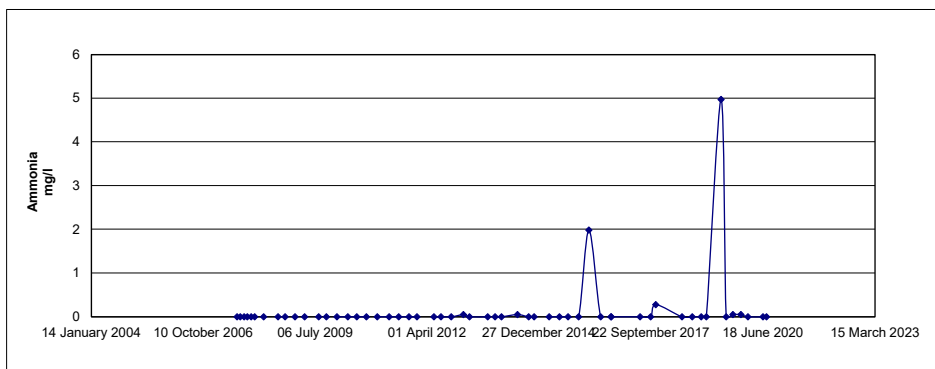
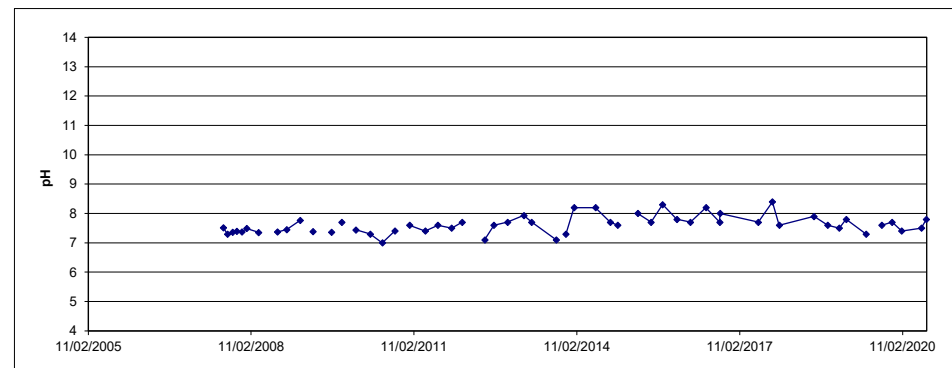
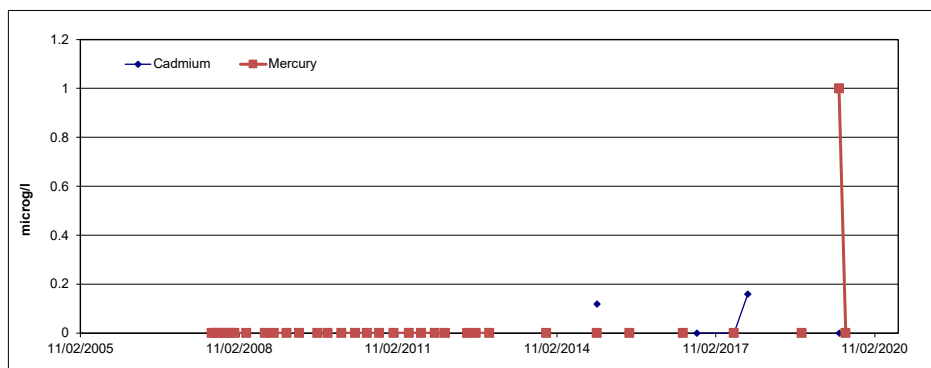


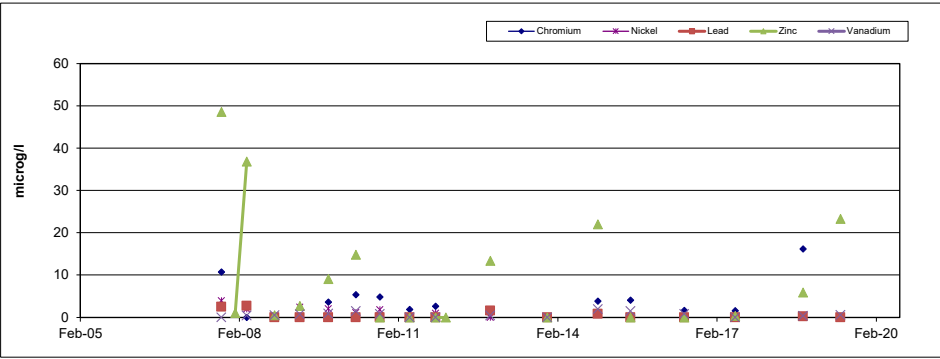
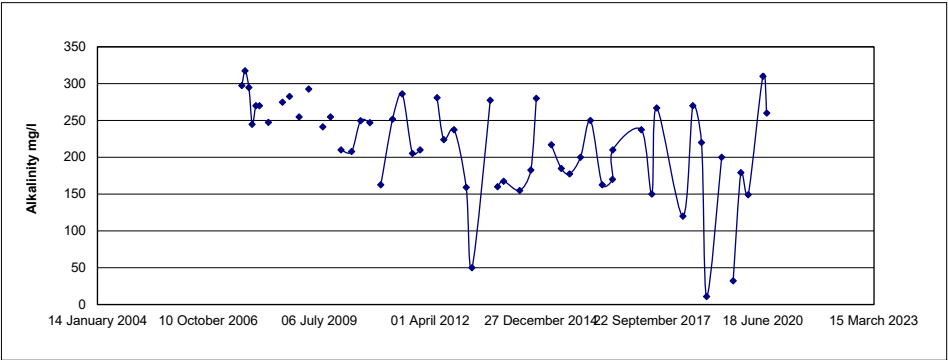
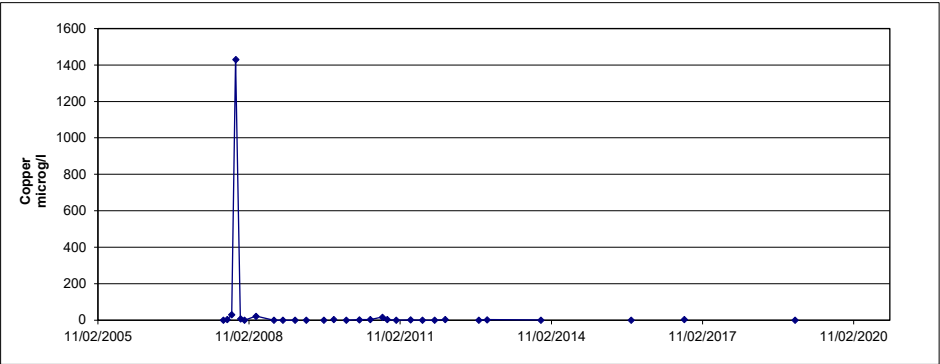


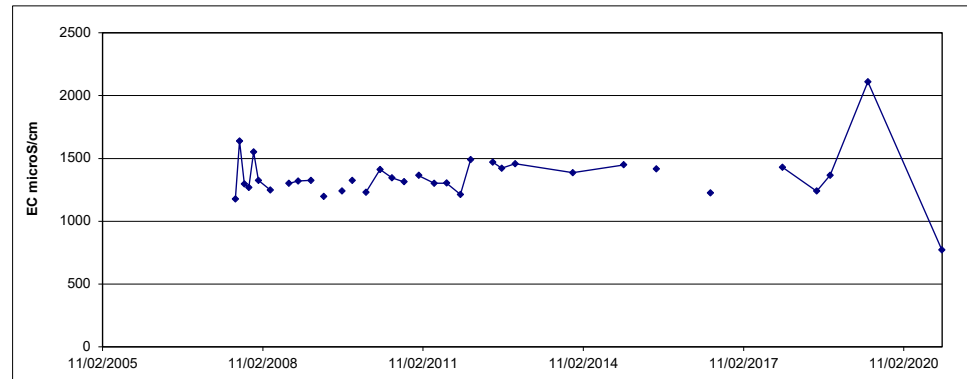
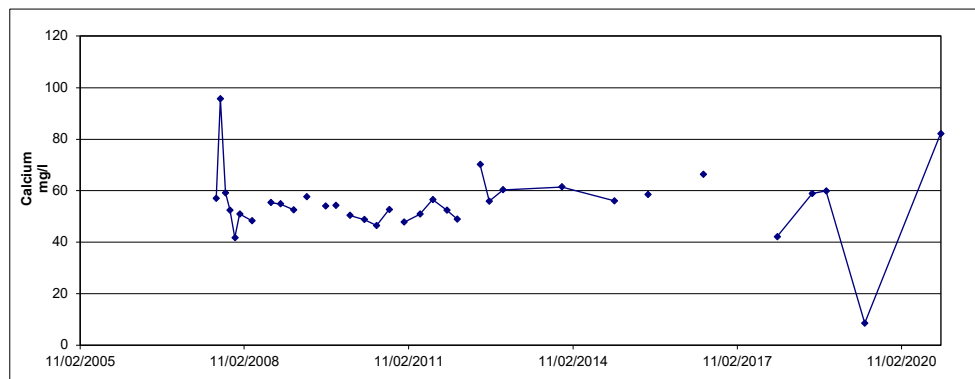
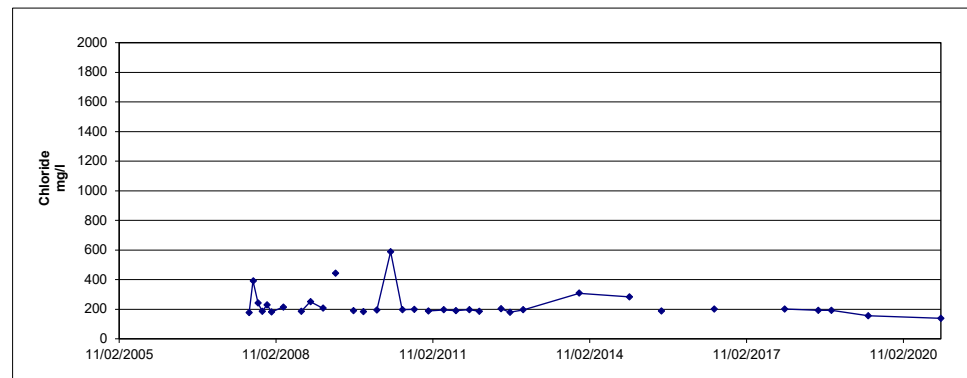
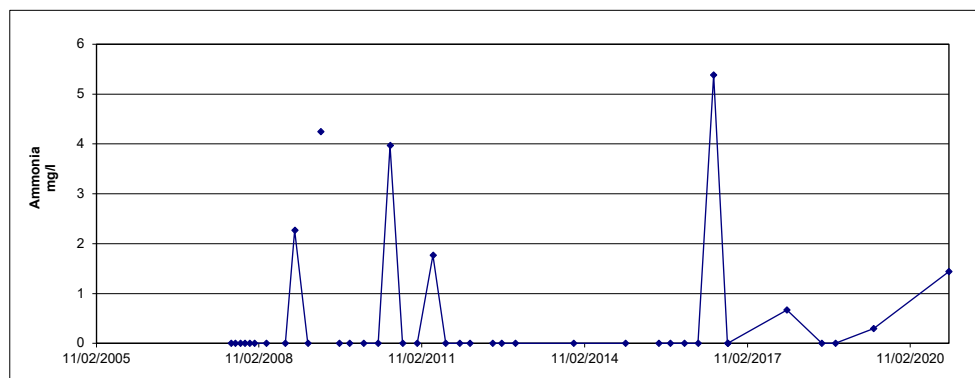
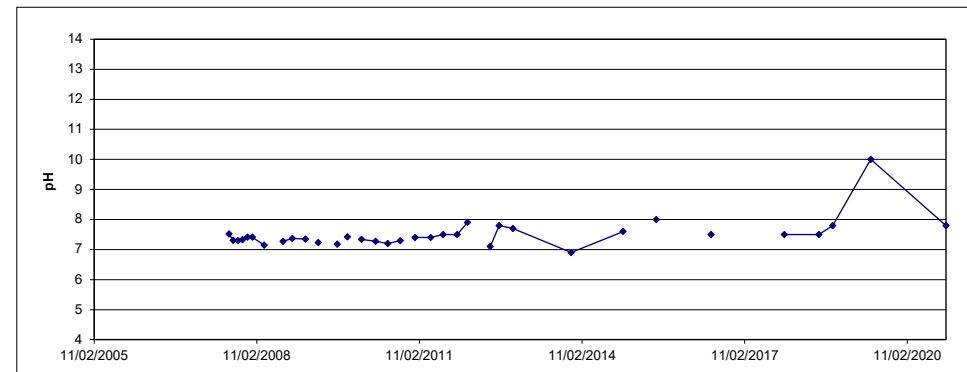
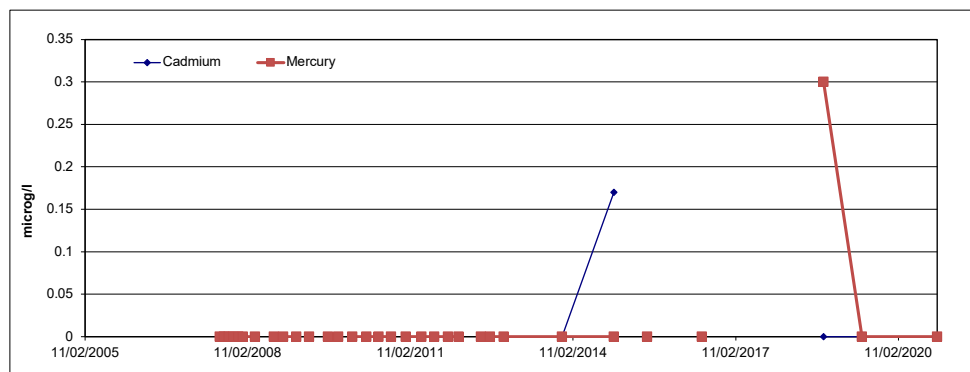


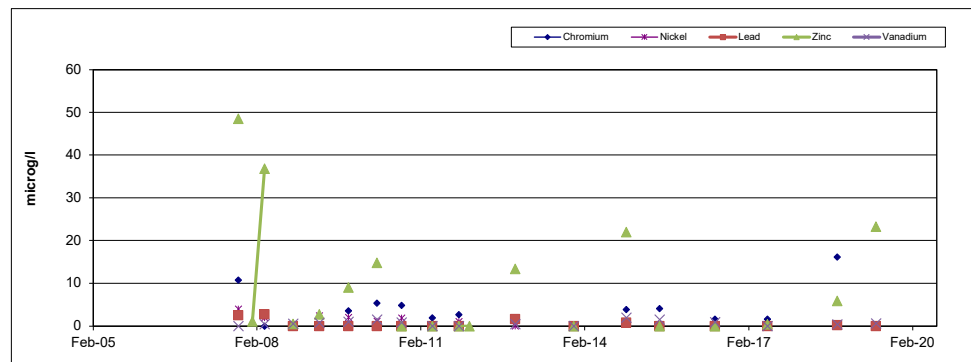
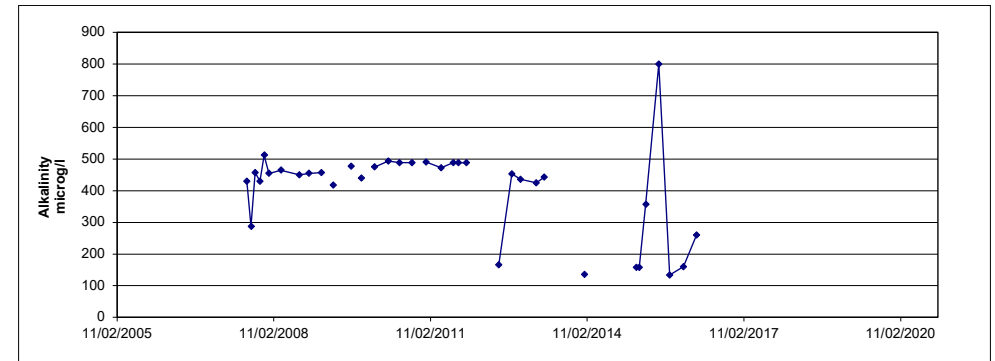
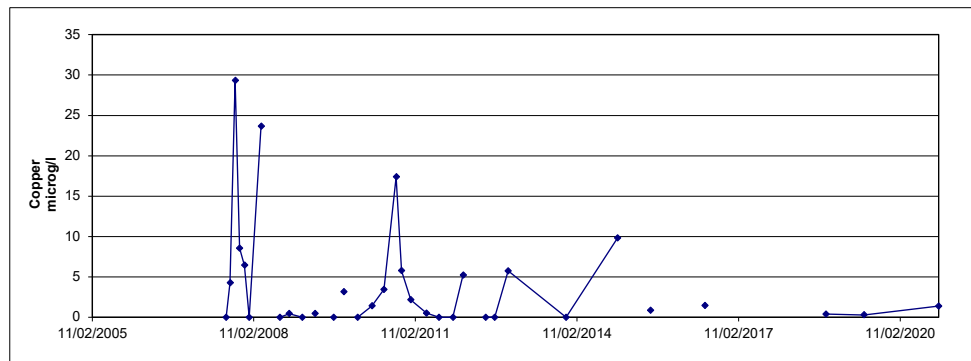


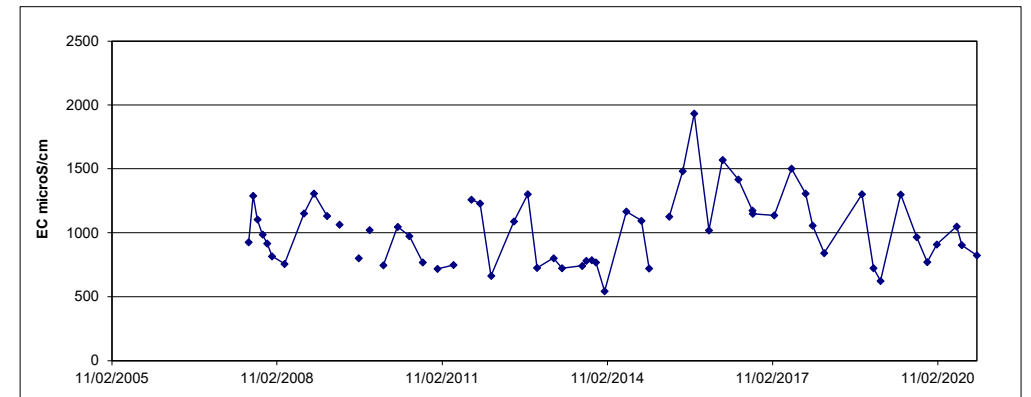
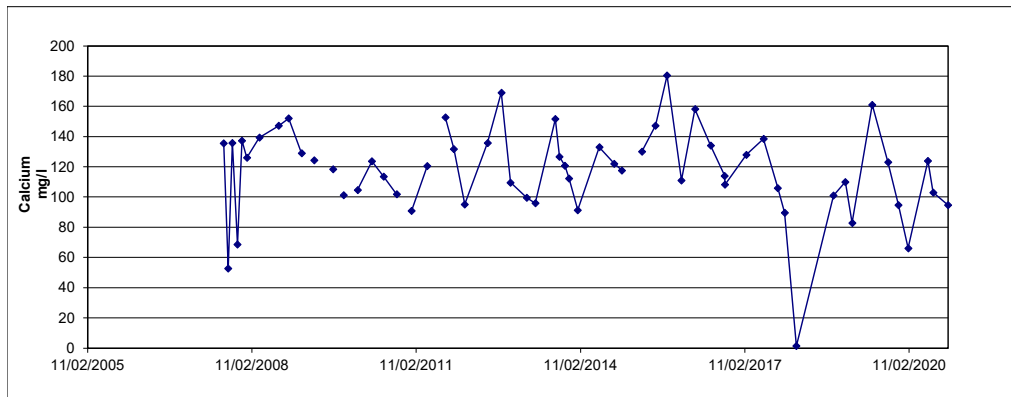
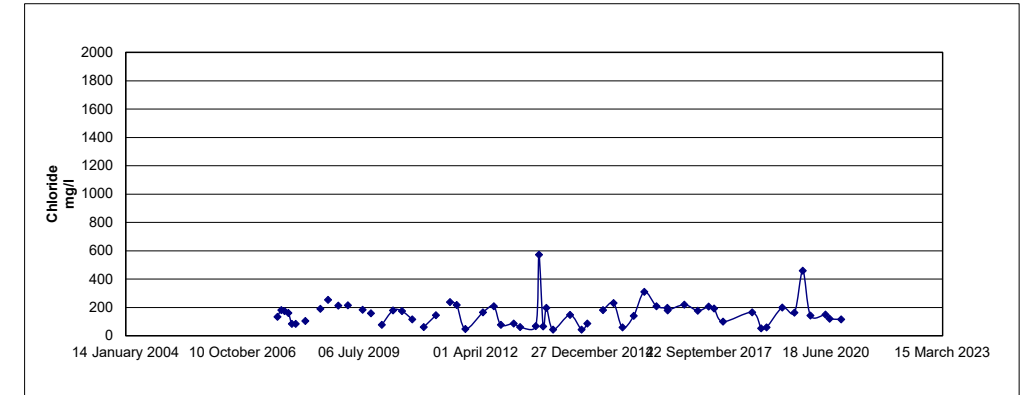
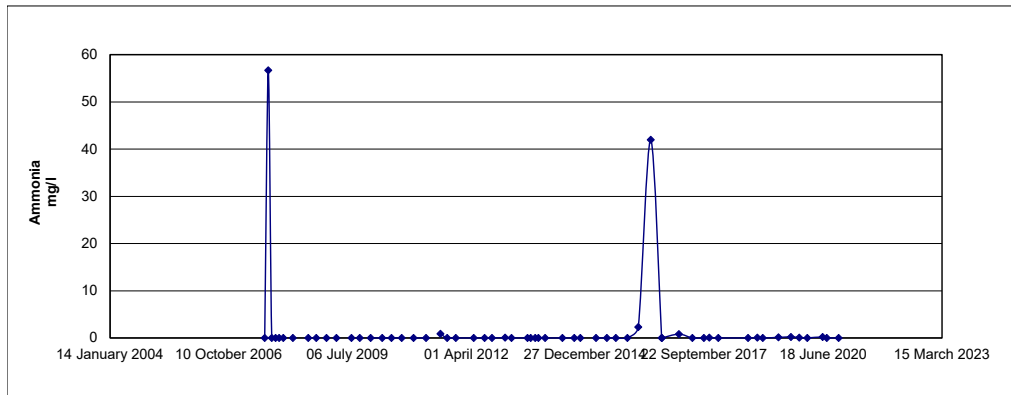
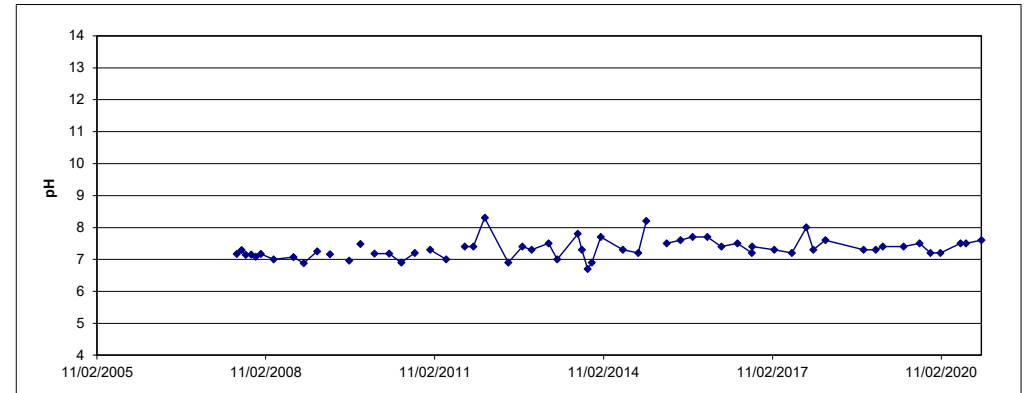
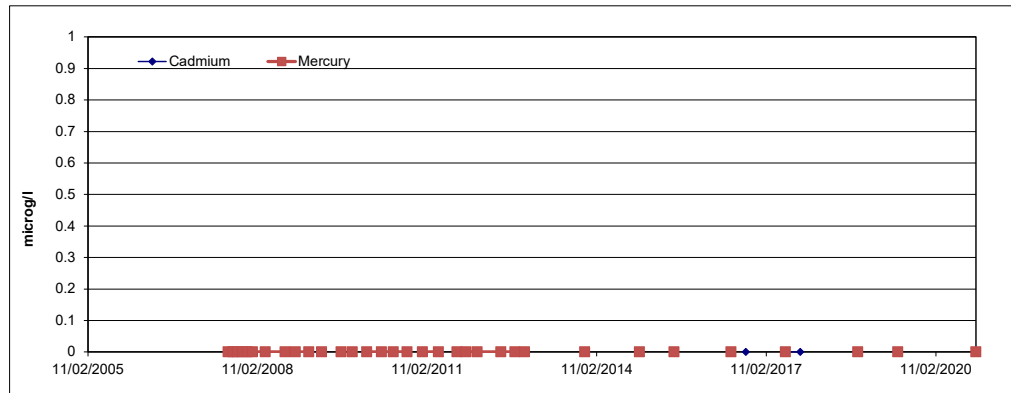


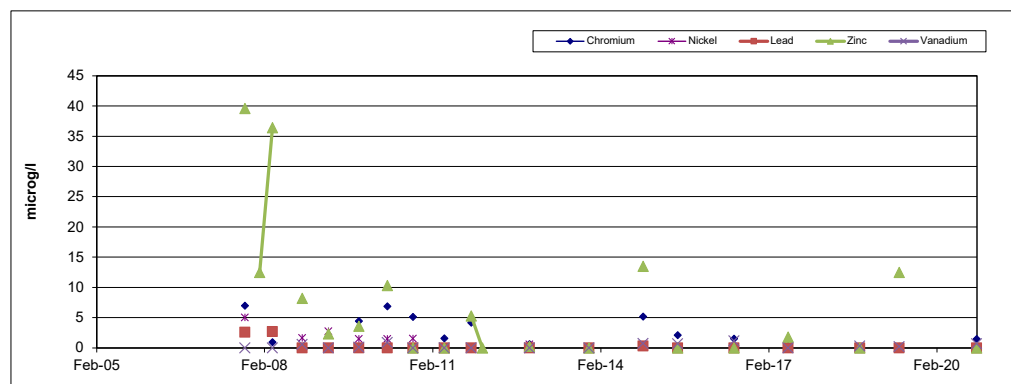
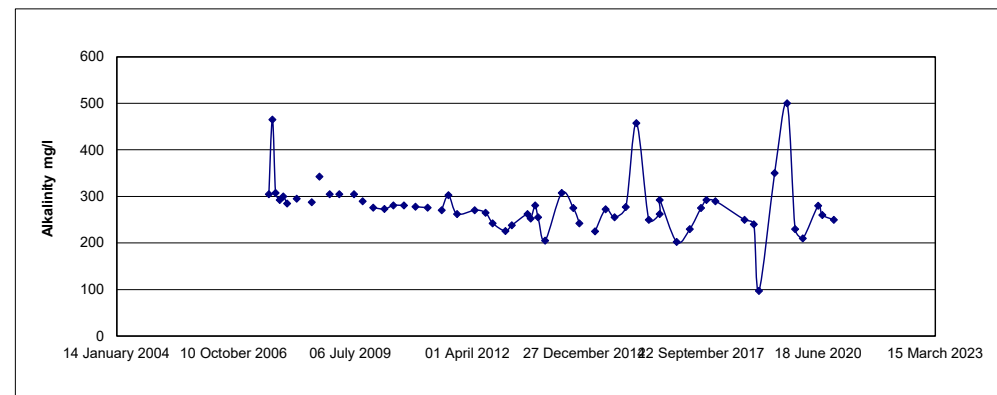
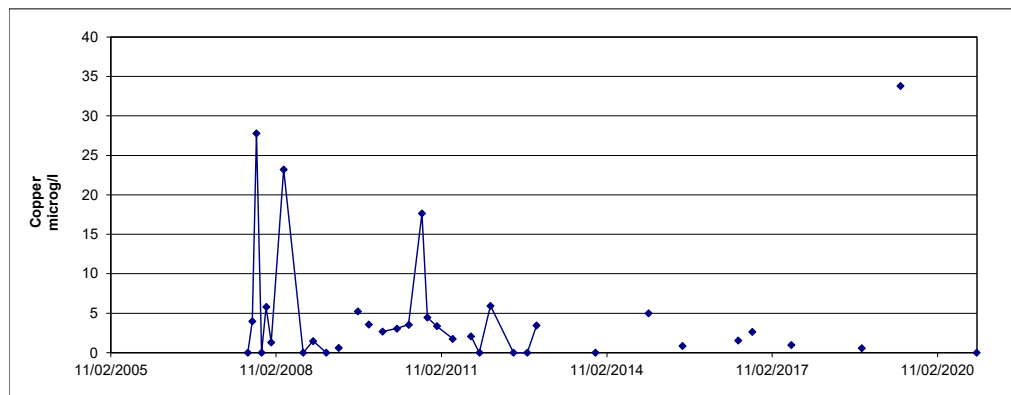


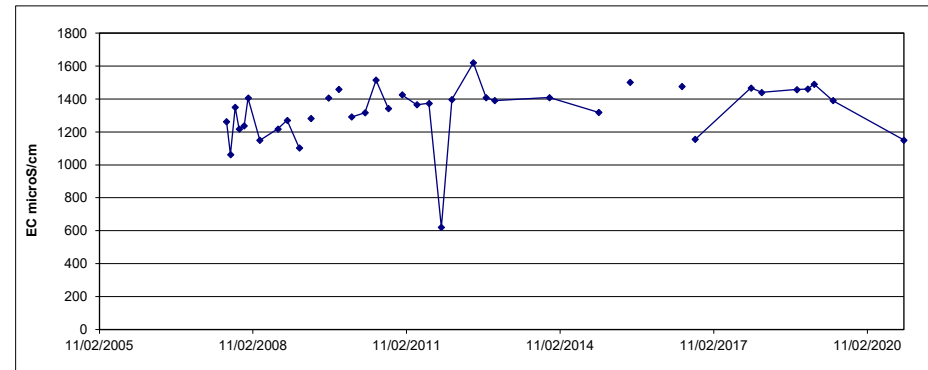
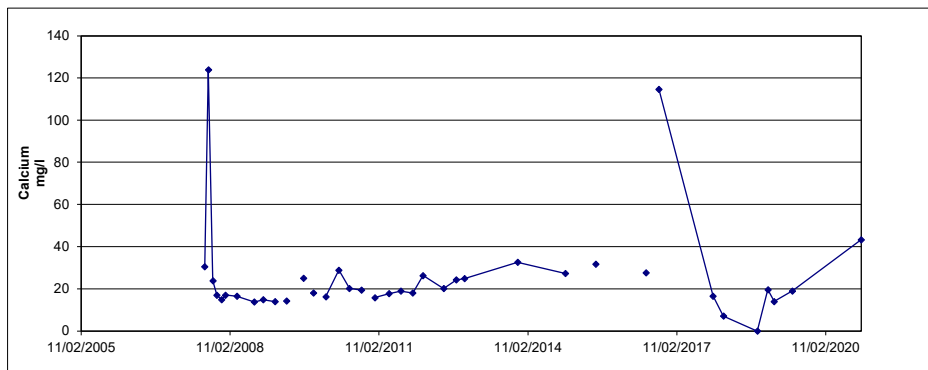
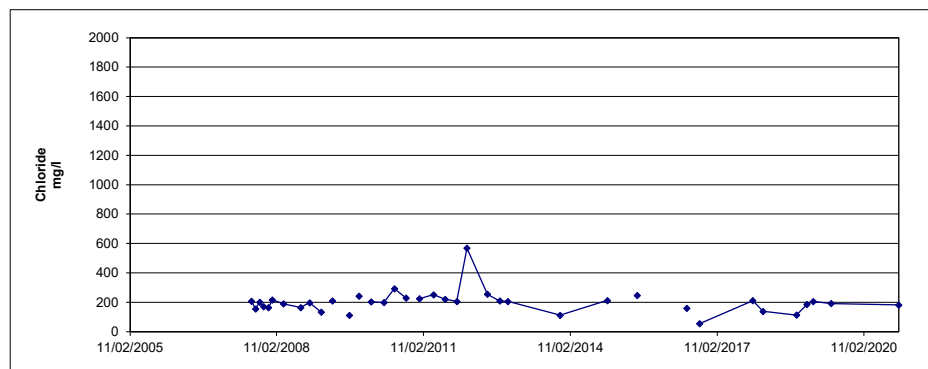
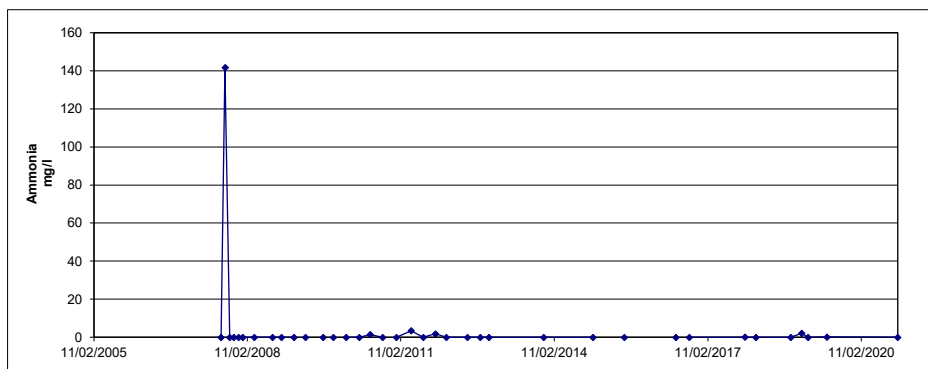
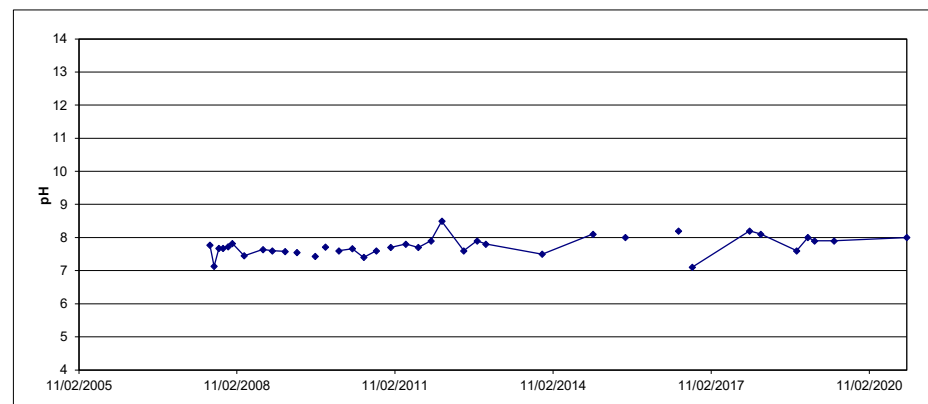
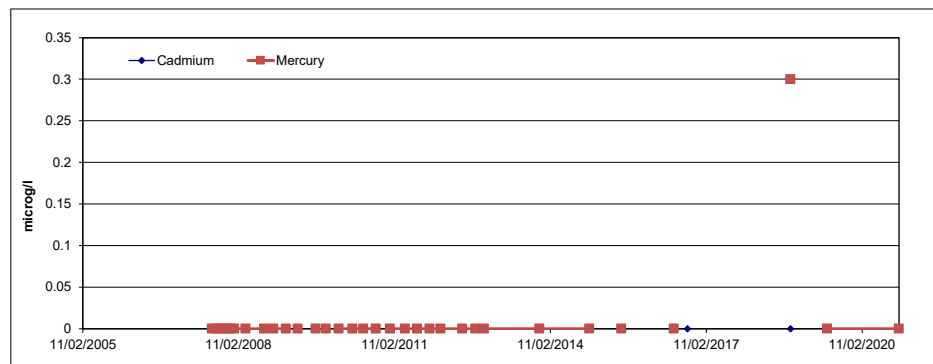


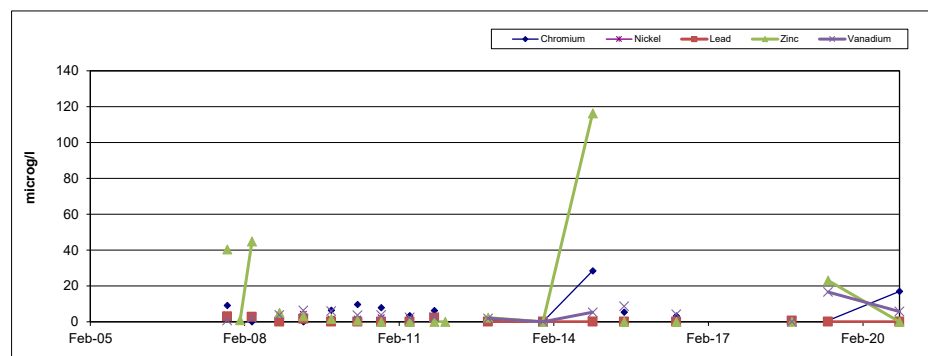
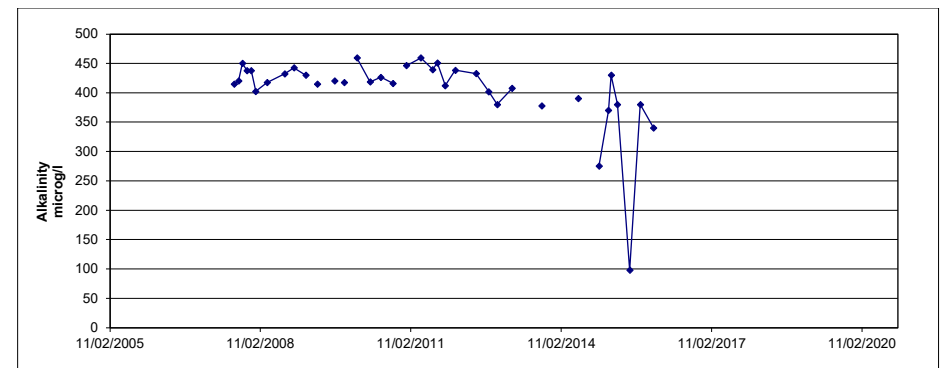
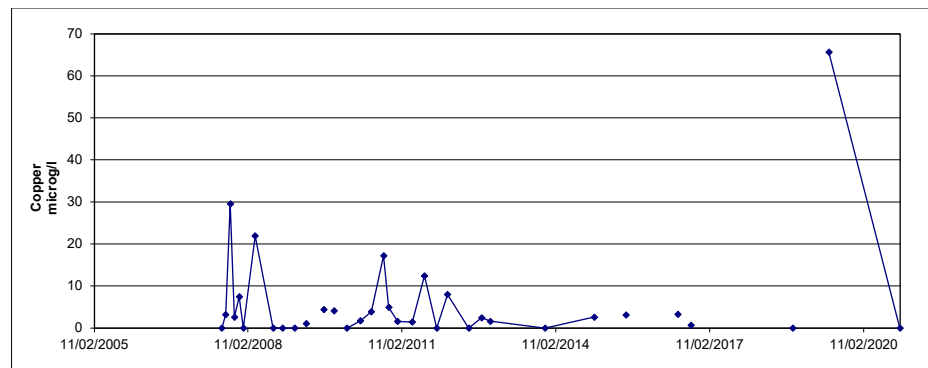












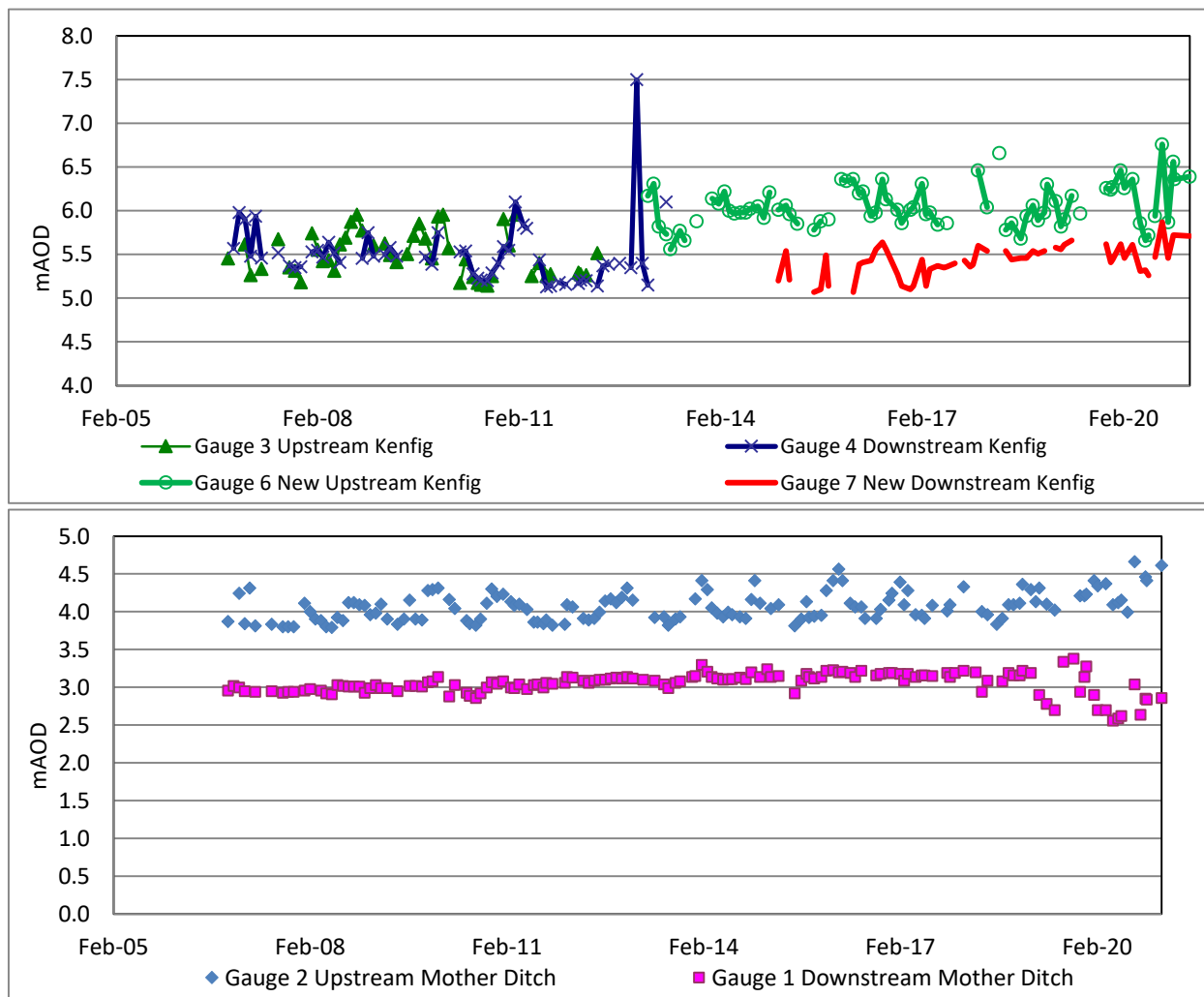
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 6
Temporal Variation of
Surface Water Levels**

Report Number 2093r1v1d0221



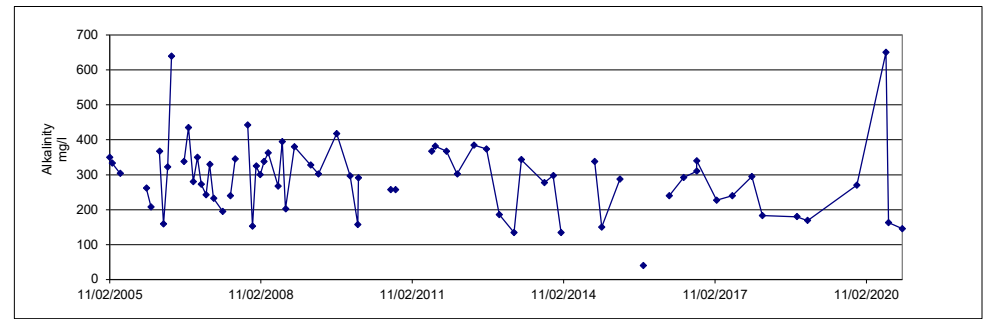
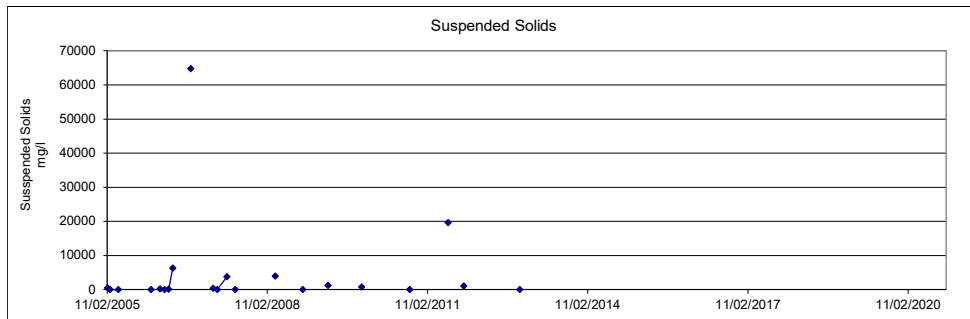
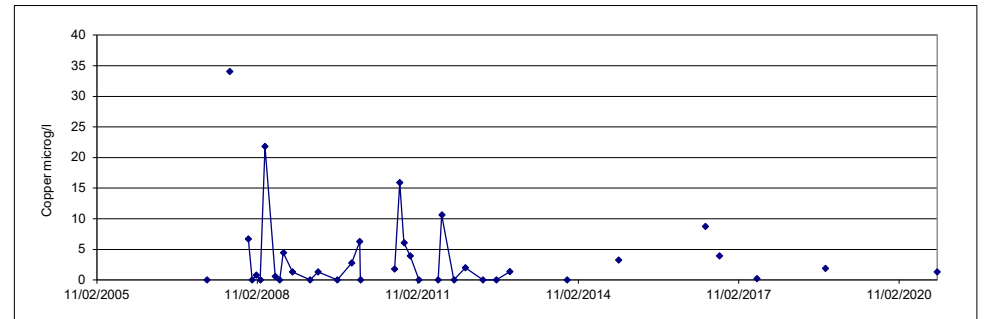
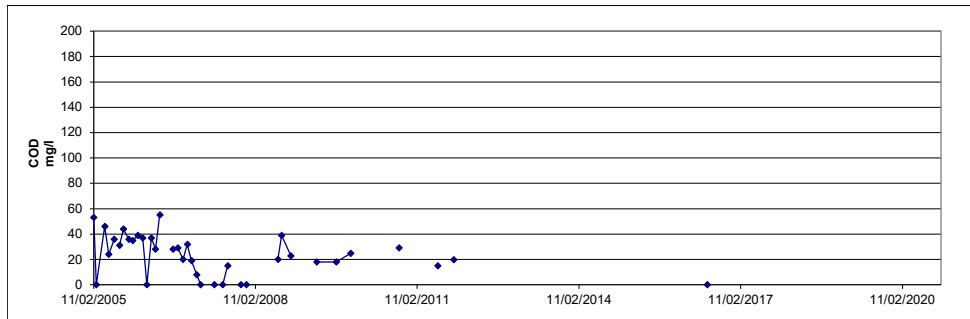
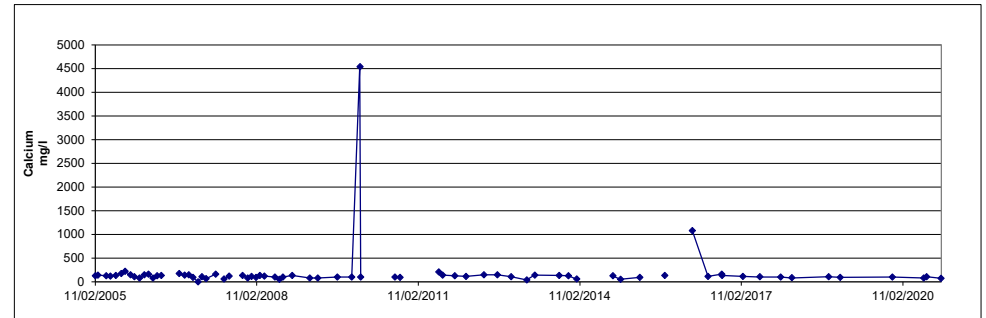
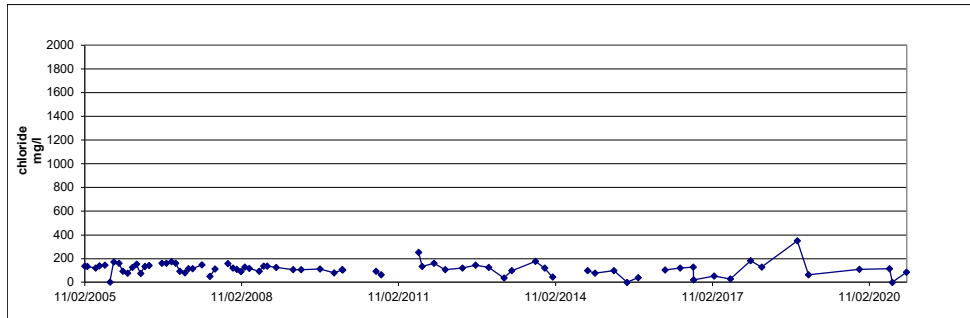
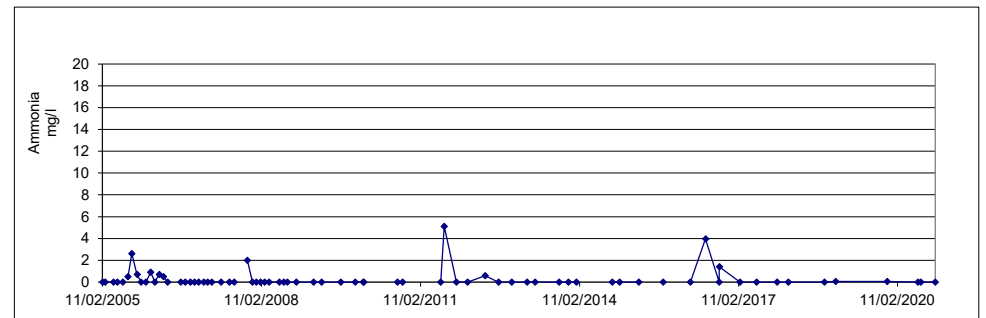
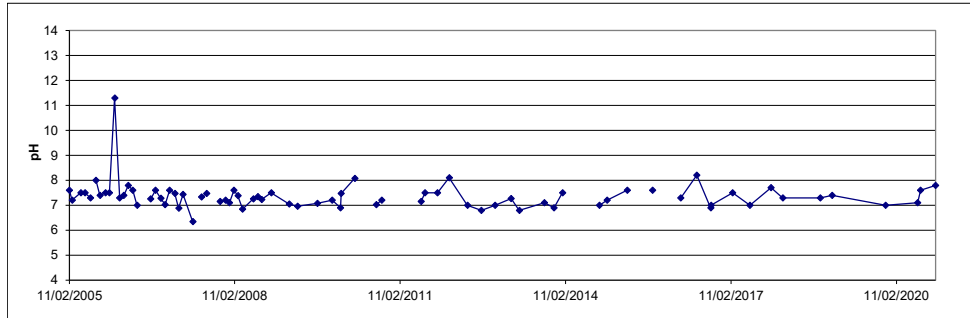
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

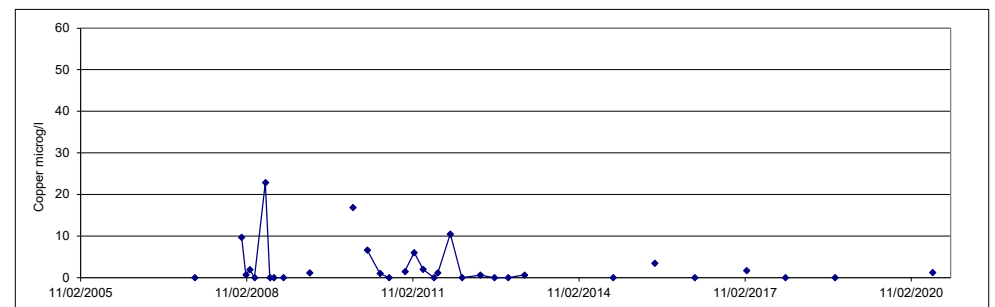
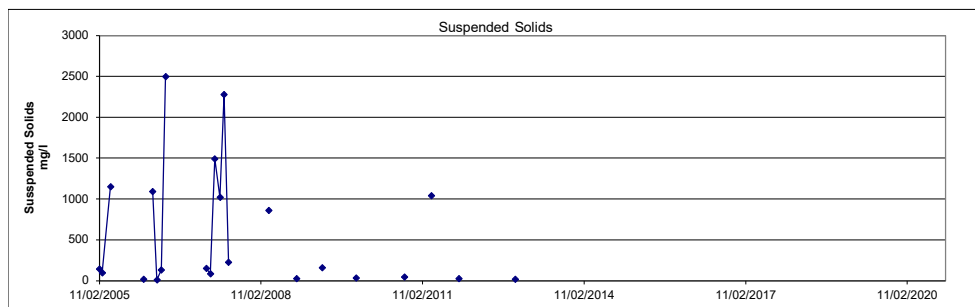
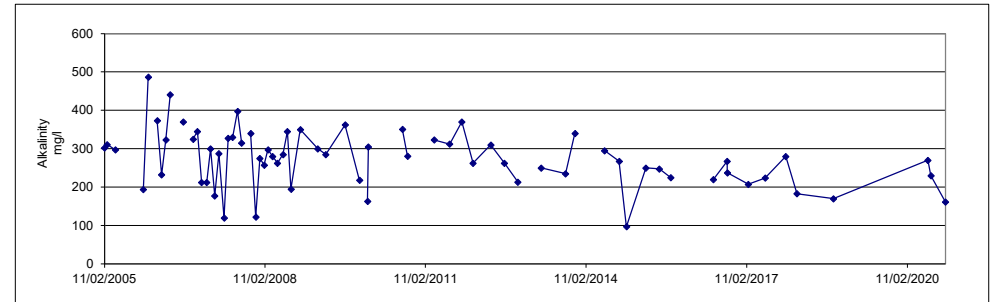
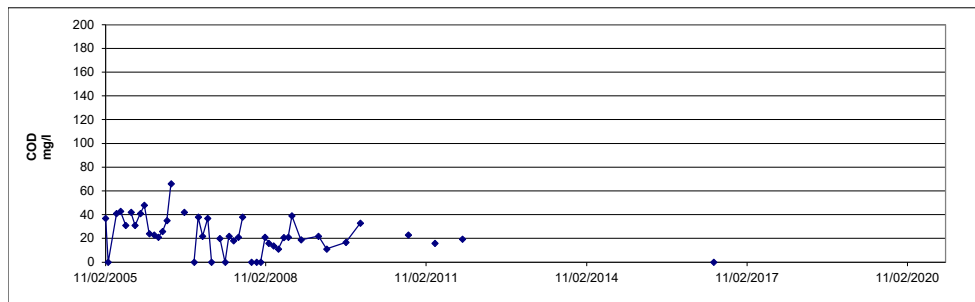
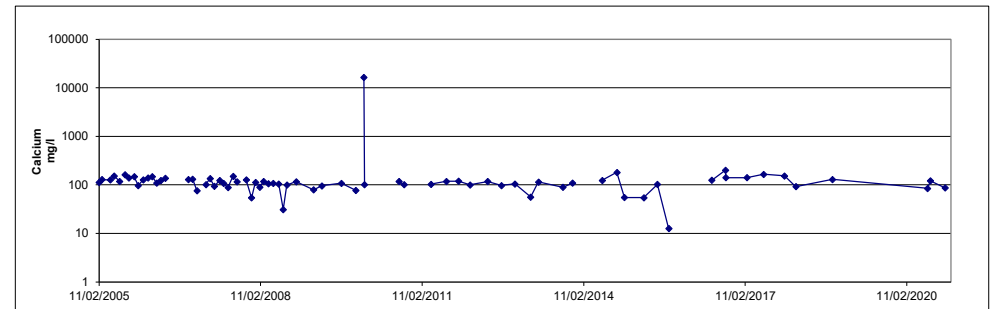
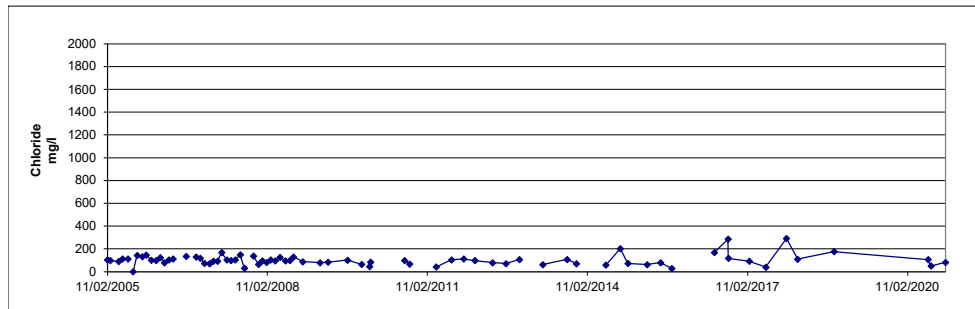
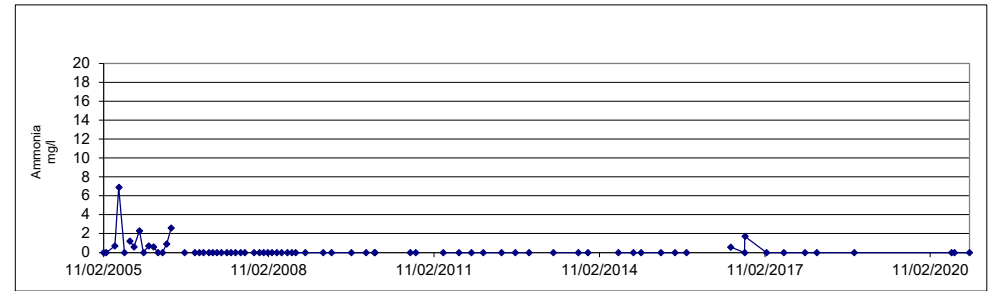
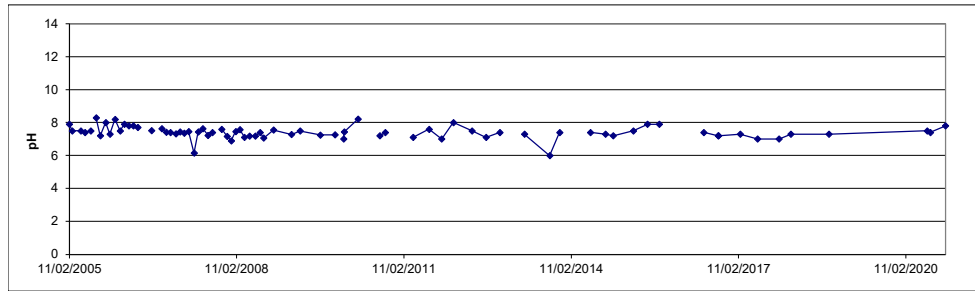
PERMIT BW2692IM

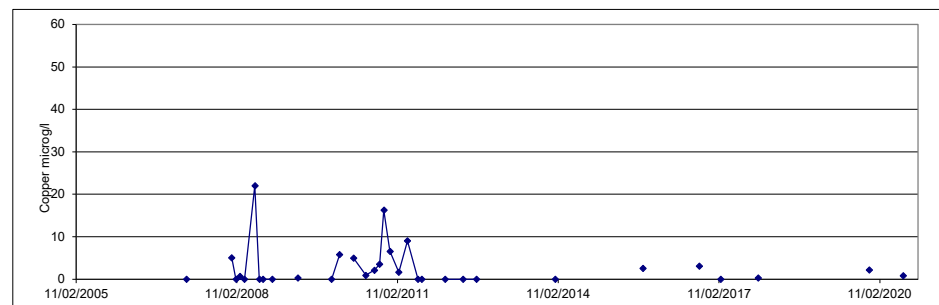
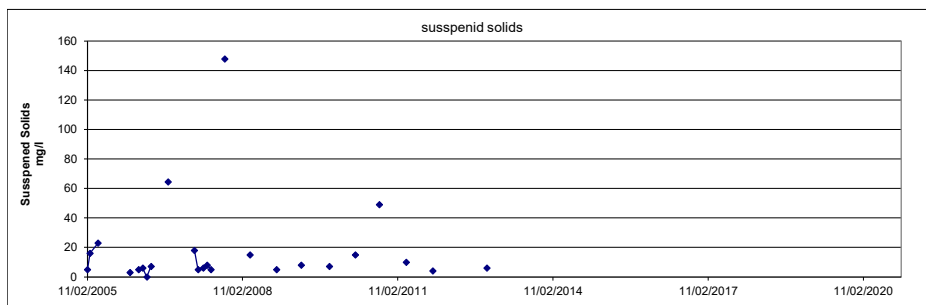
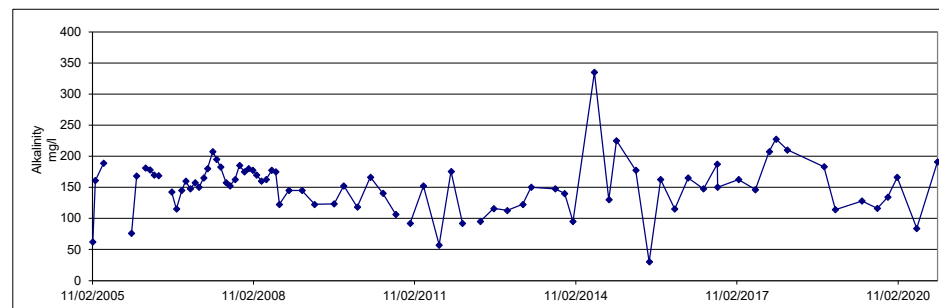
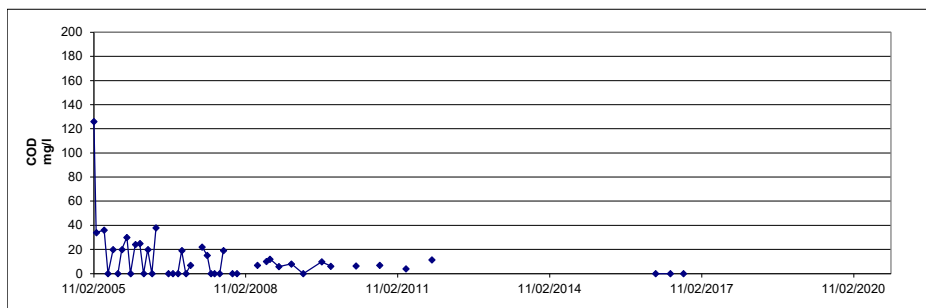
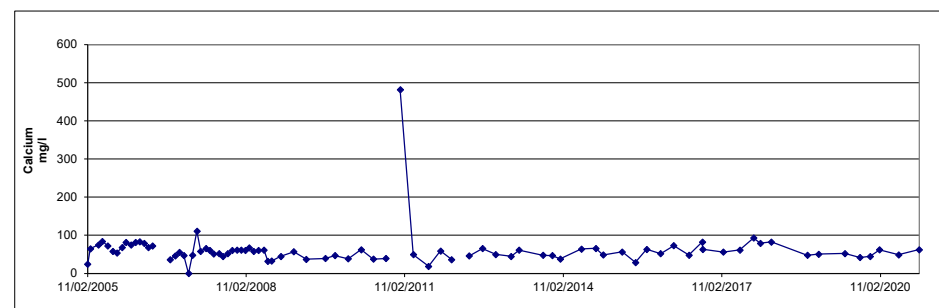
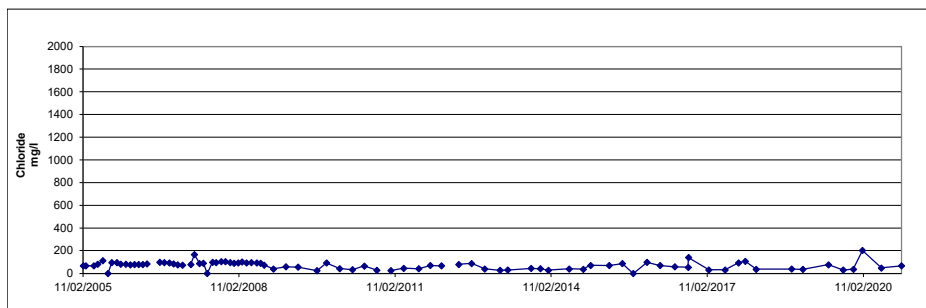
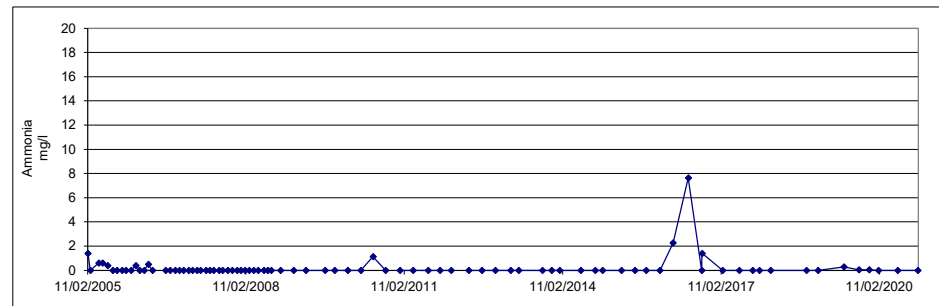
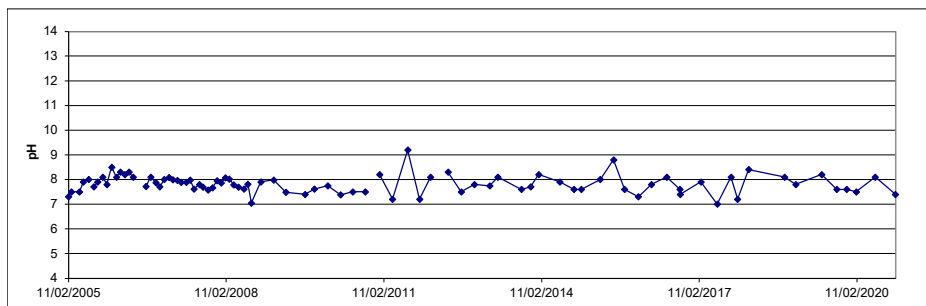
**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 7
Temporal Variation of
Surface Water
Chemistry**

Report Number 2093r1v1d0221







**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

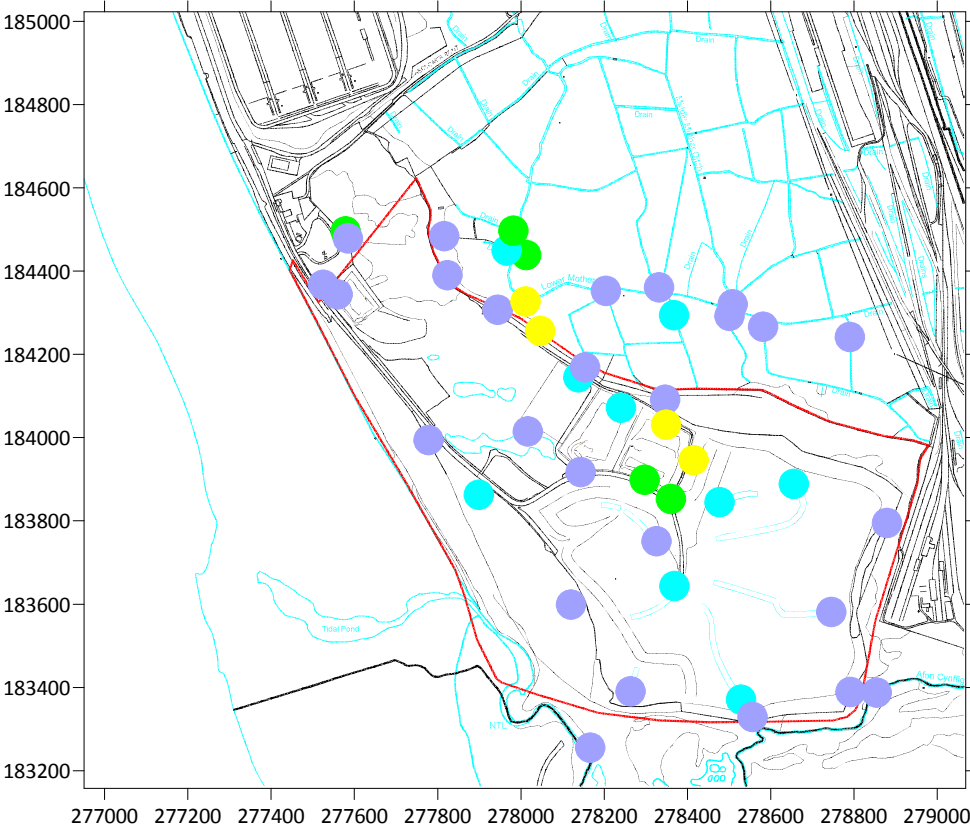
PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

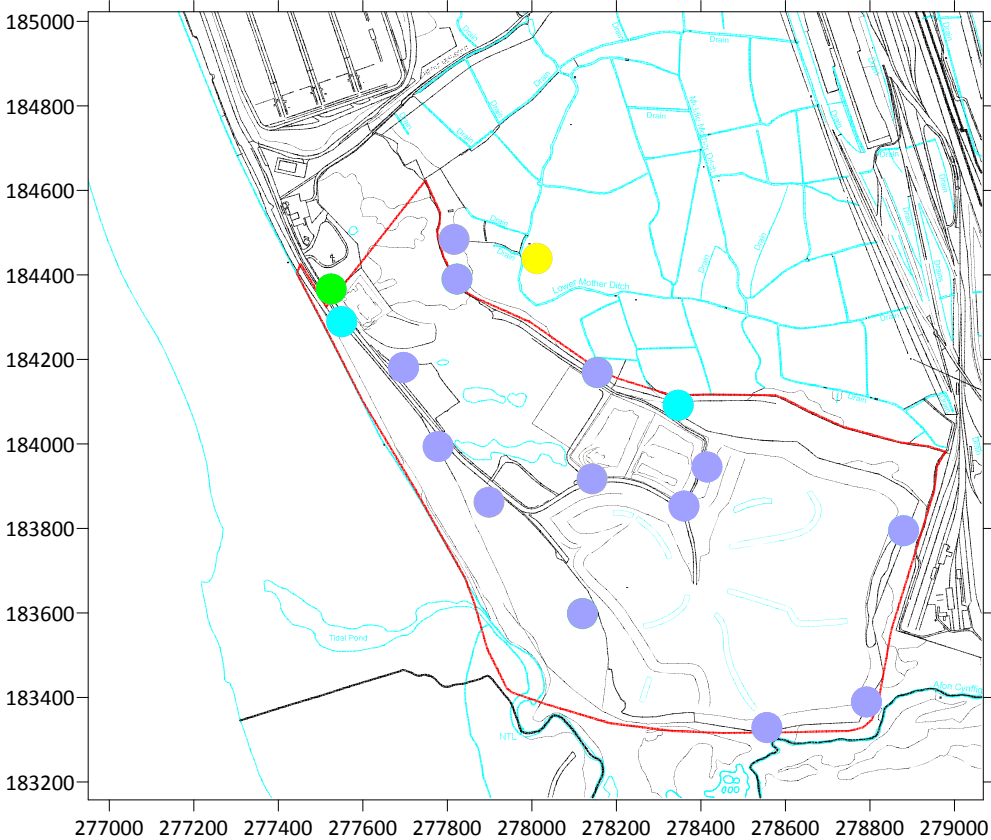
**Appendix 8
Spatial Distribution of
Key Parameters**

Report Number 2093r1v1d0221

Copper in Groundwater, Leachate and Surface Water (microg/l)

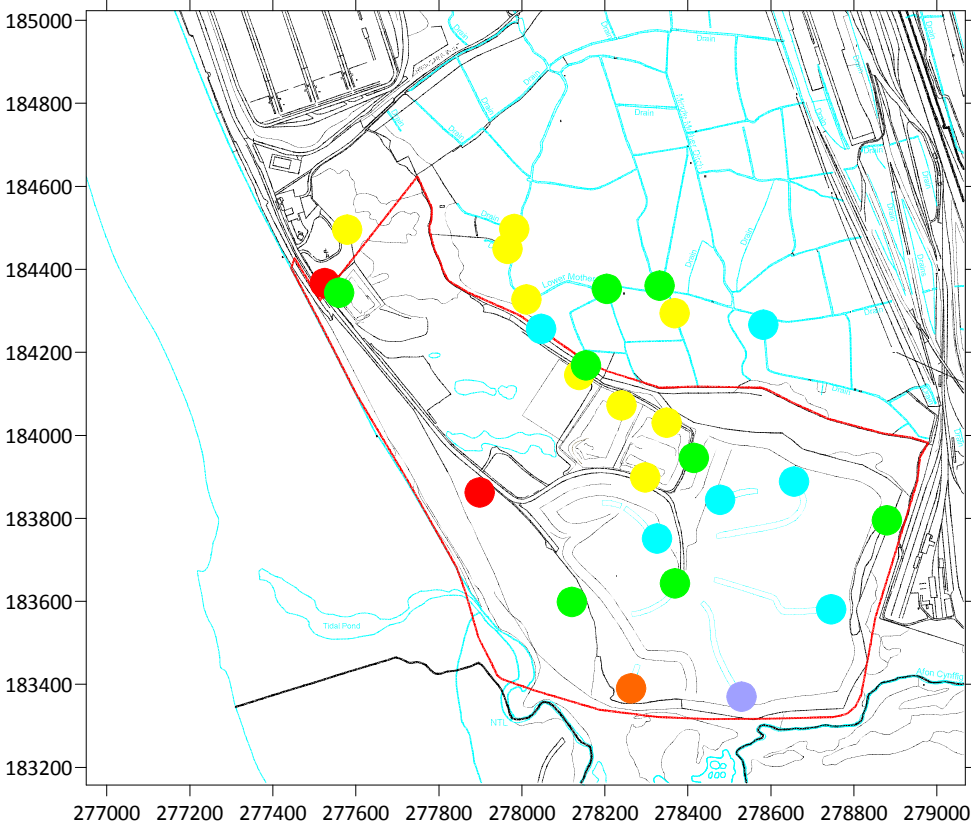


Q4, 2020 - Shallow GW, Leachate, Ponds and Surface Water

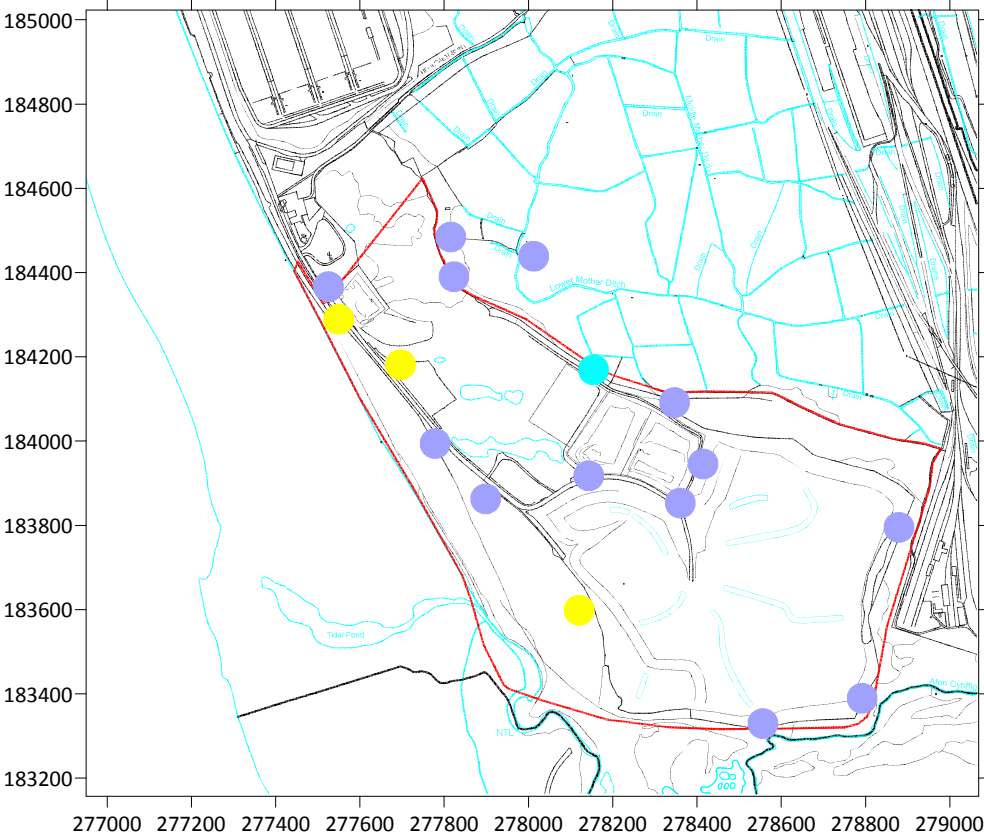


Q4, 2020 - Deep Groundwater

Zinc in Groundwater, Leachate and Surface Water (microg/l)

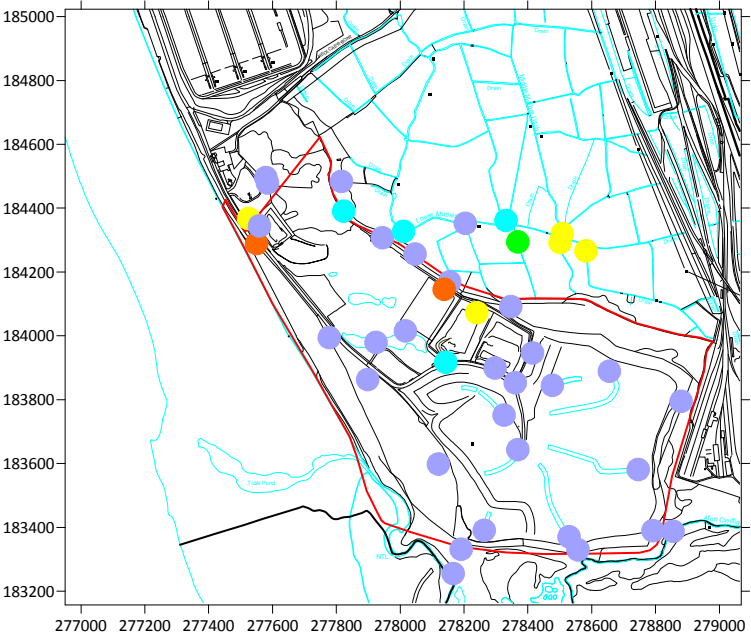


Q4, 2020 - Shallow GW, Leachate, Ponds and Surface Water

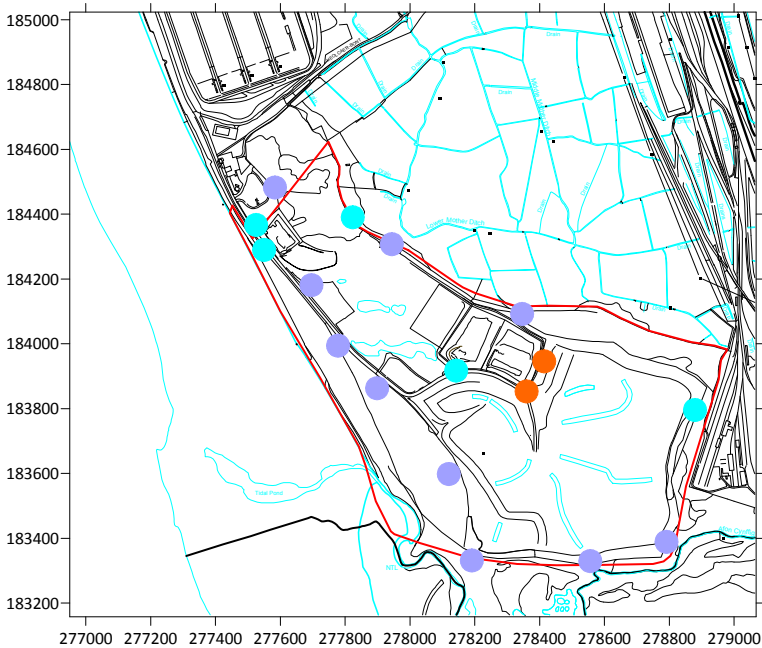


Q4, 2020 - Deep Groundwater

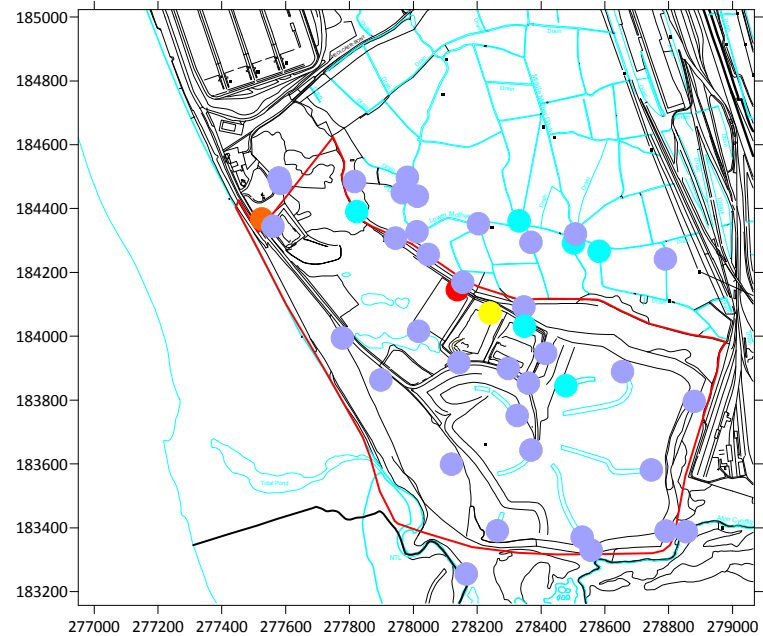
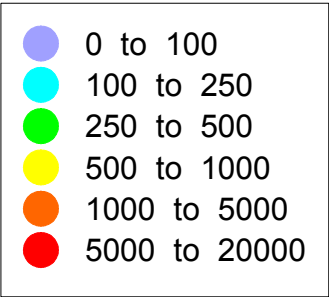
Chloride in Groundwater, Leachate and Surface Water (mg/l)



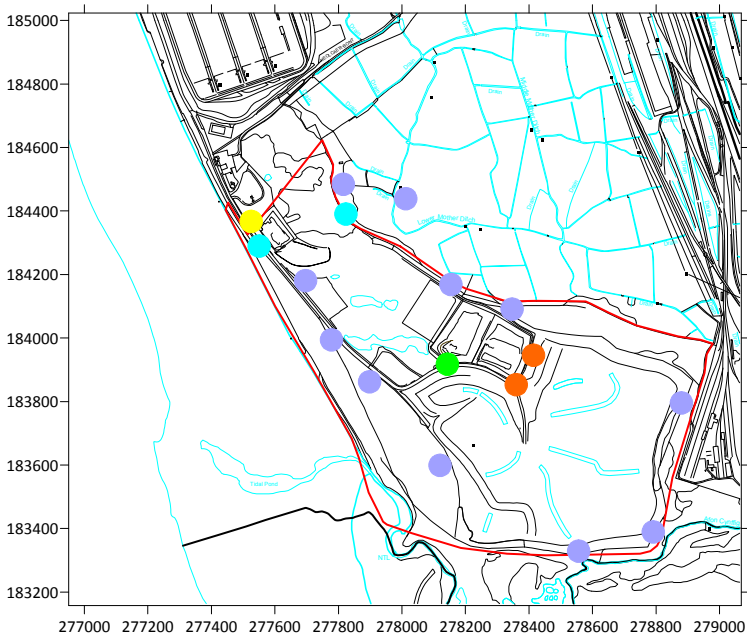
June 2019 - Shallow GW, Leachate, Ponds and Surface Water



June 2019 - Deep Groundwater

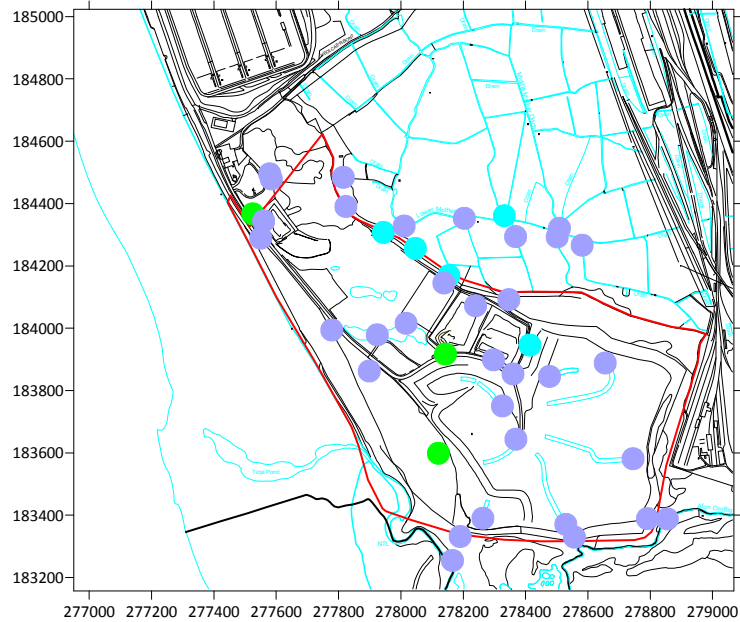


Q4, 2020 - Shallow GW, Leachate, Ponds and Surface Water

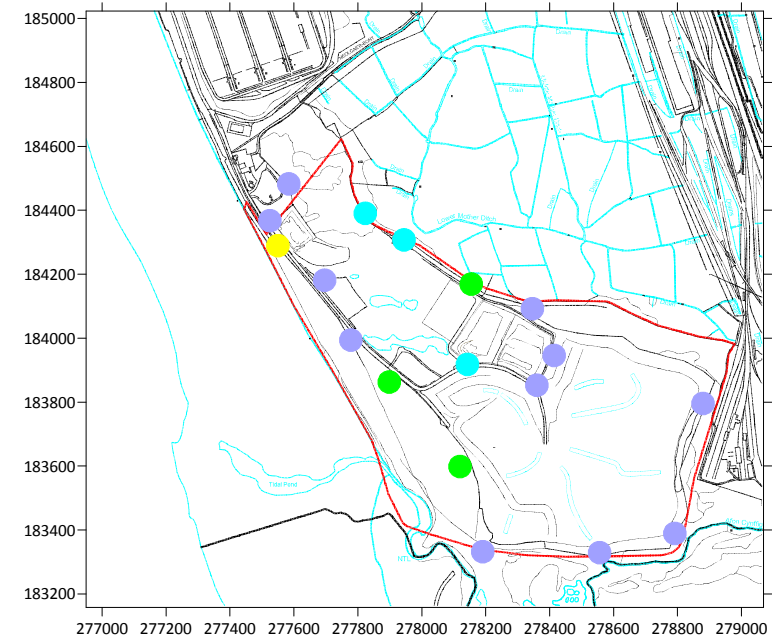


Q4 2020 - Deep Groundwater

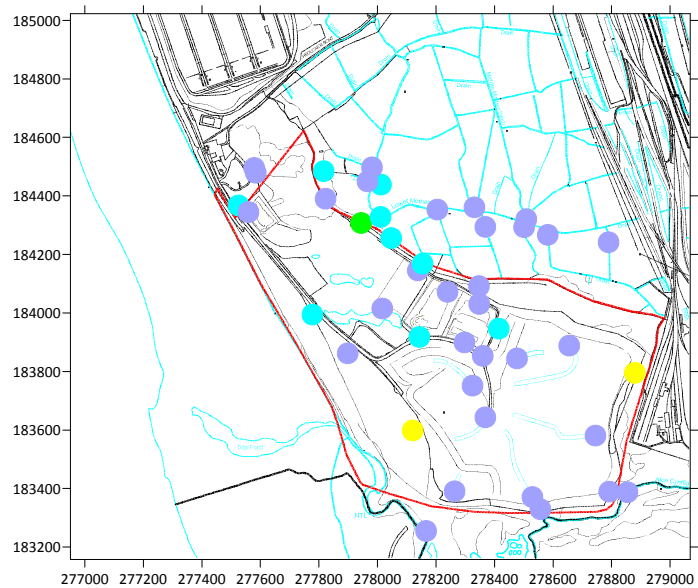
Arsenic in Groundwater, Leachate and Surface Water (microg/l)



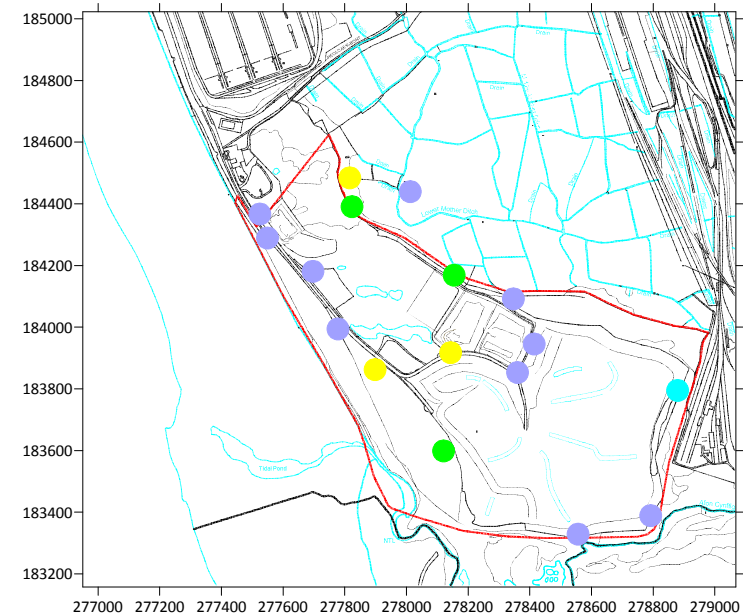
June 2019 - Shallow GW, Leachate, Ponds and Surface Water



June 2019 - Deep Groundwater



Q4, 2020 - Shallow GW, Leachate, Ponds and Surface Water



Q4, 2020 - Deep Groundwater

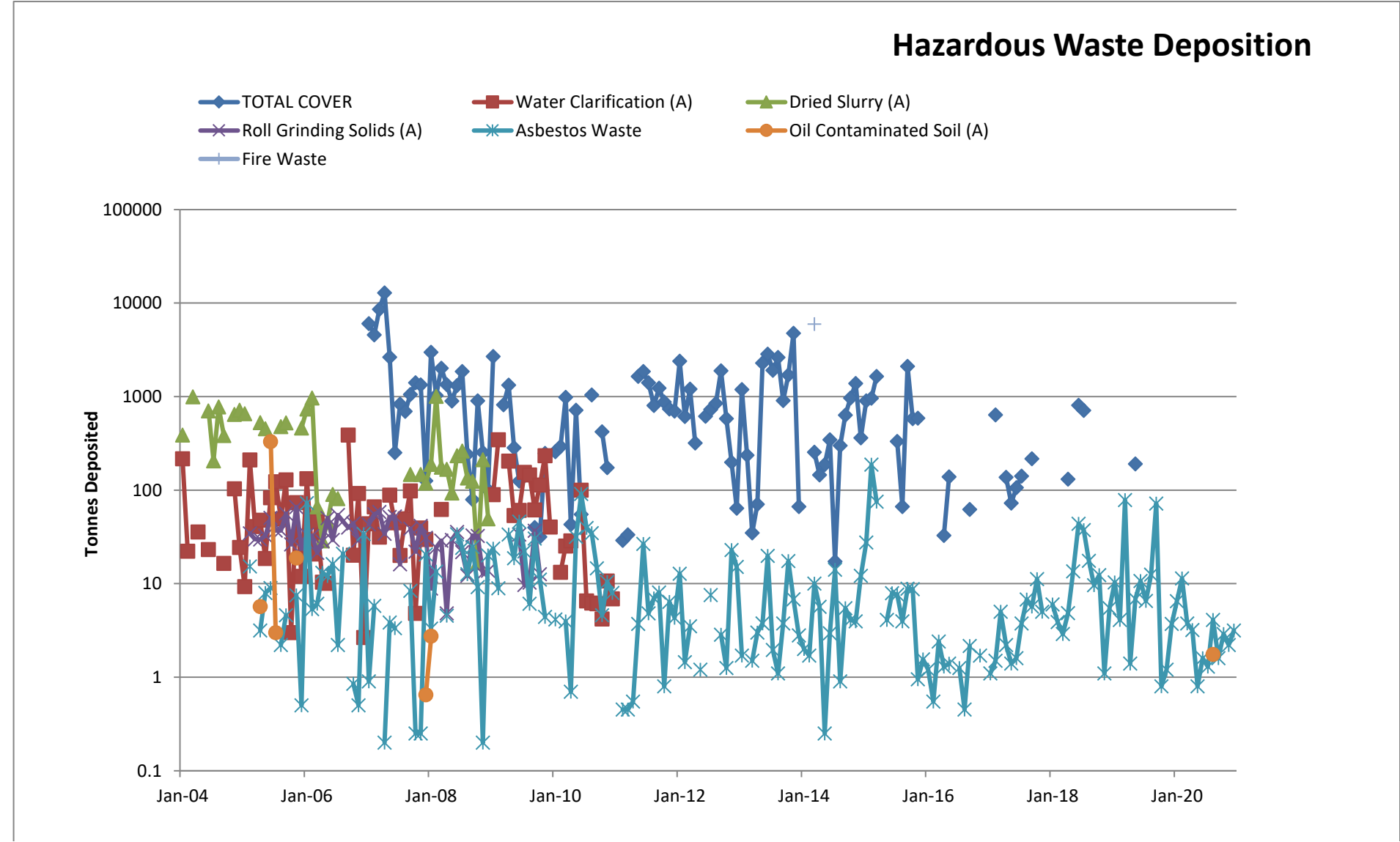
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 9
Record of Landfilled
Waste**

Report Number 2093r1v1d0221



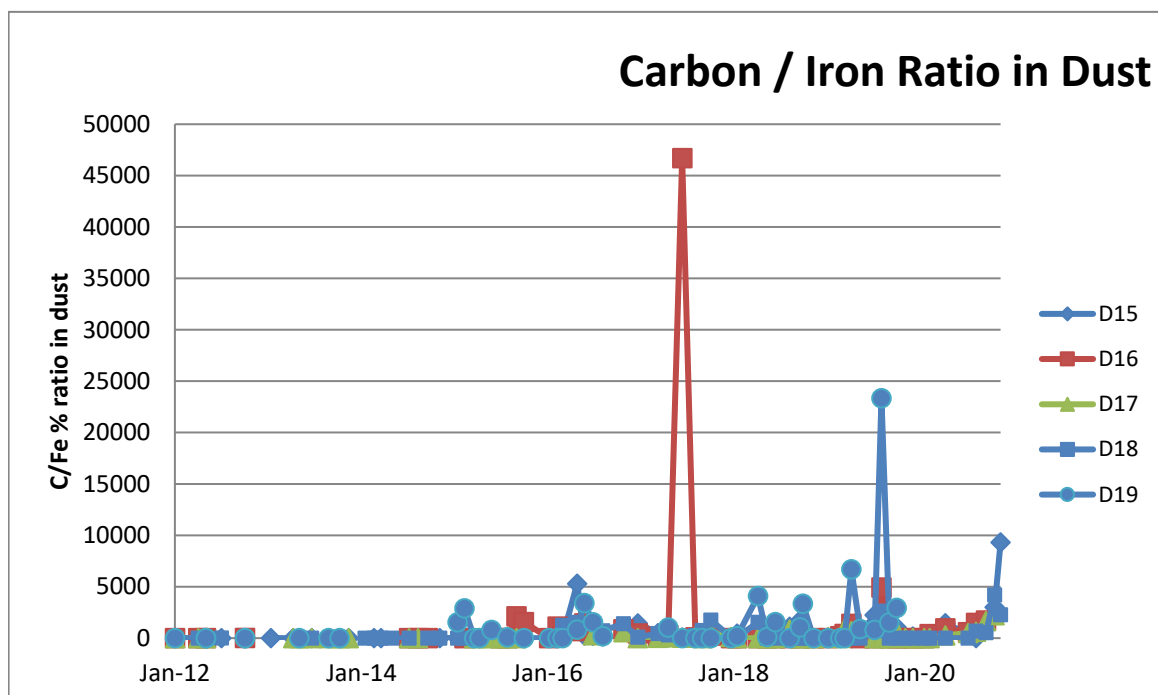
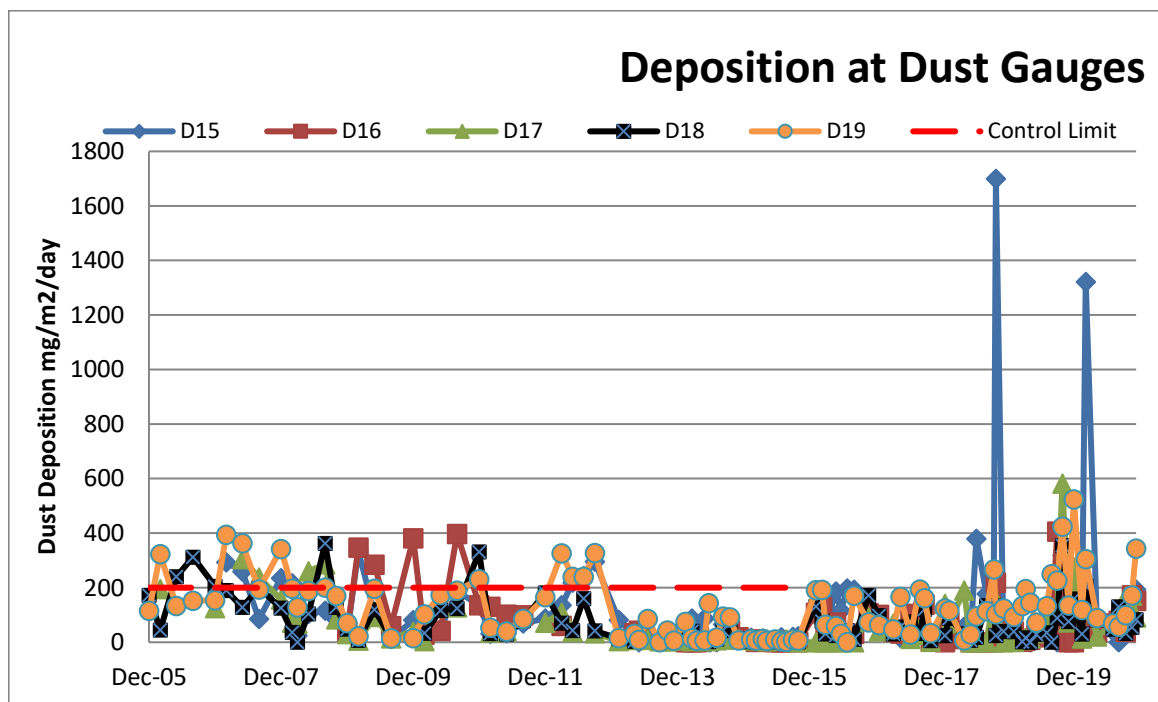
**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

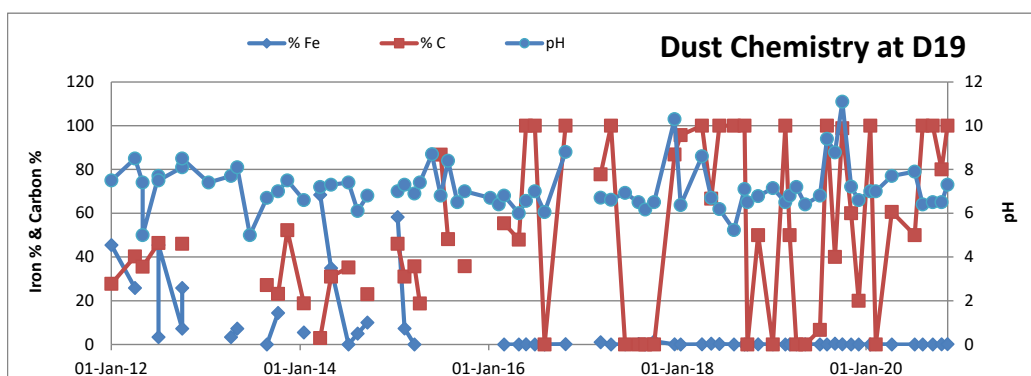
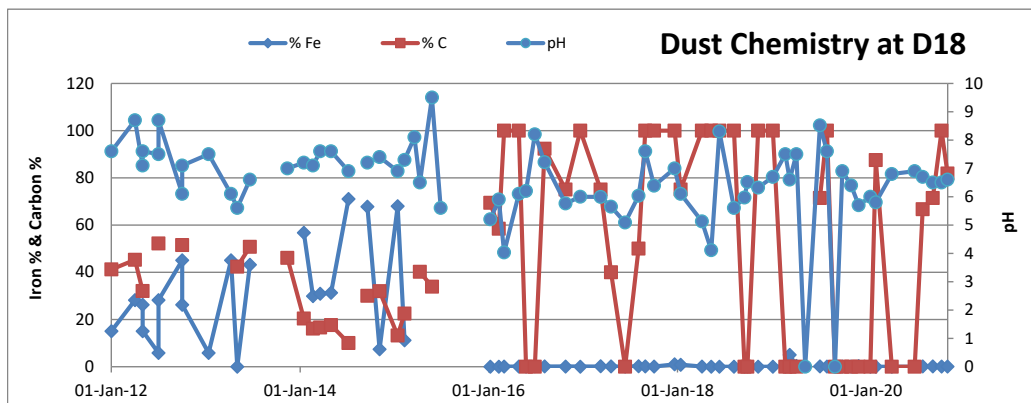
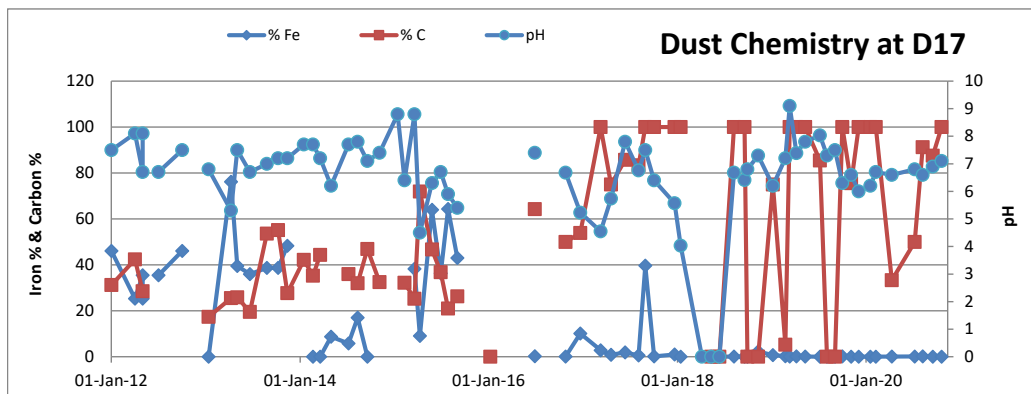
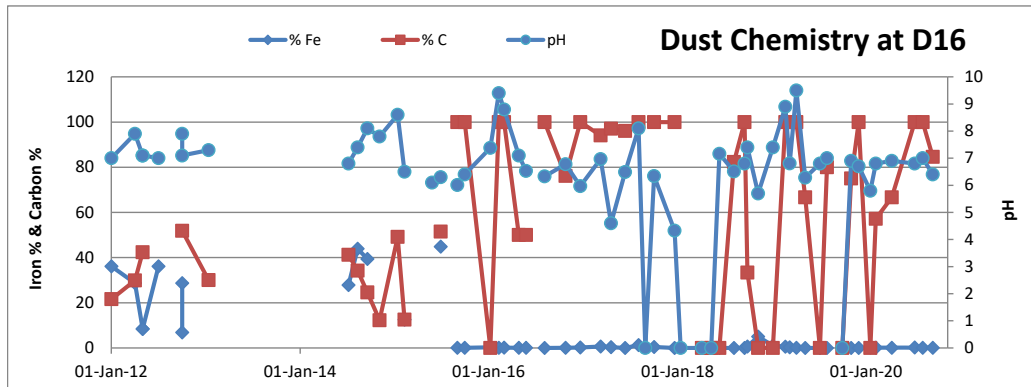
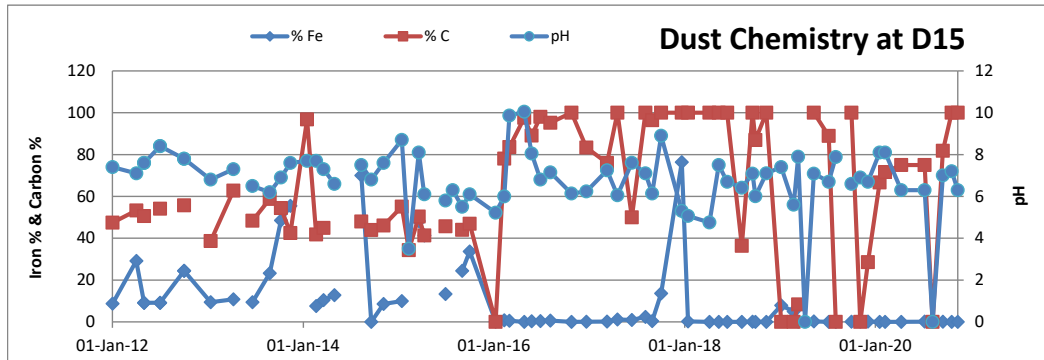
PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 10
Results from Dust
Monitoring Gauges**

Report Number 2093r1v1d0221





**MORFA HAZARDOUS
LANDFILL
PORT TALBOT**

PERMIT BW2692IM

**2020 Annual Review of
Environmental
Monitoring Results**

**Appendix 11
Asbestos Monitoring
Results**

Report Number 2093r1v1d0221



Registered Office:

D'Arcy Business Park
D'Arcy Way, Llandarcy
Neath, SA10 6EJ
Tel: 01792 323223
Fax: 01792 323236
e-mail: info@anchem.co.uk
www.anchem.co.uk
Company No. 4768038

Airborne Fibre Test Report

Issue Date	17/01/2020
Test Report	A95296-1

Date sampled	17/01/2020
Sampled by	C. Edds

Date counted	17/01/2020
Slides Counted by	C. Edds

Client	Darlow Lloyd and Sons
Site Location	Darlow Lloyd Landfill Site, Tata Steel, Port Talbot.
Areas and Description of Work	Hazardous Waste Cell, Darlow Lloyd, Landfill Site, Tata Steel - Perimeter monitoring to asbestos waste cell to ascertain airborne fibre concentration

Type of Monitoring	Static Monitor Background
Asbestos contractor	N/A
Location Slides Counted	Mobile Lab MT68 HLO

Test Slide	AS329	NPL Block Visible	5
Stage Micrometer	AS327	Graticule Diameter μm	100

[illegible]



0934



Airborne Fibre Test Report (cont.)

Issue Date	17/01/2020
Test Report	A95296-1

Diagram		Comments (Opinions and Interpretations herein are outside the scope of UKAS accreditation)
95296/04 Hazardous Waste Cell (Asbestos Only) 95296/01 95296/03 95296/02 Beach - Haul Road 95296/05 = Field Blank - not read/required.		Background air tests to establish airborne fibre concentrations at areas stated. The method of sampling is based on HSG 248 however the sampling volume and fields counted have been increased to achieve a limit of detection of 0.001f/cm³ compared with 0.01 f/cm³ for clearance testing purposes. Flow rates were checked at hourly intervals for any changes. All tests are less than 0.001f/cm³ which is below the limit of quantification. Within satisfactory limits.
Report Authoriser	C Edds	Air Sampling Undertaken in accordance with ANC/AS/2 & HSG248 Fibre Counts in accordance with HSG248 Sketch is not to scale and is an approximate representation only. Sample positions are indicated by numbers corresponding to the sample reference number suffix.
Signature		



D'Arcy Business Park
D'Arcy Way, Llandarcy
Neath, SA10 6EJ
Tel: 01792 323223
Fax: 01792 323236
e-mail: info@anchem.co.uk
www.anchem.co.uk
Company No. 4768038

Airborne Fibre Test Report

Date counted	23/07/2020
Slides Counted by	C. Edds

Client	Darlow Lloyd and Sons
Site Location	Darlow Lloyd Landfill Site, Tata Steel, Port Talbot.
Areas and Description of Work	Hazardous Waste Cell, Darlow Lloyd, Landfill Site, Tata Steel - Perimeter monitoring to asbestos waste cell to ascertain airborne fibre concentration

Test Slide	AS329	NPL Block Visible	5
Stage Micrometer	AS327	Graticule Diameter μm	100

[illegible]



0934

Issue Date	23/07/2020
Test Report	A96791-1

Airborne Fibre Test Report (cont.)



Diagram		Comments (Opinions and Interpretations herein are outside the scope of UKAS accreditation)
96791/04 Hazardous Waste Cell (Asbestos Only) 96791/01 96791/03 96791/02 Beach - Haul Road 96791/05 = Field Blank - not read/required.		Background air tests to establish airborne fibre concentrations at areas stated. The method of sampling is based on HSG 248 however the sampling volume and fields counted have been increased to achieve a limit of detection of 0.001f/cm³ compared with 0.01 f/cm³ for clearance testing purposes. Flow rates were checked at hourly intervals for any changes. All tests are less than 0.001f/cm³ which is below the limit of quantification. Within satisfactory limits.
Report Authoriser	C Edds	Air Sampling Undertaken in accordance with ANC/AS/2 & HSG248 Fibre Counts in accordance with HSG248 Sketch is not to scale and is an approximate representation only. Sample positions are indicated by numbers corresponding to the sample reference number suffix.
Signature		



D'Arcy Business Park
D'Arcy Way, Llandarcy
Neath, SA10 6EJ
Tel: 01792 323223
Fax: 01792 323236
e-mail: info@anchem.co.uk
www.anchem.co.uk
Company No. 4768038

Airborne Fibre Test Report

Issue Date	14/10/2020
Test Report	A97355-1

Date sampled	14/10/2020
Sampled by	C. Edds

Date counted	14/10/2020
Slides Counted by	C. Edds

Client	Darlow Lloyd and Sons
Site Location	Darlow Lloyd Landfill Site, Tata Steel, Port Talbot.
Areas and Description of Work	Hazardous Waste Cell, Darlow Lloyd, Landfill Site, Tata Steel - Perimeter monitoring to asbestos waste cell to ascertain airborne fibre concentration

Type of Monitoring	Static Monitor Background
Asbestos contractor	N/A
Location Slides Counted	Mobile Lab MF69 ORJ

Test Slide	AS329	NPL Block Visible	5
Stage Micrometer	AS327	Graticule Diameter μm	100

[illegible]



Airborne Fibre Test Report (cont.)



0934

Issue Date	14/10/2020
Test Report	A97355-1

Diagram		Comments (Opinions and Interpretations herein are outside the scope of UKAS accreditation)
97355/04 Hazardous Waste Cell (Asbestos Only) 97355/01 97355/03 Beach - Haul Road 97355/02 97355/05 = Field Blank - not read/required.		Background air tests to establish airborne fibre concentrations at areas stated. The method of sampling is based on HSG 248 however the sampling volume and fields counted have been increased to achieve a limit of detection of 0.001f/cm³ compared with 0.01 f/cm³ for clearance testing purposes. Flow rates were checked at hourly intervals for any changes. All tests are less than 0.001f/cm³ which is below the limit of quantification. Within satisfactory limits.
Report Authoriser	C Edds	Air Sampling Undertaken in accordance with ANC/AS/2 & HSG248 Fibre Counts in accordance with HSG248 Sketch is not to scale and is an approximate representation only. Sample positions are indicated by numbers corresponding to the sample reference number suffix.
Signature		

Air Fibre Counting Certificate

Certificate No:	SW4901	Page 1 of	Date: 23 rd April 2020
M/scope Ref No - MJ-3	Samples Analysed At Site / Lab	NPL No / Band / 5436 / 5	WBG/No -101 µm / 2
Site: <u>Cal Steel UK</u> <u>Pontefract Works</u> <u>Pontefract</u> <u>DARLTON ROAD LANDFILL SITE</u>	Client: <u>MONOLITHIC ENV SVS</u> <u>DEWNUMA FARM</u> <u>DEWNUMA ROAD</u> <u>SKELDON, NEAR</u>		
Sample no	Sample location	Ms / Smp	B / R / L
1	TO EDGE OF LANDFILL SITE SOUTH/WEST CORNER.	1/1	R
2	TO EDGE OF LANDFILL SITE NORTH/WEST CORNER.	1/1	R
3	TO EDGE OF LANDFILL SITE SOUTH/EAST CORNER.	1/1	R
4	TO EDGE OF LANDFILL SITE NORTH/EAST CORNER.	1/1	R

(B / Background, R / Reassurance, L / Leak)

Sample No.	Head No.	Pump No.	f/rate On L/min	f/rate Off L/min	f/rate Av. L/min	f/rate Corr. L/min	Time (SW12) On/Off	Vol.	N (Fibres)	n (Fields)	Calc. result (f/c.c)	Reported result (f/c.c)
1	P150	5817	8.0	8.0	8.0	N/A	09.17/13.17	1920	6	500	0.0003	<0.001
2	P151	5818	8.0	8.0	8.0	N/A	09.21/13.21	1920	4	500	0.0002	<0.001
3	P152	5819	8.0	8.0	8.0	N/A	09.26/13.26	1920	5	500	0.0002	<0.001
4	P153	5820	8.0	8.0	8.0	N/A	09.28/13.28	1920	4	500	0.0002	<0.001
C.B. P151 Field Break Monitored												
not Analysed												

Airborne concentration = 1000ND²/Vnd²

Limit of quantification = 0.010x96000/Vn = 0.000...f/c.c

(Maximum change in temperature/pressure is + or - 5%)

Temperature calibrated (°K): 289.1°K

Pressure calibrated (hPa): 1010hPa

Flow meter no : ACS/F/22

Temperature actual (°K) (T2): 288.1°K

Pressure actual (hPa) (B03):

Correction required: Yes/No

Qa = ...

Compliance with the Clearance Indicator of less than 0.01 f/c.c is regarded as satisfying the duty imposed by Regulation 11 of CAR 2012 (to prevent exposure to asbestos).

The air test result is above / below the Clearance Indicator.

Personnel On Site	Company / Organisation	Signature	Date
<u>[Signature]</u>	<u>DLS</u>	<u>James Davis</u>	<u>23/04/20</u>

Air sampling and analysis carried out in accordance with documented in-house techniques based on HSG 248.

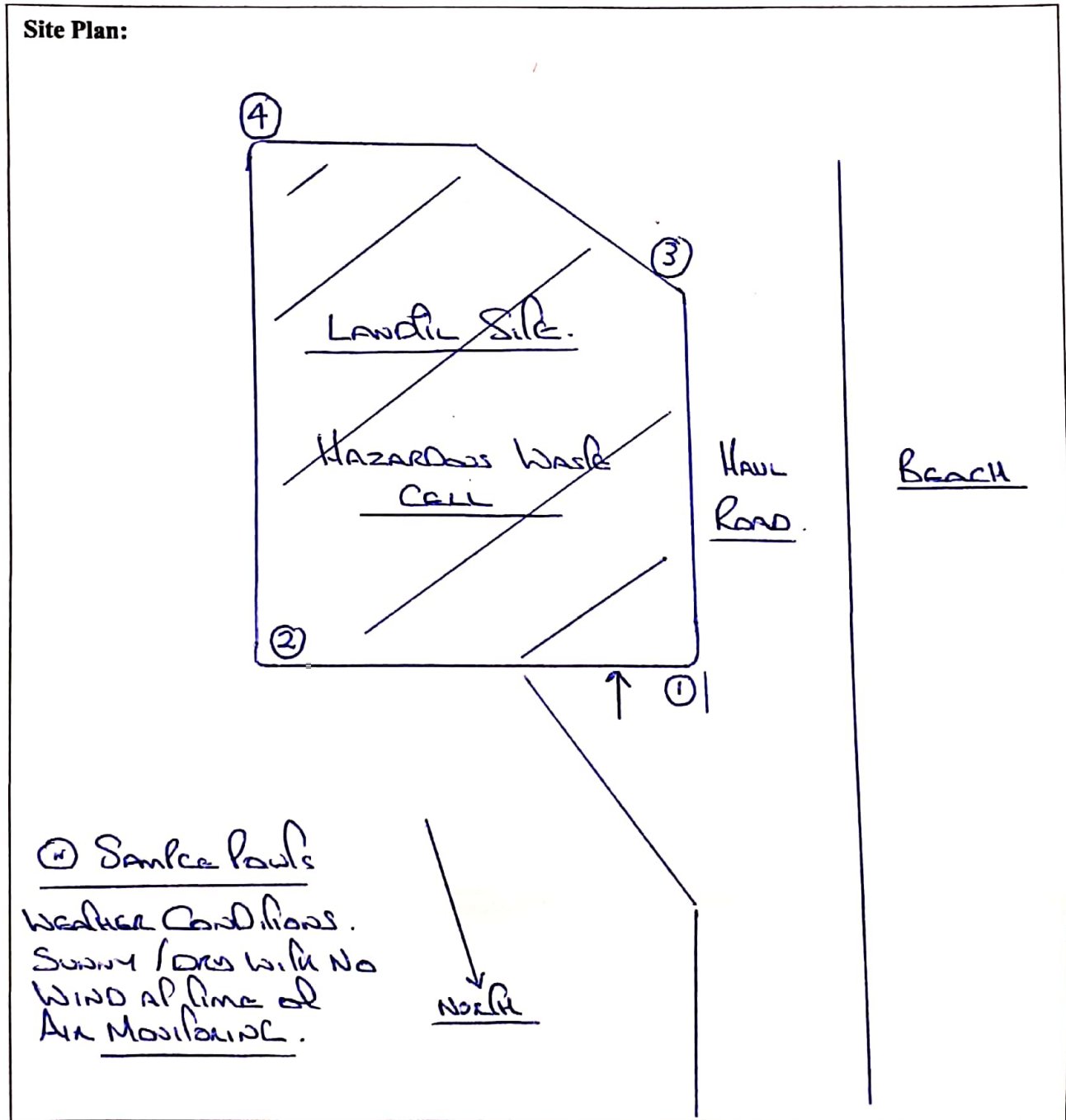
Air Fibre Counting Certificate

Certificate No: SW4901

Date: 23rd April 2020

Page 2 of 3

Site Plan:



Name of ACS Representative: M. S. S. S.

Signature: *[Signature]*



GEO
TECHNOLOGY

Geotechnical &
Environmental Services

Ty Coed
Cefn-yr-Allt
Aberdulais
Neath SA10 8HE

T 01639 775293
F 01639 779173

enquiries@geotechnology.net
www.geotechnology.net