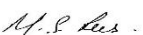


Church Village Bypass Ty Garreg Landfill Permit Surrender Report

Addendum 1
October 2015

Quality Management

Job No	GC000041		
Project	Church Village Bypass		
Location	(\Cslgwtf02) (P:) / Schemes_CGC / C000001-99 / GC000041-Church Village Bypass		
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Checked by	W. Palmer	Signature (for file)	
Authorised by	W. Palmer	Signature (for file)	

Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised

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1. Introduction

1.1 Background

In January 2015 an application was made to Natural Resources Wales (NRW) for surrender of waste permit for the Ty Garreg Landfill. The application was made following detail advice and consultation with NRW. Due to internal difficulties the application could not be reviewed by NRW until October 2015. This addendum addresses additional information requested by NRW, to enable the application to progress.

2. Surrender Additional Information

Below are the notes produced by Nadine Jones of NRW following telephone discussion with Myrddin Rees (Capita) on the 7th October 2015, together with details of additional information requested.

2.1 Type of surrender:

Simply, to clarify: The application makes mention that it is a 'basic' surrender as confirmed in the email dated 08/07/14, submitted with the application. (Response to questions 2b and 2c, Part E2 of the application form.) However, the email of 08/07/14 confirms that this is a 'Normal tier 3 surrender' - this is reflected in the fact that an Opra based, 'normal' surrender fee has been paid. We are treating the application as a normal surrender of a closed, pre Landfill Directive landfill.

[This point was agreed and no action needed.](#)

3. Application fee:

You have submitted £16,038 for the application. This is actually an overpayment of £8,840.00 based on the Opra profile (score) we have on file for the site and the relevant surrender application multiplier, at the time the application was submitted. I will therefore arrange a refund to you for the overpayment straight away. The payment was made by cheque. In these cases, our process is to refund the same way and raise a cheque in the name of the operator, unless payment was made by someone else.

Can you please confirm the following:

- Who made the initial payment; was it the operator, Mr Thomas or someone else? If it was someone else, please can you provide their name and business address.
- Can you also confirm where to send the actual cheque itself, please?

You have asked us to hold off on processing a refund, until further notice. We will not process the paperwork, until we hear from you on this point.

2.3 Signatory – Declaration in Part F of the application form:

When the permit holder is an individual, we need them to sign all applications related to the permit, unless they have given written permission for someone to sign on their behalf. I note that you have signed on Mr Thomas' behalf. Can you please send in written confirmation from Mr Thomas that you have his permission to do so. He can email me direct to confirm, if this is easier. Alternatively, Mr Thomas can email me to confirm that he wants the surrender application to proceed, and I can take this as the equivalent to his signing Part F of the application form.

You mentioned that the situation with Mr Thomas' connection with the site, and your ability to obtain a signature from him, is the same as it was when we processed the permit change in 2008. At that time, the council (RCT) were very much leading on the work and we took a pragmatic approach, accepting their signature/approval for the changes to happen. If you would be so kind as to send us a simple paragraph confirming this, we can look to take a similar approach to this surrender application.

3.1 Technical supporting information:

In line with the relevant guidance for surrender of landfills (EPR 5.02), we have identified this site as an inert landfill, pre landfill directive and Type A. We have assessed the information in our report in line with this. In theory, you have *most* of the data we need, it just needs to be presented a little more analytically in the report. We ask for surrender reports to not only include raw data, but to clearly analyse it and draw conclusions. We then 'QA' these conclusions as part of our assessment.

I have set out below, the main areas we check when assessing this type of application, and put relevant comments against each. Where we need more information, I have asked for it and tried to highlight these sections, by putting them in bold.

2.3.1.

A review of the history of the permit including a summary of the conceptual model for the facility, including environmental receptors; aquifer status; proximity and sensitivity of surface water courses; proximity of housing and human receptors; Natural 2000 sites and SSSI's and the types of waste permitted.

The information for this is contained within section 1 of the report. The report identifies the geology, hydrogeology, hydrology and human receptors. There are no SSSI or SACs in the local area. The types of waste information is contained within Section 2 and 3.

No discussion or actions needed – this point was for clarification only

2.3.2.

A review of the findings from any hydro-geological risk assessments, landfill gas risk assessments and stability risk assessments.

As inert landfill these findings have been presented in a simple manner. However, some basic information is missing – for example, a diagram of the conceptual model with geology and hydrogeology included. **Please can you send this missing information to us.**

You confirmed that this information exists and you can provide it, as requested. Thank you.

Refer to Ty Garreg risk Assessment (Arup) 2008, Fig 7, copy provided in Appendix A.

2.3.3.

Details of the design of pollution control measures installed at the site including the geological barrier, any lining or capping system installed and any other measure required to prevent pollution (including harm to health). This should include details of construction quality assurance, the lifespan, and details of any accidents that may have affected the effectiveness of the measure and any remedial actions taken. (All sites but inert sites may only require a geological barrier).

This information is contained within section 1.5 of the report. **Please can you confirm if this has been checked/confirmed by a Geotechnical Engineer, or is this based on historic records/understanding of what happened at the site, at the relevant time?**

You confirmed that this information is historic, based on information provided by the contractor at the time the bypass scheme took place. I asked if you could send this to us, with as much detail as possible. You confirmed that you can provide it, as requested. Thank you.

Fig 2 and 3 in the report are taken from the Health and Safety File from information provided by the design and build contractor for the Church Village Bypass Costain Group PLC. It is a statutory requirement under the CDM regulations for the principal contractor to provide this information to the client RCTCBC. Costain along with their consultant (Atkins) would have

operated a quality system in order to ensure as built drawings were correct. A copy of the H & S file can be forwarded.

2.3.4.

Confirmation of completion in accordance with permit conditions, (including any improvement / pre-operational conditions).

There are conditions in the permit regarding final landform and gradients. **Please can you update the information to reference these and show how the site has been completed' in accordance with the relevant permit conditions.**

You confirmed that this information exists – in the form of a 3D survey of the site, taken after completion of the scheme. You can provide the information, as requested. Thank you.

Refer to TerraData laser survey carried out in 2012, copy enclosed in Appendix B.

2.3.5.

Characterisation of the waste accepted including details of audits and inspections; details of any site investigations of deposited waste; details of any acceptance of non-compliant waste including location and extent of the non-compliant waste and details confirming removal of waste from site.

This information is contained within sections 2 and 3 of the report. The closure report has reviewed the inspection reports, but they are not included. **Please can you include the referenced reports for completeness and so we can cross check the information in the closure report to the specific documents being referenced.**

You confirmed that you're not sure what information exists, but that you will check and provide what's available, as requested. Thank you.

Rev(4) refers to: Halcrow Group Limited Church Village Bypass Phase 5 Ground Investigation (Ty Garreg Landfill). Geo-Environmental Report March 2006. A copy of which is contained in Appendix C

2.3.6.

Details of the make-up and generation rate of any leachate and landfill gas and how it has changed over the life of the site.

The waste has been characterised as inert; so no information in leachate has been included. There's no evidence of leachate monitoring, although the boreholes appear to be within the waste mass. **Can you confirm whether there has ever been any leachate monitoring carried out at the site, and if so, provide the relevant information (data) and an analysis of it.**

You confirmed that you're not sure what information exists, but that you will check and provide what's available, as requested. Thank you.

The report includes information on gas monitoring and emissions from the site. We have looked at this information and carried out some assessment (measurements) during our site inspection. As a result, we will not ask for any additional information on gas at this time.

Details of the monitoring carried out on the Ty Garreg Landfill, together analysis is provided in TES Bretby Scientific Results. A copy is enclosed in Appendix D.

2.3.7.

A review of all groundwater, surface water and landfill gas monitoring results demonstrating no impact at any sensitive receptor including details of the design of any boreholes and wells used.

The report is missing the raw sampling data, in tabulated and graphical formats. **Please can you provide the information in the requested formats.**

You were unsure what exactly was being requested here. I apologise for not being clear and for any confusion caused. I've checked this point with my colleague and can confirm that this point relates to water quality sampling data. This data is normally in table (tabular) form for each borehole, which is then turned into graph form. (Lab certificates should contain the individual data.) We're requesting the data in the tabular and graph formats, because whilst the table format allows us to see the individual results, the graph format allows us to simply and quickly assess the results as a whole *over time* – for example, potential trends, patterns and seasonal differences are much easier to spot; making the assessment far more efficient.

Details of the monitoring carried out on the Ty Garreg Landfill, together analysis is provided in TES Bretby Scientific Results. A copy is enclosed in Appendix D.

The report does not include borehole logs. We need to assess this information to ensure that the boreholes used to monitor impacts from the site are fit for purpose and providing representative data. **Please can you provide borehole logs for all boreholes at the site.**

You confirmed that this information exists and you can provide it, as requested. Thank you.

Details of the boreholes logs are contained within Ty Garreg Factual Reports, Ty Garreg Monitoring issue 2 and Costain Limited report 'Ty Garreg YBI and Tontreg verification report- Appendix A'. A copy of the boreholes are provided in Appendix E

The report includes a plan showing all monitoring points. However, it is quite difficult to make out the location of the boreholes, their operational status and individual reference number. It was quite difficult to locate the monitoring points using the plan, whilst at the site yesterday. It may also be worth noting that the locations on the plan in the surrender report, are different to previous plans submitted with the variation application (in 2008). **Please can you send an updated, clearer plan showing the locations and operational status of all boreholes at the site.** Ideally, we would like a plan without the shade area for the landfill – as this will be easier to interpret.

You confirmed that you can provide this information, as requested. Thank you.

Plan has been updated and a copy is enclosed in Appendix F

Table 6.2 in the surrender report needs unit information added. **Please can you update the table to include this information.**

You confirmed that you can make this amendment, as requested. Thank you.

Table 6.3 has been updated and a copy is enclosed in Appendix G

The report states that the site has been sampled from 2008 to 2012. There are also specific conditions in the permit requiring regular monitoring. However, only the 2009 sampling results are noted.

Please can you confirm:

- what happened to the monitoring points at the site during the road construction – it seems that only four boreholes operational boreholes remain on site?
- do you have access to previous borehole data – including from those monitoring points lost during the road construction? This data should also be presented in the surrender report, up to the point that the monitoring location ceased being used.
- what happened to the monitoring points 'lost' during the road construction? Were they decommissioned and removed, or left in situ? This could be causing a pathway for pollution.

The surrender report needs to be updated to include information on these issues.

You confirmed that you can make this amendment, as requested, and will send the update. Thank you.

Paragraph 6.1 has been updated to reflect what happened to the boreholes and is included in Appendix H.

Details of the monitoring carried until the boreholes were lost are contained in TES Bretby Scientific Results. A copy is enclosed in Appendix D.

As mentioned above, the most recent sampling data provided in the surrender report is from 2009. The permit conditions require regular sampling and this is a requirement until the point at which surrender is accepted. On that basis, there should be more recent sampling data available. **Please can you confirm whether more recent data (at least the 2012 data, as referenced) is available and include this data, along with suitable analysis and interpretation of it, into the surrender report.** We will look at this data and compare it to what's already been submitted. If it does not flag up any immediate concerns, then we could accept data from 2012. We're happy to do this first, rather than jump straight to a request for a fresh round of sampling.

You confirmed that you're not sure what information exists, but that you will check and provide what's available, as requested. Thank you.

Details of the monitoring carried out are contained in TES Bretby Scientific Results. A copy is enclosed in Appendix D. The results and interpretation are covered by the current surrender report.

2.3.8.

Confirmation that any decommissioning works set out in the application have been completed.

It's our understanding that no decommissioning is needed, as there are no active leachate pumps on the site. We have assessed the report

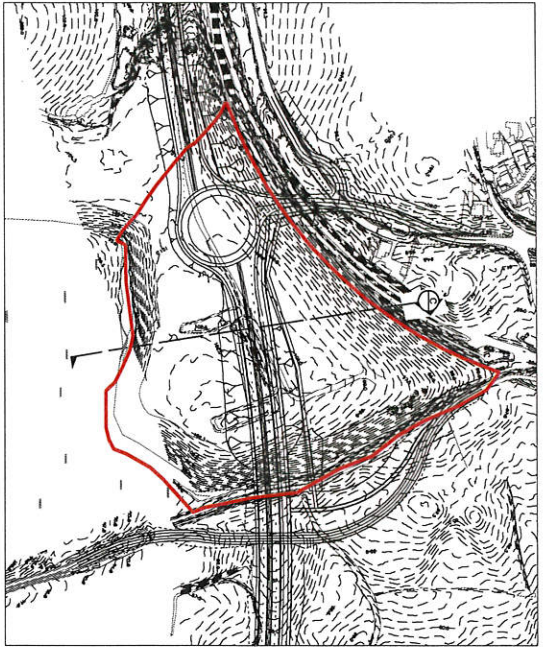
4. Note

4.1

4.2 The information requested by the NRW and provided in this report has been previously sent to the NRW or the Environment Agency Wales , during the construction and maintenance of the new road.

Appendix A

Fig 7 from Ty Garreg risk Assessment (Arup)



BH 5/12

BH 22A

BH 23A

BH 5/14

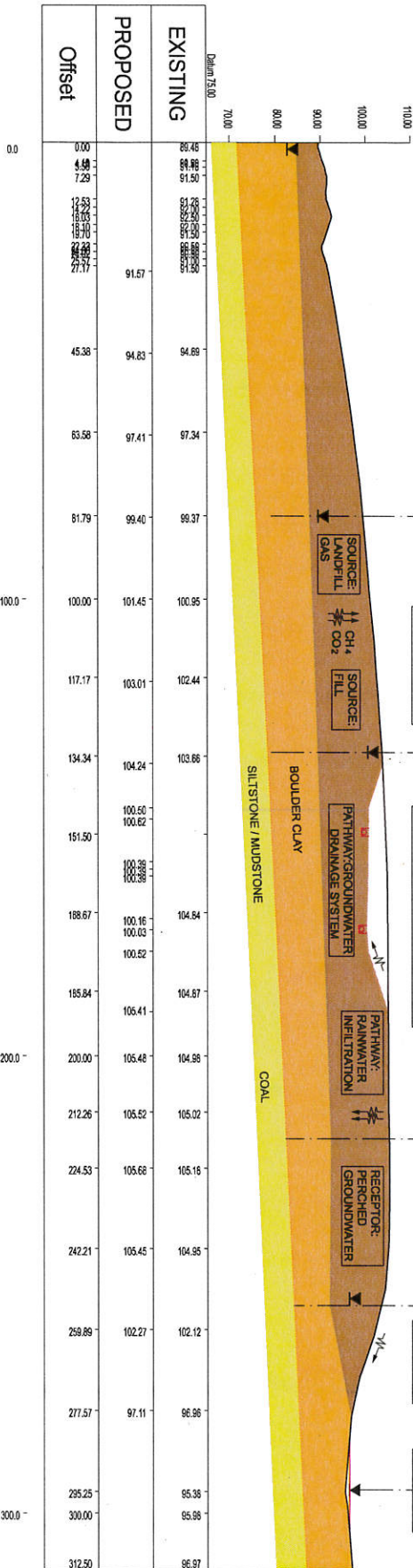
- RECEPTORS:**
- CONSTRUCTION WORKERS
 - COMMUNITY ROAD USERS
 - HIGHWAY USERS
 - HIGHWAY MAINTENANCE CREW

PATHWAY:
INHALATION OF
VAPOURS OUTSIDE

PATHWAY:
- INGESTION OF SOIL
- DERMAL CONTACT WITH SOIL
- INHALATION OF SUSPENDED DUST
- INHALATION OF VAPOURS OUTSIDE

PATHWAY:
RAINFALL
RUN OFF

RECEPTOR:
BOUNDARY
DITCH



SECTION C-C

CONCEPTUAL MODEL

SCALE 1:1000

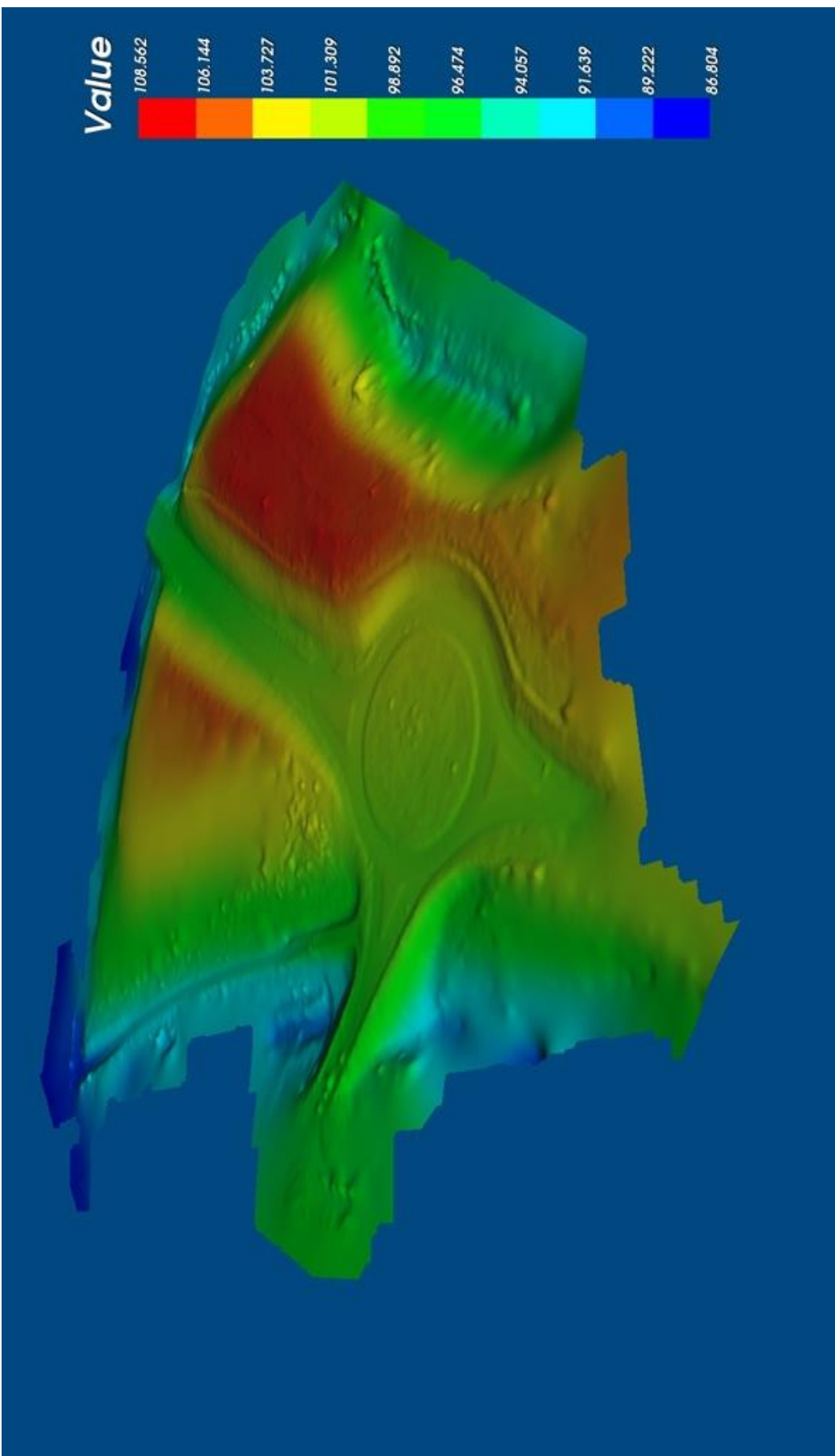
114802/40

FIGURE

7

Appendix B

TerraData Laser Survey



APPENDIX C

Halcrow Group Limited
Church Village Bypass Phase 5
Ground Investigation (Ty Garreg Landfill).
Geo-Environmental Report March 2006

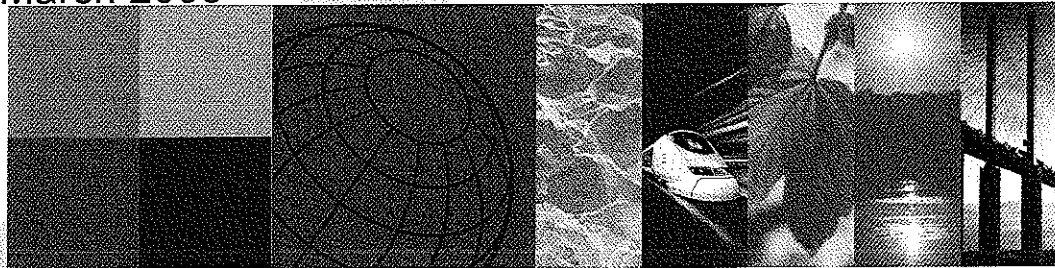
Glamorgan Engineering Consultancy

Church Village Bypass

Phase 5 Ground Investigation (Ty Garreg
Landfill)

Geo-environmental Report

March 2006



Halcrow Group Limited

Halcrow

Glamorgan Engineering Consultancy

Church Village Bypass

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Landfill)

Geo-environmental Report

March 2006

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Glamorgan Engineering Consultancy
Church Village Bypass
Phase 5 Ground Investigation (Ty Garreg Landfill)
Geo-environmental Report

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Approved by
1	-	Final	14 March 2006	

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<i>Appendix D</i>	<i>Analytical results</i>
	Soil results
	Leachate results
	Groundwater results
	Surface water results
	Waste acceptance criteria results
	Gas results
	Gas radiocarbon dating

1 Introduction

1.1 *Terms of Reference*

Part of the proposed Church Village Bypass scheme will pass through the Ty Garreg Landfill site (“the site”), which is situated approximately 1.5km north east of Llantrisant and immediately south of the A473 (see Figure 1). The site, which is licensed for the disposal of “soils, subsoils and hardcore”, has been tipped on since around 1990 and investigations to date have identified fill thicknesses of between 9 and 14m. The scheme will be in cutting through the landfill site at depths of up to 10m approximately.

At the request of Glamorgan Engineering Consultancy (GEC), Halcrow Group Ltd. (Halcrow) has designed and supervised a ground investigation to obtain geological and geoenvironmental data on the landfill materials. The ground investigation comprised:

- the boring/excavation of 37 exploratory holes to visually determine the ground conditions and obtain samples for contamination and waste characterisation testing
- the installation of 26 groundwater/gas monitoring standpipes to allow long term monitoring and sampling

The investigation was designed to determine the prevailing conditions at the site and to provide site specific data in order to assist in meeting regulatory requirements with regards to transfer/surrender of the existing Waste Management Licence. The investigation was also aimed at characterizing the waste to enable the preparation of future applications for Pollution Prevention and Control (PPC) permits should these be deemed necessary as a result of the proposed construction. The investigation and subsequent assessment of the results does not take into consideration the effect the landfill may be having on the surrounding environment. Further monitoring, sampling and testing is currently underway, the results of which will be discussed in a further report.

The information gained from this investigation will be used to supplement data collated from several earlier investigations (section 2.2 refers).

This report presents and interprets the data collated by the various investigations undertaken at the site in order to fully characterise the waste that has been deposited at Ty Garreg. The report concludes by making recommendations on appropriate end uses for the material that will be generated by construction of the bypass.

2 Ground Investigation

2.1 Introduction

The centre of the site is located at National Grid Reference 306⁵⁰⁰, 183⁶⁰⁰. The site is bounded to the north by a disused railway line, to the east by Rhiwsaeson Lane, and to the south and west by open pasture. The landfill site is approximately rectangular measuring 600m east to west and 300m north to south approximately. For further details relating to the history and development of the site reference should be made to ArupGeotechnics Desk Study Report (Draft) dated November 2005.

2.2 Investigations and Monitoring

A total of five intrusive ground investigations have been undertaken along the route of the proposed Church Village Bypass. Table 2.1 lists only those investigations, parts of which, were carried out within the Ty Garreg Landfill site.

Table 2.1: Summary of Ground Investigation Phases

Investigation Phase	Contractor (Date)	Details	Monitoring Installations	Reference
Phase 1	Integrale Geotechnique (June/July 2002)	Boreholes 14, 14A, 15, 16, 17, 17A, 19, 20A, 21, 21A, 22 (22B/22C), 22A, 23 (23B), 23A (23C/23D), 27 Trial Pits 7, 8, 11, 12, 14, 14A Gas and groundwater monitoring equipment	Located in boreholes: 15, 16 (not found), 17, 17A, 21, 21A, 22A, 23A, 23B	August 2003 Church Village Bypass, Ground Investigation, Church Village. Factual Report, Volumes 1 - 7
Phase 3	Soil Mechanics Ltd. (March 2004)	Boreholes X01, X02, X03, X04, X06 Trial Pits X13, X14, X15, X16, X17, X18 Gas and groundwater monitoring equipment	Located in boreholes: X01, X03	May 2004 Church Village Bypass Phase 3 Additional Ground Investigation, (H4023)
Phase 5	Soil Mechanics Ltd. (October 2005)	Boreholes 5/1 to 5/5, 5/5A, 5/6 to 5/13, 5/13A, 5/14 Trial pits TP5/1 to TP5/8 and TPBH5/2 to TPBH5/14 Surface water sampling points SW01, SW02, SW03, SW05, SW06, SW07, SW08, SW09 Gas and groundwater monitoring equipment	Located in boreholes: 5/1, 5/2, 5/3, 5/4, 5/5A, 5/6, 5/7, 5/8, 5/9, 5/10, 5/11, 5/12, 5/14	December 2005 Church Village Bypass Phase 5 Ground Investigation (Ty Garreg Landfill), (H5141)

Note: Phases 2 and 4 were not carried out within the Ty Garreg Landfill Site

Phases 1 and 3 of the investigations were primarily designed to determine the depth of waste materials placed within the landfill site coupled with undertaking geotechnical testing to assess the in situ properties of the placed waste. A limited amount of contamination testing was undertaken during these phases in addition to installing several instruments to monitor groundwater levels and gas emissions. The Phase 5 investigation was designed to take a more detailed look at the waste materials and any potential contamination issues particularly with respect to meeting regulatory requirements related to the possible surrender/transfer of the Waste Management Licence in order to permit the scheme to be constructed through the landfill.

Although this report takes into consideration the results of all of the investigations carried out to date it primarily concentrates on the results obtained from the most recent Phase 5 investigation.

2.3

Phase 5 Ground Investigation

The Phase 5 ground investigation was undertaken during October and November 2005, and comprised the excavation of 21 trial pits to depths of between 2.2m and 6.0m. Of the 21 trial pits, 13 were excavated at proposed borehole locations in order to expedite the cable percussive boring. Previous intrusive investigations had encountered difficult drilling conditions, with impenetrable obstructions encountered at a significant number of exploratory locations. Thus upon excavation and subsequent backfilling of the Phase 5 trial pits, boulders and large obstructions were removed from the arisings. This enabled the cable percussion casing to be advanced relatively easily through the upper metres of the landfill.

Unlike Phases 1 and 3 investigations, the Phase 5 works did not undertake extensive drilling within the natural deposits underlying the landfill site. All the boreholes were terminated upon proving natural ground.

In total, 16 boreholes were undertaken using cable percussion techniques, to depths of between 2.2m to 17.5m, including three additional holes which were required due to the originally scheduled holes encountering impenetrable obstructions at various depths. A total of 13 boreholes were therefore advanced to their scheduled depths. Samples of the landfill materials were collected from the exploratory holes, and scheduled for waste characterisation and chemical testing.

A 19mm diameter standpipe piezometer and a 50mm diameter combined gas and groundwater monitoring standpipe were installed in each of the 13 boreholes in order to provide information relating to groundwater and gas regimes across the site. The response zones of the installations were screened within the landfill materials only, and were not extended into the underlying glacial deposits. The exception to this was BH5/1, which had a response zone entirely within natural ground. Bentonite seals were placed above and below each response zone.

Seven gas/groundwater monitoring standpipes which had been installed during Phases 1 and 3, and had subsequently been left in depressions as a result of continued filling at the site, were raised as part of this investigation to allow monitoring of them to continue.

Gas monitoring undertaken during site operations showed no notable traces of gas within the boreholes. On completion of the site works further

monitoring was undertaken during which methane, oxygen, carbon dioxide and hydrogen sulphide levels were measured, along with ambient (barometric) pressure and gas flow rates.

Water samples taken from eight surface locations around and within the Ty Garreg site were also collected for contamination testing.

Figure 2 shows the locations of all of the exploratory holes undertaken within the Ty Garreg site, together with the location of all instruments currently being monitored. A list detailing the locations and depths of all the exploratory holes is given in Appendix A.

2.4

Ground Conditions

2.4.1

Published Ground Conditions

The following geological information (Table 2.2) has been summarised from British Geological Survey (BGS) Map Sheet 248, 1:50,000 scale (Drift edition) and the accompanying geological memoir published by the BGS.

Table 2.2 Published Geological Information

Drift Deposits	Hill Peat Boulder Clay
Solid Strata	Upper Coal (Pennant) Measures comprising numerous thick sandstones separated by relatively thin mudstones, each of which usually contains one or more relatively thin coals.
Structural Features	No major faults are indicated to occur in the site area. The strata strikes roughly east-west and dips between 25° and 39° to the north

2.4.2

Previous Ground Investigations

Phases 1 and 3 investigations have indicated that the natural deposits beneath the site comprise a thin and impersistent layer of peat overlying glacial deposits and Upper Coal Measures bedrock. Details relating to the natural deposits as encountered during these investigations are summarised below.

Table 2.3 Ground Conditions

Peat	Soft, very compressible, brown to black peat. The thickness of the deposits is approximately 0.5m.
Drift Deposits	Glacial deposits - predominantly cohesive, characteristically stiff, grey, variable silty/sandy clays with gravel, cobbles and boulders. The deposits range in thickness from approximately 7m in the west to 12m in the east.
Bedrock	Upper Coal Measures - comprises alternate layers of mudstone, siltstone and sandstone together with coal and associated seatearths. The sandstones are the dominant stratum.

2.4.3 Phase 5 Ground Investigation

The Phase 5 ground investigation revealed that an engineered landfill capping layer does not exist across the site.

The fill material found within the trial pits and boreholes consisted mainly of soil which varied from firm black to grey-brown clayey gravel/gravelly clay, containing bricks, paving and kerbing slabs, sheet metal, lead flashing and pipe, plastics and timber. Reinforced concrete, kerbstones and slabs of brickwork were the main cause of obstructions within the boreholes.

A slight hydrocarbon odour was noted at two locations, but other than demolition waste and rubble no other type of waste was recovered from any part of the site. The depth of fill ranged from 3.2m in BH5/4 to 14.5m in BH5/9. Underlying the fill material and above the glacial deposits a layer of peat was encountered at three locations. The exploratory hole logs included in Appendix B contain more detailed information on the materials encountered.

2.5 *Hydrogeology*

During the site operations, water was observed entering six of the trial pits between the depths of 0.8m to 4.5m. In TPBH5/9 the flow rate was sufficiently high to cause instability and collapse, and the abandonment of the excavation at a depth of 2.2m. Within the boreholes, water strikes were observed at ten locations, with levels rising by as much as 3.1m.

Groundwater monitoring was undertaken between 27 October 2005 and 20 February 2006. Groundwater was encountered in all but four boreholes, namely BH5/2, BH5/4, BH5/7 and BHX03, at depths between 1.03m below ground level (BH21A) and 18.16m below ground level (BHX01). During the monitoring period, water levels fluctuated on average by 0.7m. Groundwater levels recorded from the boreholes can be seen in Appendix C.

2.6 *Hydrology*

The Ty Garreg site is bounded to the east by an open ditch containing water flowing from south to north. Two surface water sampling locations were established within this watercourse namely SW05 and SW06 (see Figure 2). To the south of the site are a series of small ponds and open ditches. Three locations appropriate for the sampling of surface waters were identified along this boundary (SW03, SW07 and SW08). Visual inspection indicated that very little flow occurs within these water bodies and that the water remains stagnant for long periods of time. Under such conditions, higher than normal readings of ammoniacal nitrogen can be expected, and should not be considered as unusual. Surface water sampling point SW02 is located within the Ty Garreg site, in a large pond which appears to receive no direct inflow. Close to the site entrance is a small pond, which is recharged by an outflow pipe draining water from the site. SW01 has been established at this location. To the south of the site (within the restored Rhiwsaeson Lane municipal landfill – see Figure 2) a culvert runs beneath the site from south to north. Water samples were taken from a manhole (SW09) along the line of this culvert. All collected water samples have been scheduled for detailed contamination testing.

3

Contaminated Land Risk Assessment

3.1

Assessment of Risks

3.1.1

Human Health

Assessment criteria have been selected to allow an assessment of the site conditions to determine whether it poses a risk to site users following development. Risks to human health have initially been assessed by comparing contaminant concentrations to soil guideline values (SGVs) calculated using the Contaminated Land Exposure Assessment (CLEA) model for the proposed end use of the site. Where SGVs have not been published by the Environment Agency, interim Site Specific Assessment Criteria (SSAC) have been derived, using publicly available physical and chemical data. SSAC have also been adopted from published sources, as described further below.

The concentrations of contaminants found have been statistically analysed to obtain a 95% upper confidence level (UCL95) value, in accordance with the requirements of the CLEA methodology (lead is assessed using the average only in accordance with the model). This takes account of the variability of the data set to obtain an average concentration for the entire population within a given probability (in this case 95%). Individual sample concentrations may not be representative of the entire area being investigated and this procedure provides a statistically robust method of taking into account the variability encountered. Where there is insufficient data, individual values are compared to the adopted reference value in order to determine the significance of contaminant concentrations. Statistical analysis of a small sample population may introduce disproportionate errors due to the overly high standard deviation and does not provide a robust method of analysing small data sets.

Interpretation of data has been carried out as part of the human health risk assessment, completed in line with CLEA guidance, and the associated model, published by the Environment Agency in March 2002. It is noted however, that this model has been largely withdrawn due to significant problems with its functionality.

CLEA guidance relates contamination exposure to a number of pre-defined exposure scenarios. It is acknowledged that the CLEA model does not adequately cover the proposed land use for this project, however the end use of the site comprises a dual carriageway, roundabout and adjacent community route. Consideration has therefore been given to highway maintenance workers, public road users and users of the community route. Both the residential (without plant uptake) and commercial/industrial land use scenarios have therefore been used for this assessment as being the most representative of the proposed end use, and therefore representing a reasonable compromise.

In assessing the potential risks to the human receptor from the pollution linkages identified, guidance indicates that comparison of an observed pollutant concentration can be assessed by:

- Use of relevant, appropriate, authoritative and scientifically based guideline values (SGVs), and/or

- Derivation of interim SSAC using appropriate, authoritative and scientifically based methods.

For the purposes of this report, comparison of observed pollutant concentrations has been made using appropriate, authoritative and scientifically based SGVs where available (Table 3.1). Where SGVs are unavailable, interim SSAC have been derived using toxicological data derived from published sources including the commercially available risk assessment model Risc-Human, or from other commercially available models and data sources.

It is acknowledged that data contained within the Risc-Human model have been derived for use in the Netherlands, and as such are not viewed as being “appropriate and authoritative” with respect to current Environment Agency standards or other related published guidance. In the absence of UK derived data, however, the data within the Risc-Human model have still been used. The data is considered appropriate for use in this risk assessment, as it has been validated for use within a European Union country. Data derived for use in the United States of America have also been used, when appropriate UK or European Union data have not been available.

Table 3.1 SGVs derived using CLEA

Standard Land Use			Residential without plant uptake	Commercial/ Industrial
			(mg/kg dry weight)	
Arsenic			20	500
Chromium			200	5000
Nickel			75	5000
Lead			450	750
Mercury			15	480
Selenium			260	8000
Cadmium	pH	6	30	1400
		7	30	1400
		8	30	1400
Ethylbenzene		1.0%	16	48000
		2.5%	41	48000
		5.0%	80	48000
Toluene	Organic Content	1.0%	3	150
		2.5%	8	350
		5.0%	15	680
Phenol		1.0%	21900	21900
		2.5%	34400	43000
		5.0%	37300	78100

SSAC for copper and zinc (Table 3.2) have been derived using thresholds for maximum permissible concentrations of potentially toxic elements in soil after application of sewage sludge to land used for arable crop production. These are concentrations above which it is deemed, that further application of material containing these substances, should be prohibited from arable farmland, and therefore these SSAC are considered to be protective of human health and appropriate for use for this scheme. The CLEA model has been used to derive SSAC for industrial end uses where

plant uptake is not relevant. SSAC for benzo[a]pyrene (Table 3.2) have been derived using the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) model.

Table 3.2 Derived SSAC

Standard Land Use		Residential with plant uptake	Commercial/ Industrial
	pH	(mg/kg dry weight)	
Copper	<6.0	100	10,000
	6 -7	135	
	>7.0	200	
Zinc	<6.0	250	340,000
	6 -7	300	
	>7.0	450	
Benzo[a]pyrene		1	36

The thresholds described above are for assessing long term risks only and do not cover risks to site workers and visitors during construction. These risks are assessed separately and concentrate on determining any special handling requirements or the need for measures to control exposure to potentially harmful contaminants.

In order to analyse the total petroleum hydrocarbon (TPH), an organics spreadsheet from the SNIFFER report, 'Method for deriving site specific human health assessment criteria for contaminants in soil' (2003) was used. The spreadsheet provides Site Specific Assessment Criteria (SSAC) values for each group of aromatics (Table 3.3). Having performed statistical analysis on the results, both the maximum value and the 95% upper confidence level (UCL95) values for each carbon band were compared to their corresponding SSAC value.

Table 3.3 SSAC values for TPH

Analyte	SSAC value (mg/kg)
C8 – C10	42.8
C10 – C12	218
C12 – C16	2610
C16 – C21	2860
C21 – C35	3040

3.1.2

Disposal or Reuse of Materials

Reuse of excavated materials will only be possible if it can be proven that its use will not cause risk of harm to human health or to the wider environment arising from substances contained within the fill material. This will be determined by considering the mobility of contaminants and comparing these to environmental quality standards for the Nant Myddlyn (see Figure 1), the nearest sensitive surface water receptor. In order to minimise off site disposal of the material excavated from the cutting through the landfill site,

it is anticipated that the majority of the material will be reused as earthworks fill for other parts of the scheme and that this operation will be carried out by exemption under Paragraph 19/19A of the Waste Management Licencing Regulations 2005 (as amended) as appropriate.

It is intended that materials which are geotechnically unsuitable for use as engineering fill be used in landscaped areas of the site.

3.1.3

Wider Environmental Risks

There is potential for contaminants within the ground to be mobilised and to migrate away from the site towards potentially sensitive surface water receptors. Leachate tests have been used to determine the mobility of contaminants. Comparison of these with environmental quality standards (EQS) for freshwater will determine whether or not remedial action is required to prevent mobilisation. When selecting appropriate standards for metals for water within the fill material, the hardness value and fishery type of the surrounding watercourses is required. A hardness of 100 – 150mg/l and a cyprinid fishery type have been selected. In situations where EQS values were not available for comparison with the results, other appropriate reference values have been adopted.

In some cases, river quality objectives (RQO) have been used. In order to use the RQO accurately, consultation of Environment Agency data relating to the quality of local watercourses was undertaken. The data showed the quality of water within the vicinity of the scheme to be classified as “good” (Grade B).

The UK drinking water quality standards have also been used. Some of the values used however are no longer current (1989) and therefore the appropriate considerations should be taken when comparing these with test results.

The surface waters (abstraction for drinking water) regulations 1996 were used for comparison of TPH values.

4 Monitoring and Testing Results

4.1 *Introduction*

This section presents a factual description of the analytical testing and monitoring undertaken at the Ty Garreg site. Section 5 provides discussion of the results.

4.2 *Analytical testing – soils and leachate*

4.2.1 Soils

Soil samples were subjected to analysis using a selection of determinants taken from a full suite. The results can be found in Appendix D.

From the results, three of the determinants (free cyanide, total cyanide, and phenol index) display values below their respective method detection limit (MDL) for all locations.

For the remaining determinants, whilst the values recorded are above their respective MDL, only two (chromium and nickel) show values that lie above the SGV for a residential (without plant uptake) land use (200mg/kg and 75mg/kg respectively). These two values however, of 518.6mg/kg and 227.1mg/kg respectively still lie well below the SGV relating to industrial and commercial land use (5000mg/kg).

The pH values obtained range from 7.3 (BH5/12) up to 10.1 (TP5/7) with an average value across the site of 9.0.

Asbestos was not identified within any of the samples tested for this determinant.

• PAH

Analysis for polycyclic aromatic hydrocarbons (PAH) was undertaken as part of the semi-volatile organic (SVOC) suite. Samples from boreholes BH5/8, BH5/11 and BH5/12 produced values below the MDL. All other samples recorded values above their respective MDL.

At TP5/1, TPBH5/2 and BH5/6, the values of benzo[a]pyrene all lie above the SSAC (1mg/kg) for residential (without plant uptake) land use, with the maximum value of 2.21mg/kg being recorded in TP5/1. The values are however still below the SSAC relating to commercial and industrial land use (36mg/kg).

• VOC

Within the volatile organic compound (VOC) suite, all the values lie below the MDL with the exception of xylene, which display values of 8µg/kg in TPBH5/2.

- **TPH**

Within the TPH suite, for all the bands, the maximum and therefore the UCL95 values were all significantly below the SSAC values (Table 4.1).

Table 4.1 Maximum and UCL95 values for TPH

Analyte	Maximum value (mg/kg)	UCL95 (mg/kg)	SSAC value (mg/kg)
C8 – C10	6.9	3.1	42.8
C10 – C12	7.0	3.7	218.8
C12 – C16	47.4	19.0	2609.2
C16 – C21	227.0	62.1	2859.6
C21 – C35	859.0	280.5	3044.7

- **SVOC**

The primary focus of the semi-volatile organic compounds (SVOC) suite is the determination of levels of PAHs, all of which have been discussed previously. There are however six further analytes that display a significant number of values greater than their respective MDL. Phenol occurs above its MDL at three locations (TP5/6, TP5/8, TPBH5/10), but these results (0.039mg/kg to 0.28mg/kg) are still significantly lower than the SGV of 21900mg/kg for commercial and industrial land use.

Five further analytes display results greater than their respective MDL values at a number of sampling locations across the site. Table 4.2 details the information relating to these analytes.

Table 4.2 SVOC analytes above MDL

Analyte	Range (µg/kg)	MDL (µg/kg)	No. of locations
2-methylnaphthalene	24.5 – 454.1	1.0	11
1-methylnaphthalene	9.4 – 348	1.0	11
Biphenyl	68.4 – 116.9	1.0	10
Dibenzofuran	25.3 – 239.4	0.6	10
Bis(2-ethylhexyl)phthalate	116.8 - 1946	2.0	11

4.2.2

Leachate

A two-stage leachate test was undertaken on all the scheduled samples. Whilst the majority of the results lie above the MDL, only six of the determinants have concentrations above their EQS or RQO values. Values relating to ammoniacal nitrogen exceed the RQO in eight of the 16 tests with the maximum value of 9.4mg/l being recorded in a sample from

TPBH5/12. The next two highest values of 7mg/l and 6.2mg/l occurred in samples from TPBH5/7 and TPBH5/10 respectively.

Five further determinants (total sulphur, copper, zinc, iron and mercury) display results above their respective EQS values. These results however only occur at a small number of locations, and in the case of mercury, the elevated result is an isolated occurrence.

For a full list of the analytical testing results relating to soils and leachate, refer to Appendix D.

4.3

Analytical testing – groundwater

As with the leachate results, the ammoniacal nitrogen values are considerably higher than the RQO at all but two monitoring locations, namely at BH5/1 and BH17(W). The concentrations range from 0.01mg/l in BH5/1 up to a maximum of 17.3mg/l in BH5/11. Further high concentrations occur at BH5/12 (12.6mg/l), BH15 (11.3mg/l) and BH5/14 (8.7mg/l). All other results are below their respective guideline values with the exception of potassium. As an EQS for potassium is unavailable, the UK drinking water quality standard of 12mg/l has been adopted. The potassium results exceed this value at all but three of the monitoring locations.

- **PAH**

Within the PAH suite, the results for benzo[a]pyrene are elevated above the MDL at seven locations, with the highest concentration (0.7µg/l) occurring at BH5/6. The values for naphthalene lie above the MDL at eleven locations with the highest concentration recorded at BH5/12 (2.4µg/l). Examination of the total PAH results reveals that BH5/6 displays the highest value (13.1µg/l) with BH5/8 (7.2µg/l) and BH5/12 (7.2µg/l) also displaying elevated values. In contrast, BH5/1 and BH17(W) display low values of 1µg/l and 0.79µg/l respectively.

- **VOC**

Within the VOC suite, all of the results including the BTEX (Benzene, Toluene, Ethylbenzene and Xylene) substances lie below the MDL values, with the exception of chloroform. At six locations (BH5/1, 5/5A, 5/6, 5/8, 5/10 and BH17(W)), the chloroform values lie between 2µg/l and 7µg/l which although being greater than the MDL, are still lower than the EQS value for freshwater (12µg/l).

- **TPH**

Within the TPH suite, an EQS value of 0.03mg/l (xylene) has been used to assess the concentrations of hydrocarbons within the C8 – C10 band. For all locations, the results are below 0.03mg/l.

In addition, the total values for all the TPH bands were calculated. The results were compared to a value of 1mg/l, which was taken from the Surface Waters (Abstraction for Drinking Water) Regulations 1996. Only BH5/6 displays a value greater (1.53mg/l) than the guideline value of 1mg/l.

- **SVOC**

Within the SVOC suite, the majority of the results lie below their MDL. BH5/6 however shows a series of results higher than the MDL values. These include nitrobenzene (2.1µg/l), benzoic acid (31.9µg/l), and 2,4-dinitrotoluene (3.6µg/l). In addition, the recorded values for bis(2-ethylhexyl)phthalate appear elevated (1.2µg/l to 9.4µg/l) in comparison to their MDL at the majority of monitoring locations.

For a full list of the analytical testing results relating to groundwater, refer to Appendix D.

4.4

Analytical testing – surface water

The hydrology of the site is discussed in section 2.6. For a full list of the analytical testing results relating to surface water, refer to Appendix D.

Surface water samples were recovered from nine locations across the Ty Garreg site and the adjacent Rhiwsaeson Lane sites. The values for pH ranged from 6.7 to 7.8 with the average value lying at 7.5. The majority of the tests have produced values either below the detection limit or below their respective guideline values.

Ammoniacal nitrogen however is at concentrations greater than the RQO (0.25mg/l) at location SW07 with 9.6mg/l. In addition, the sulphide at SW09 is significantly greater (0.06mg/l) than its EQS value (0.00025mg/l).

For total dissolved solids, a reference value of 500mg/l has been adopted which has been taken from the National Secondary Drinking Water Regulations (NSDWR) of America. Using this guideline, locations SW06 and SW07 both display values (734mg/l and 755mg/l respectively) in excess of the NSDWR figure.

- **PAH**

Within the PAH suite, only naphthalene, phenanthrene, fluoranthene and pyrene show values above the MDL. Despite rising above the MDL, the results are below their respective EQS values. For example, the maximum value recorded for naphthalene is 0.28µg/l, compared to a freshwater EQS value of 10µg/l. The results for benzo[a]pyrene at all surface water locations lie below the MDL.

- **VOC**

With the exception of one result for chloromethane (SW07), the remaining values from the VOC testing suite, including the BTEX substances, all fall below their detection limits.

- **TPH**

Within the TPH test results, values below the detection limits were recorded at all locations with the exception of SW07. At SW07, three carbon bands (C10 – C12, C12 – 16 and C16 – C21) lie above the detection limits.

- **SVOC**

The majority of the results from the remaining SVOC tests fall below their respective MDL values. In situations where values are greater than the

respective MDL, the values are considered too small and the occurrences too infrequent to cause any concern.

4.5

Waste Acceptance Criteria (WAC)

Prior to waste being accepted at a landfill site, the Landfill Regulations require that it must be shown that the waste at that site complies with permit conditions. In order to fulfil these requirements, a Waste Acceptance Criteria (WAC) suite of analytical testing must be undertaken on the material in question.

Waste materials can be characterised into one of three categories.

- Inert waste
- Non hazardous waste
- Non hazardous waste

Each waste category has leaching limit values and total content limit values for acceptance of a waste material. The limits relating to each category of waste are shown in Table 4.4.

A total of 16 samples obtained from the boreholes and trial pits have been subjected to WAC testing. The results of these tests are as follows:

- Inert Waste - 8 of the samples tested have recorded values below the upper limit values for inert waste.
- Non hazardous waste - 6 of the samples tested have exceeded the limiting values set for inert waste therefore classifying them as non-hazardous. One sample exceeded sulphate, mineral oil and fluoride, one exceeded total organic carbon (TOC), cadmium and zinc, one exceeded sulphate, one exceeded mineral oil, and two exceeded antimony.
- Hazardous waste – 2 of the samples tested exceeded the limiting values of mineral oil set for non-hazardous waste therefore classifying it as hazardous.

A full list of the results can be found in Appendix D. A list of locations displaying non-hazardous or hazardous results is shown in Table 4.3.

Table 4.3 Non-hazardous and hazardous locations

Location	Non-hazardous material	Hazardous material
TP5/1	-	Mineral oil
TP5/8	Zinc, Cadmium, TOC	-
TPBH5/4	Mineral oil	-
TPBH5/6	-	Mineral oil
TPBH5/10	Antimony	-
TPBH5/12	Sulphate, Fluoride, Mineral oil	-
BH5/5A	Sulphate	-
BH5/2	Antimony	-

Table 4.4 Waste acceptance criteria values

Component	Inert waste	Non hazardous waste	Hazardous waste
	Limit Values (mg/kg dry residue) for compliance testing using L/S 10l/kg		
As	0.5	2	25
Ba	20	100	300
Cd	0.04	1	5
Cr (total)	0.5	10	70
Cu	2	50	100
Hg	0.01	0.2	2
Mo	0.5	10	30
Ni	0.4	10	40
Pb	0.5	10	50
Sb	0.06	0.7	5
Se	0.1	0.5	7
Zn	4	50	200
Chloride	800	15,000	25,000
Fluoride	10	150	500
Sulphate	1,000	20,000	50,000
Phenol Index	1		
DOC	500	800	1,000
TDS	4,000	60,000	100,000
Parameters determined on waste (mg/kg)			
TOC	30,000	5%	6%
BTEX	6		
PCB's	1		
Mineral Oil	500		1,000
PAH's	100		
pH		Minimum 6	
Acid Neutralisation Capacity (ANC)		Must be evaluated	Must be evaluated
Loss on Ignition (LOI)			10%

4.6***Field monitoring – soil gases***

Gas monitoring has been undertaken in the new and the existing installations across the site on two occasions (8 December 2005 and 6 February 2006). For a full list of the results relating to the gas monitoring conducted in the field, refer to Appendix D.

4.6.1**Methane**

With the exception of BH23B(W), the monitoring has identified that the higher CH₄ values can be seen to occur in the recently installed installations (see Table 4.5), rather than those installed during Phase 1. Insufficient monitoring has been undertaken at this point to be able to assess the reason for this but it is anticipated that future monitoring will assist in determining a more detailed picture of the gas regime within the site.

4.6.2**Oxygen**

Variation exists in the levels of oxygen (O₂) both across the site, and also between the monitoring visits. In similarity to the methane, a discernable trend has not been established between the O₂ values and their locations within the site.

Three locations have shown significant variation with O₂ concentrations increasing in BH5/10, BH5/11 and BH22A, whilst only one location has shown a decrease (BH5/3).

4.6.3**Carbon Dioxide**

A significant change has not occurred in the individual CO₂ values between the two monitoring dates, with the exception of BH5/2 and BH5/11 where increases have occurred from 0.2%vol to 7.1%vol and 0%vol to 5.1%vol respectively.

4.6.4**Flow Rates**

Flow rates were not recorded during the gas monitoring on 8 December. They were however measured on 6 February, with all flow rates below 15litres/hour. It has been observed that the previously installed gas standpipes display flow rates no higher than 0.11litres/hour. In contrast, the recently installed gas standpipes display values up to 9.4litres/hour.

According to Waste Management Paper 26a, gas flows from the site are deemed satisfactory if the maximum concentration of methane (CH₄) lies below 1%vol and the maximum concentration of carbon dioxide (CO₂) is below 1.5%vol. Alternatively, the gas flow rate of each borehole should not exceed 15litres/hour. Table 4.5 summaries the results obtained from the field gas monitoring.

Table 4.5 Summary of field gas monitoring

	GI Phase	Oxygen (%vol)	Methane (%vol)	Carbon Dioxide (%vol)	Barometric Pressure (mb)	Flow Rate l/hr
BH5/1	5	20.3 – 20.8	0	0.1 – 0.8	1008 – 1017	0.07
BH5/2	5	1.4 – 8.2	0 – 4.2	0.2 – 7.1	1006 – 1019	-0.41
BH5/3	5	0.8 – 20.5	0 – 35	0 – 1.2	1008 – 1019	2.31
BH5/4	5	20.4 – 20.8	0 – 0.2	0 – 0.1	1008 – 1019	1.71
BH5/5A	5	0.9 – 3.7	26 – 55	2.1 – 2.5	1008 – 1018	9.41
BH5/6	5	0.1 – 0.9	4.9 – 18.5	5.4 – 6.8	1007 – 1019	1.11
BH5/7	5	0.4 – 0.7	7.8 – 12	3.3 – 3.8	1007 – 1019	1.21
BH5/8	5	0.5 – 1	31 – 37	1.2 – 3.9	1007 – 1019	7.31
BH5/9	5	0.8 – 1.3	22 – 54	4 – 4.2	1007 – 1018	0.61
BH5/10	5	6.1 – 21	0.8 – 53	0 – 0.6	1006 – 1019	-0.11
BH5/11	5	3.7 – 21	0.2 – 13.5	0 – 5.1	1006 – 1019	-1.07
BH5/12	5	2.6 – 3.7	80	2.1 – 2.2	1006 – 1019	1.21
BH5/14	5	0.7 – 3	15 – 26.5	1.7 – 3.4	1006 – 1019	4.57
BH15	1	18.9 – 21.2	0 – 0.1	0.2 – 1.9	1007 – 1019	0.07
BH17 (E)	1	20.5 – 20.6	0	0 – 0.2	1007 – 1019	0.11
BH17 (W)	1	20.5 – 21	0	0	1007 – 1018	0.07
BH17A (E)	1	19.8 – 20.6	0 – 1.3	0 – 0.2	1006 – 1019	-0.11
BH17A (W)	1	19.6 – 20.6	0 – 1.6	0 – 0.3	1006 – 1018	0.01
BH20A	1	20.5 – 21.1	0	0	1007 – 1018	0.07
BH21A	1	20.5 – 21.1	0	0	1007 – 1018	0.11
BH22A	1	12.9 – 20.1	0	1 – 3.2	1006 – 1018	0.01
BH23B (E)	1	18.9 – 21	0.1 – 1.2	0 – 0.1	1006 – 1018	-1.01
BH23B (W)	1	4.7 – 6.4	13.5 – 14.5	2.5	1006 – 1018	-0.21

5 Discussion

5.1 *Introduction*

A conceptual model has been developed for the site and is shown in Figure 3. The model summarises the current site conditions.

5.2 *Soils and leachate*

5.2.1 Soil

Owing to the slightly elevated sulphate concentrations measured within the ground, it will be necessary to specify suitable cement and concrete to prevent sulphate attack. BRE Special Digest 1 (2005) provides advice for the specification of concrete buried in the ground where risks arising from elevated sulphate concentrations are anticipated.

The majority of pH values lie above 8.5. Whilst not considered significantly high, the soil is clearly alkaline in nature. This could be attributable to the presence of concrete building rubble or the presence of slag within the fill (as shown in the borehole logs).

- **PAH**

The values of benzo[a]pyrene were higher than the SGVs relating to residential (without plant uptake) land use but lower than commercial land use at three locations. At two of these locations (TP5/1 and TPBH5/2), hydrocarbon odours were noted on the logs, explaining the occurrence of both elevated benzo[a]pyrene and total PAH values. At the third location however, displaying the highest values of benzo[a]pyrene (6.16mg/kg) and total PAH (56.9mg/kg), neither visible nor olfactory evidence of hydrocarbons was noted.

The assessment of whether the above values constitute a contamination risk can only be completed upon further consultation with the Environment Agency and other appropriate bodies, following which it is envisaged an appropriate proposed end use of the site (in accordance with CLEA) can be established.

- **SVOC**

With reference to Table 4.2, five analytes have been detected above their respective MDL. The substances are more typically found within recent municipal landfill sites, and are not typical of an inert landfill site. The presence of these substances is not readily explainable but their concentrations are not considered to be of particular significance for the proposed development.

5.2.2 Leachate

The ammoniacal nitrogen results are in excess of the RQO in eight of the 16 leachate tests, although a discernable trend within the results relating to either depth or location across the site has not been identified. The elevated values relating to ammoniacal nitrogen resulting from the leachate tests are unexpected because whilst being typical of municipal landfill waste, they are not considered to be symptomatic of building rubble/demolition waste.

At one location (BH5/2), a mercury value (0.0017mg/l) slightly higher than the EQS figure of 0.001mg/l was observed. As this is the only occurrence however, and the value is relatively low, it is unlikely to be significant in relation to the entire site. Mercury levels will however be checked as part of an ongoing groundwater monitoring programme, which should confirm whether BH5/2 will continue to produce elevated levels.

In similarity to the soil results, elevated sulphate values have been found at a number of monitoring locations across the site. These could be attributed to the presence of concrete and slag within the fill material.

5.3

Groundwater

Monitoring equipment placed in BH5/1 is solely within the natural ground i.e. no fill material is present at this location and the results of the chemical testing undertaken on the groundwater in this borehole indicate that there is no contamination present. This location has therefore been selected as a benchmark by which other groundwater monitoring results can be compared.

With the exception of ammoniacal nitrogen, sulphide, potassium and hydrocarbons the testing of the groundwater in all the other boreholes has shown results generally similar to those in BH5/1. Elevated levels of ammoniacal nitrogen and sulphide have however been recorded in all of the other boreholes which suggests that materials present within the fill are causing a deterioration in water quality within the site.

Elevated potassium values range from 15.6mg/l to 41.1mg/l (BH5/12) and occur at all but three of the groundwater monitoring locations. One potential source for the higher values of potassium could be in the sandstone found both within the fill material and the underlying bedrock. Gravel and cobble size fragments of sandstone have been commonly identified within exploratory holes across the site, and at BH5/12 (41.1mg/l) sandstone was noted in every horizon.

- **PAH**

The elevated total PAH results are dominated primarily by naphthalene. Other species however such as benzo[a]pyrene, phenanthrene, fluoranthene, acenaphthene and fluorene also contribute to the total values. Whilst the presence of asphalt is noted in the log of BH5/14, none of the six remaining locations record any specific reasons for the presence of elevated PAH values. This indicates that the hydrocarbon values result from water movement from elsewhere on the site, and not the individual locations.

- **TPH**

Only BH5/6 displays a total hydrocarbon figure greater than the guideline value of 1mg/l. As stated before however, evidence has not been found within the logs to explain the presence of this elevated level. Groundwater movement from either elsewhere on the site or offsite from the Rhiwsaeson Lane municipal landfill may be responsible for these values.

- **SVOC**

Despite the higher values of benzoic acid, nitrobenzene and 2,4-dinitrotoluene at BH5/6, there has been no evidence of hydrocarbons in the trial pit or borehole logs. It is therefore considered that, rather than

contaminants at the location directly affecting the groundwater, the elevated SVOC values are likely to be due to contaminated groundwater from elsewhere on the site, or alternatively offsite from the adjacent Rhiwsaeson Lane municipal landfill.

Elevated values of bis(2-ethylhexyl)phthalate occurring at all but one location across the site may be due to plastics within the waste material, which is a potential source of phthalate.

No particular pattern/trend has been established with respect to the quality of the groundwater within the landfill.

As detailed in Section 1.1, the scope of this report is to examine and assess the quality of groundwater within the Ty Garreg site in order to determine the extent of contamination within the landfill materials. The assessment does not take into consideration the effect the landfill may be having on the quality of groundwater outside of the site. Monitoring and sampling of groundwater outside the site has been undertaken, and a bi-monthly monitoring programme has been set up. The results of the recent monitoring, sampling and testing of the groundwater outside of the site will be the subject of a further report.

5.4

Surface water

Monitoring of surface water on and around the periphery of the site has been undertaken to determine whether leachate from Ty Garreg is migrating offsite and subsequently affecting the quality of surface watercourses. This has been suspected, as what appear to be leachate breakouts from the base of the slopes of Ty Garreg, have been observed along the eastern boundary of the site between points SW05 and SW06.

Test results (Appendix D) have shown, that with the exception of SW07, no significant contamination has been observed within the surface water locations around the site. Surface water monitoring location SW07 has displayed elevated concentrations of ammoniacal nitrogen compared to the other locations. SW07 is located in a stagnant pond, displaying extremely low or no flow conditions, except in times of flood where overtopping occurs releasing water into the adjacent stream (SW05). The land upstream of location SW07 comprises a municipal landfill site which has been restored and subsequently used for grazing livestock. These two factors are likely to explain the elevated levels of ammoniacal nitrogen.

The total dissolved solids results are also elevated at SW07 and SW06. The value at SW07 could be attributed to the fact the monitoring location was stagnant and cloudy, and would therefore have a higher degree of total dissolved solids. The elevated value at SW06 could simply be attributable to the fact that it lies downstream of SW07. Alternatively, the elevated values could be due to seepage of water from the north east boundary of Ty Garreg. Further investigation will be needed in order to provide further information on the source.

5.5

Gas

Prior to the monitoring, sampling and testing that has been undertaken as part of the Phase 5 investigation, an initial gas monitoring programme was established at the site back in 2004. Four gas standpipes namely BH21A, BH22, BH22A and BH23B, which are screened within the landfill, were monitored monthly from May to October. A Halcrow prepared report

entitled “Rhiwsaeson (now Ty Garreg) Lane Landfill – Initial Assessment of Gas Monitoring - November 2004” details the results of this monitoring, and revealed that significant quantities of methane and carbon dioxide (50 to 90% vol) and flow rates ($>20\text{l/hr}$) were present within the eastern side of the landfill. Reference should be made to this report for further details on the results of the gas monitoring undertaken.

During the monitoring undertaken for Phase 5 high levels of CH_4 and CO_2 , as well as depleted O_2 values, were observed at approximately 50% of the gas monitoring locations. Such values may be indicative of significant organic content or putrescible materials within the fill. The description of the fill materials encountered during the various phases of ground investigation however does not provide a clear indication of a source of soil gases. Timber has been recorded within two thirds of the exploratory holes and trial pits, but the frequency is often described as ‘occasional’ and then only occurs as fragments. With exception of this timber, the fill is largely inert and free from any obvious sources of gas.

As detailed in Sections 2.4.2 and 2.4.3, a layer of peat was encountered between the fill material and the underlying glacial deposits in a number of boreholes, indicating a possible source for both the CH_4 and the CO_2 . In May 2005 however, a sample of gas extracted from BH21A was measured for tritium and carbon 14 in an attempt to determine the age and hence the origin of the gas. The results of the testing which are included in Appendix D indicate that the gas is of a modern, post 1950 origin, thus ruling out the peat layer and the underlying Coal Measures bedrock as being possible sources.

Flow rates of up to 9.4l/hr indicate that gas generation is still active at the site. Section 4.6.4 details, that the flow rates are significantly less in the Phase 1 boreholes than in the ones carried out under Phase 5. As detailed above, much higher flow rates were initially measured in the Phase 1 boreholes shortly after their completion indicating perhaps that gas generation within the landfill site is generally diminishing.

Taking into account the above discussion it appears most likely that the gas present within the landfill is being released from the decomposition of small isolated pockets of organic/putrescible materials. This gas remains largely trapped within the fill but is released when disturbed by investigatory techniques explaining the initial high readings of gas flow measured in the boreholes. Evidence to date suggests that the concentration and flow rate of gas encountered within each hole is diminishing overtime but further monitoring is required to confirm this.

6

Conclusions

The Ty Garreg site has previously been used for the disposal of construction waste. Prior to use as a landfill site in the early 1990's, the site was undeveloped and comprised fields. Disposal of material continued throughout the 1990's and although the site was closed on 1 July 2001, tipping of waste material has continued.

Investigations undertaken at the Ty Garreg Landfill site have been undertaken for two main reasons. Firstly to assess the chemical properties of the fill material and groundwater with a view to characterising the waste in terms of its end use. The second reason was to install instrumentation for the purpose of undertaking long term sampling and monitoring of leachate and gas within the site such that the stability (chemical) of the site and its effect on the environment can be assessed at some time in the future.

This report has concentrated on assessing both the chemical composition and characterisation of the waste. In so doing, the report has identified that the waste is predominantly non-degradable with generally low levels of contamination. The majority of tests results indicate the fill material to be appropriate for a "residential (without plant uptake)" end-use in accordance with the CLEA model. The contamination which is present consists primarily of hydrocarbons, as well as ammoniacal nitrogen. Slight heavy metal contamination also occurs at various locations across the site, comprising mainly chromium and nickel, putting the waste above SGVs for residential (without plant uptake) but well below the upper limit of SGVs for commercial/industrial use.

In order to characterise the waste that will arise from the proposed development, waste acceptance criteria testing has been undertaken on a number of samples, such that the end use of the material with respect to disposal or reuse can be determined. With the exception of two test results, the testing has indicated the waste to be non-hazardous. The two exceptions (samples from TP5/1 and TPBH5/6), relate to the presence of mineral oil which was recorded as falling within the 'hazardous' range. These results may indicate the presence of potential hotspots within the landfill but insufficient information is currently available to assess this.

Gas has been recorded emanating from some of the boreholes. The source of the gas has not been accurately identified but the evidence to date suggests it is being released from small isolated pockets of degradable materials within the landfill. Further monitoring will determine whether gas levels are continuing to diminish.

Having examined the results of all of the analytical testing from samples recovered from within the site, it is concluded that with the exception of two isolated areas (TP5/1 and TPBH5/6) which will require further consideration, the level of contamination within the material that will be excavated is generally low and unlikely to pose a threat of harm to either human health or the environment.

Site specific risk assessments will however be required if this material is deemed acceptable (geotechnically) for use as earthworks fill elsewhere on the scheme. Based on the overall assessment of the material it is considered that it is appropriate for re-use within the permanent works, subject to the

registration of appropriate exemptions from the Waste Management Regulations.

7 Recommendations

The investigations undertaken to date have provided data which have enabled characterisation of the waste in Ty Garreg to be undertaken and also provided a means for the establishment of a long term sampling and monitoring programme of the gas and leachate outputs from and within the site. In order to meet regulatory requirements it is recommended that sampling and monitoring of the site is continued on a regular basis in order for data to be collected to assist in determining the stability of the site with regards to future generation of leachate and or gas. Once the condition of the site with respect to stability has been established then further assessment will need to be undertaken to determine the potential for leachate and or gas to cause pollution of the environment or harm to human health.

8 References

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APPENDIX A

EXPLORATORY HOLE SUMMARY

Coordinates and Depths of Exploratory Holes

Code	Contractor	Phase	Easting	Northing	Elevation (MOD)	Depth (m)
BH14	Integral Geotechnique	Phase 1 (June 2002)	306321.5	183735.3	101.91	15
BH14A	Integral Geotechnique	Phase 1 (June 2002)	306388.9	183731.3	104.51	20.5
BH15	Integral Geotechnique	Phase 1 (June 2002)	306433.5	183750.4	104.73	10.6
BH16	Integral Geotechnique	Phase 1 (June 2002)	306466.4	183784.9	100.86	10.2
BH17	Integral Geotechnique	Phase 1 (June 2002)	306516.9	183734.21	104.06	12
BH17A	Integral Geotechnique	Phase 1 (June 2002)	306535.2	183817	100.51	22.5
BH19	Integral Geotechnique	Phase 1 (June 2002)	309470	183842	94.38	15
BH20A	Integral Geotechnique	Phase 1 (June 2002)	306594.61	183869.8	100.45	21
BH21	Integral Geotechnique	Phase 1 (June 2002)	306623.7	183807.92	103.99	30
BH21A	Integral Geotechnique	Phase 1 (June 2002)	306593.7	183770.3	104.71	25
BH22 (BH22B/C)	Integral Geotechnique	Phase 1 (June 2002)	306680.5	183880.9	105.23	4.6
BH22A	Integral Geotechnique	Phase 1 (June 2002)	306723.3	183903.9	104.24	33
BH23A	Integral Geotechnique	Phase 1 (June 2002)	306676.2	183802.1	103.14	29.1
BH23 (BH23B/C/D)	Integral Geotechnique	Phase 1 (June 2002)	306723	183836.2	105.61	8.6
BH27	Integral Geotechnique	Phase 1 (June 2002)	306797.3	183871.1	89.13	30
BHX01	Soil Mechanics	Phase 3 (March 2004)	306308.69	183733.82	99.22	39.5
BHX02	Soil Mechanics	Phase 3 (March 2004)	306378.2	183786.2	99.83	41.5
BHX03	Soil Mechanics	Phase 3 (March 2004)	306432	183800.24	98.01	39.5
BHX04	Soil Mechanics	Phase 3 (March 2004)	306536.4	183779.2	101.25	40
BHX06	Soil Mechanics	Phase 3 (March 2004)	306539.6	183884.3	93.52	13
BH5/1	Soil Mechanics	Phase 5 (October 2005)	306340.61	183661.38	102.32	6.1
BH5/2 (TPBH5/2)	Soil Mechanics	Phase 5 (October 2005)	306383.94	183785.51	100.22	9.0 (5.8)
BH5/3 (TPBH5/3)	Soil Mechanics	Phase 5 (October 2005)	306413.77	183767.54	102.56	10.0 (5.9)
BH5/4 (TPBH5/4)	Soil Mechanics	Phase 5 (October 2005)	306479.32	183834.13	95.96	4.2 (4.2)
BH5/5 (TPBH5/5)	Soil Mechanics	Phase 5 (October 2005)	306462.25	183701.36	105.91	3.2 (5.9)
BH5/5A	Soil Mechanics	Phase 5 (October 2005)	306462.25	183701.36	105.91	16.4
BH5/6 (TPBH5/6)	Soil Mechanics	Phase 5 (October 2005)	306512.71	183654.08	102.75	9.0 (5.3)
BH5/7 (TPBH5/7)	Soil Mechanics	Phase 5 (October 2005)	306469.07	183581.04	106.4	7.0 (4.5)
BH5/8 (TPBH5/8)	Soil Mechanics	Phase 5 (October 2005)	306512	183771.18	103.23	13.0 (5.6)
BH5/9 (TPBH5/9)	Soil Mechanics	Phase 5 (October 2005)	306599.39	183833.1	103.64	17.5 (2.2)
BH5/10 (TPBH5/10)	Soil Mechanics	Phase 5 (October 2005)	306578.27	183909.65	95.11	6.4 (5.0)
BH5/11 (TPBH5/11)	Soil Mechanics	Phase 5 (October 2005)	306680.33	184024.89	93.36	8.4 (4.2)
BH5/12 (TPBH5/12)	Soil Mechanics	Phase 5 (October 2005)	306697.82	183963.76	100.05	13.5 (4.5)
BH5/13 (TPBH5/13)	Soil Mechanics	Phase 5 (October 2005)	306668.92	183799.81	105.24	8.4 (5.9)
BH5/13A	Soil Mechanics	Phase 5 (October 2005)	306668.26	183800.92	105.24	7.9
BH5/14 (TPBH5/14)	Soil Mechanics	Phase 5 (October 2005)	306734.9	183773.73	105.07	11.5 (6.0)
TP7	Integral Geotechnique	Phase 1 (June 2002)	306301.3	183752.8	98.52	3
TP8	Integral Geotechnique	Phase 1 (June 2002)	306381.1	183786.7	99.8	2.5
TP11	Integral Geotechnique	Phase 1 (June 2002)	306566.6	183803.8	100.82	2.5
TP12	Integral Geotechnique	Phase 1 (June 2002)	306537.3	183837.2	100.74	3.3
TP14	Integral Geotechnique	Phase 1 (June 2002)	306634.9	183853	102.94	1.8
TP14A	Integral Geotechnique	Phase 1 (June 2002)	306738.2	183839.8	103.35	2.9
TPX13	Soil Mechanics	Phase 3 (March 2004)	306386.5	183781.7	100.8	3.9
TPX14	Soil Mechanics	Phase 3 (March 2004)	306445.7	183766.7	100.62	4.5
TPX15	Soil Mechanics	Phase 3 (March 2004)	306503.3	183819.8	99.08	3.9
TPX16	Soil Mechanics	Phase 3 (March 2004)	306594.9	183802.4	101.6	3.7
TPX17	Soil Mechanics	Phase 3 (March 2004)	306656.6	183858	105.18	4.2
TPX18	Soil Mechanics	Phase 3 (March 2004)	306734.4	183834.1	103.22	4.2
TP5/1	Soil Mechanics	Phase 5 (October 2005)	306438.86	183720.38	104.79	6
TP5/2	Soil Mechanics	Phase 5 (October 2005)	306450.29	183612.39	105.84	6
TP5/3	Soil Mechanics	Phase 5 (October 2005)	306513.81	183583.85	105.73	4.7
TP5/4	Soil Mechanics	Phase 5 (October 2005)	306551.12	183771.16	103.8	3
TP5/5	Soil Mechanics	Phase 5 (October 2005)	306621.48	183771.43	104.88	5.8
TP5/6	Soil Mechanics	Phase 5 (October 2005)	306612.27	183902.04	99.4	5.9
TP5/7	Soil Mechanics	Phase 5 (October 2005)	306645.51	183969.65	95.47	6
TP5/8	Soil Mechanics	Phase 5 (October 2005)	306729.34	183878.07	104.74	6

APPENDIX B

PHASE 5 EXPLORATORY HOLE LOGS

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF		Start 24/11/2005 End 24/11/2005		Equipment, Methods and Remarks Pilon 1500 Light cable percussion GL - 6 10m. Terminated on engineer's instruction		Depth from 0.00m to 6.10m Diameter 250mm Casing Depth 6.10m		Ground Level +102.32 mOD Coordinates E 306340.61 National Grid N 183561.38	
Samples and Tests					Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0.10-0.50	B 1		24/11/2005	1000	TOPSOIL: Very soft brown slightly sandy organic CLAY/SILT with many rootlets.	0.10 +102.22 (0.40)			
0.50-1.00	B 2				Soft to firm orange brown mottled grey slightly sandy slightly gravelly friable CLAY with occasional rootlets. Gravel is sub-angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	0.50 +101.82			
3.00-3.20	B 3				Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional locally some sub-angular to sub-rounded cobbles of sandstone. [GLACIAL DEPOSIT]	(5.60)			
4.50-4.70	B 4				4.50-6.10 m grey mottled orange brown.				
6.00-6.10	B 5		24/11/2005 6.10	1640 4.90	EXPLORATORY HOLE ENDS AT 6.10 m	6.10 +96.22		SPIE SP	
Depth	Type & No	Records	Date Casing	Time Water					
Groundwater Entries No. Struck Post strike behaviour 1 6.10 Standing at 4.90m (end of shift)					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used 1.70-2.10 60 mins Chisel 2.80-3.10 60 mins Chisel 4.10-4.60 75 mins Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taf County Borough Council		Borehole BH5/1 Sheet 1 of 1		

Scale 1:50

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Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.80m (TPBH5/2). Light cable percussion GL - 9.00m. Terminated on engineer's instruction. Hand excavation at 0.40m to remove boulder (0.75hrs).		Depth from 0.00m	to 9.00m	Diameter 250mm	Casing Depth 9.00m	Ground Level +100.22 mOD Coordinates E 306383 94 National Grid N 183785 51
Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
		0.00-5.80 m Open holed	28/11/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/2 for details)	(5.80)		
5.80-7.00 5.80-7.00	B 1 ES 2				MADE GROUND: Soft to firm brown grey sandy gravelly CLAY with occasional angular to sub-angular cobbles of sandstone & concrete. Gravel is angular fine to coarse of sandstone, concrete & brick. With occasional fragments of timber.	5.80 +94.42 (1.20)		
7.00-7.20	B 3				Firm grey mottled orange brown sandy slightly gravelly CLAY/SILT with occasional sub-angular to sub-rounded cobbles of sandstone [GLACIAL DEPOSIT]	7.00 +93.22		SPIE SP
8.00-8.20	B 4					(2.00)		
			28/11/2005 9.00	1645 6.60	EXPLORATORY HOLE ENDS AT 9.00 m	9.00 +91.22		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 7.00 Standing at 6.60m (end of shift)					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used 2.60-3.00 60 mins Chisel 3.00-3.60 90 mins Chisel 4.90-5.20 45 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/2 Sheet 1 of 1	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF		Start 24/10/2005 End 24/10/2005		Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/3), then backfilled to GL Light cable percussion GL - 10.00m Terminated on engineer's instruction.		Depth from 0.00m to 10.00m Diameter 250mm Casing Depth 10.00m		Ground Level +102.56 mOD Coordinates E 306413.77 National Grid N 183767.54	
Samples and Tests					Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
		0.00-5.90 m Open holed	24/10/2005	0800	Backfilled trial pit arisings (Refer to TPBH5/3 for details)	(5.90)			
5.90-9.00 6.00	ES 1 B 2				MADE GROUND: Brown clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone with some sub-rounded cobbles of sandstone Occasional pockets of soft to firm brown slightly sandy clay.	5.90 +96.66 (1.10)			
7.50	B 3				MADE GROUND: Dark grey brown clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular sandstone cobbles.	7.00 +95.56 (2.00)			
9.00 9.00	KRH B 4	k=1.2-10 m/s			Firm grey mottled orange brown and brown slightly sandy locally sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse gravel of sandstone. [GLACIAL DEPOSIT]	9.00 +93.56 (1.00)		SP1E SP	
			24/10/2005 10.00	1730 dry	EXPLORATORY HOLE ENDS AT 10.00 m				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)					Depth sealed (m)		Depth Related Remarks * From to (m)		
Chiselling Depths (m) 6.00 - 6.40 8.10 - 8.40					Time 60 mins 75 mins		Tools used Chisel Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/3 Sheet 1 of 1		

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 25/10/2005 End 25/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 4.20m (TPBH5/4), then backfilled to GL. Light cable percussion GL - 4.20m. Terminated on engineer's instruction.		Depth from 0.00m	to 4.20m	Diameter 250mm	Casing Depth 4.20m	Ground Level +95.96 mOD Coordinates E 306479 32 National Grid N 183834 13 Chainage
Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
		0.00-4.20 m Open holed	25/10/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/4 for details)	(4.20)		
			25/10/2005	1100 dry	EXPLORATORY HOLE ENDS AT 4.20 m	4.20 +91.76		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/4 Sheet 1 of 1	

Borehole Log



Soil Mechanics

Drilled MY Logged MY Checked AF	Start 17/11/2005 End 17/11/2005	Equipment Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/5), then backfilled to GL. Light cable percussion GL - 3.20m. Large obstruction deflecting casing at 3.20m, terminated on engineer's instruction. Move 1m to BH5/5A		Depth from 0.00m to 3.20m Diameter 250mm Casing Depth 3.20m	Ground Level +105.91 mOD Coordinates E 306481.25 National Grid N 183702.38 Chainage
Samples and Tests			Strata		
Depth	Type & No	Records	Date Casing	Time Water	Description
		0.00-3.20 m Open holed	17/11/2005	1445 0.00	Backfilled trial pit arisings (Refer to TPBH5/5 for details)
			17/11/2005	1600 3.20 dry	
			EXPLORATORY HOLE ENDS AT 3.20 m		
Depth	Type & No	Records	Date Casing	Time Water	
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m)		Depth Related Remarks * From to (m)
Chiselling Depths (m) 2.10 - 2.30 Time 105 mins Tools used Chisel					
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/5 Sheet 1 of 1

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 17/11/2005 End 21/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/5). Light cable percussion GL - 16.40m Terminated on engineer's instruction.		Depth from 0.00m to 16.40m Diameter 250mm Casing Depth 16.40m	Ground Level +105.91 mOD Coordinates E 306462 25 National Grid N 183701 38 Chainage
Samples and Tests				Strata	
Depth	Type & No	Records	Date Casing	Time Water	Description
		0.00-5.90 m Open holed	17/11/2005	1630	Backfilled trial pit arisings. (Refer to TPBH5/5 for details)
			17/11/2005	1715 dry	
			18/11/2005	0800 dry	
5.90-8.90	B 1				
5.90-8.90	ES 2				
					MADE GROUND: Firm grey brown slightly sandy gravelly CLAY with occasional sub-angular cobbles of sandstone. Gravel is angular to subangular fine to coarse of sandstone brick & concrete
					MADE GROUND: Brown grey silty sandy angular to sub-rounded fine to coarse GRAVEL of sandstone & brick.
					MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular cobbles of sandstone. Some cobble size fragments of timber and occasional plastic.
8.90-11.90	B 3				
8.90-11.90	ES 4				
					Stratum continues to 13.40 m
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)		Depth Related Remarks * From to (m)
Chiselling Depths (m) 5.90-6.40 6.40-7.20 7.20-7.40 8.50-9.10			Time Tools used 60 mins Chisel 105 mins Chisel 30 mins Chisel 75 mins Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council
Scale 1:50					Borehole BH5/5A Sheet 1 of 2

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 17/11/2005 End 21/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/5). Light cable percussion GL - 16.40m. Terminated on engineer's instruction.	Depth from 0.00m to 16.40m Diameter 250mm Casing Depth 16.40m	Ground Level +105.81 mOD Coordinates E 306462 25 National Grid N 183701 38 Chainage			
Samples and Tests			Strata				
Depth	Type & No	Records	Date Casing Time Water	Description (Continued from Sheet 1)	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
			18/11/2005 1700 10.70 9.20	MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular cobbles of sandstone. Some cobble size fragments of timber and occasional plastic	(5.10)		
			21/11/2005 0800 10.70 10.00				
11.90-13.40 11.90-13.40	B 5 ES 6						
13.40-14.00	B 7			Firm grey mottled dark brown and brown slightly sandy slightly gravelly organic CLAY with some fibrous organic matter. Gravel is angular to sub-angular fine to coarse of sandstone. [GLACIAL DEPOSIT]	13.40 +92.51 (0.60)		SPIE SP
14.00-16.40	B 8			Firm to stiff grey mottled brown sandy slightly gravelly CLAY with some sub-angular to sub-rounded cobbles of sandstone. [GLACIAL DEPOSIT]	14.00 +91.91 (2.40)		
			21/11/2005 1700 16.40	EXPLORATORY HOLE ENDS AT 16.40 m	16.40 +89.51		
Depth	Type & No	Records	Date Casing Time Water				
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m)				Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used	
1 10.70 Rose to 9.20 m after 20 minutes.						10.30-10.70 60 mins Chisel 10.70-11.60 120 mins Chisel 11.60-12.00 90 mins Chisel 13.00-13.40 75 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/5A Sheet 2 of 2	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 23/11/2005 End 23/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.30m. Light cable percussion GL - 9.00m. Terminated on engineer's instruction.		Depth from 0.00m to 9.00m Diameter 250mm Casing Depth 9.00m	Ground Level +102.75 mOD Coordinates E 306512.71 National Grid N 183654.08 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-5.30 m Open holed	23/11/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/6 for details)			
5.30-6.80 5.30-6.80	B 1 ES 2				MADE GROUND: Firm grey brown slightly sandy gravelly CLAY with occasional angular cobbles of sandstone & concrete. Gravel is angular to sub-angular fine to coarse of concrete sandstone & brick	5.30 +97.45 (1.50)		
8.0-7.60	B 3				Firm grey brown mottled orange brown sandy slightly gravelly CLAY with occasional locally some sub-angular to sub-rounded cobbles of sandstone. Gravel is angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]	6.80 +95.95 (2.20)		
7.60-9.00	B 4							
			23/11/2005 9.00	1700 5.90	EXPLORATORY HOLE ENDS AT 9.00 m	9.00 +93.75		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour 1 6.80 Rose to 5.90 m after 20 minutes.					Depth Related Remarks * From (m) to (m)		Chiselling Depths (m) Time Tools used 2.60-3.00 60 mins Chisel 4.80-4.80 45 mins Chisel 5.80-6.00 30 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/6 Sheet 1 of 1	

Scale 1:50

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Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 22/11/2005 End 22/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 4.50m (TPBH5/7). Light cable percussion GL - 7.00m. Terminated on engineer's instruction		Depth from 0.00m to 7.00m Diameter 250mm Casing Depth 7.00m	Ground Level +106.40 mOD Coordinates E 306469 07 National Grid N 183581 04 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-4.50 m Open holed	22/11/2005	1045	Backfilled trial pit arisings. (Refer to TPBH5/7 for details)			
4.50-5.00	B 1					4.50 +101.90		
4.50-5.00	ES 2					(0.50)		
5.00-7.00	B 3				Soft to firm dark brown grey slightly sandy slightly gravelly organic CLAY with occasional rootlets. Gravel is sub-angular fine to coarse of sandstone. [GLACIAL DEPOSIT]	5.00 +101.40		
					Firm brown mottled orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone. (Driller notes cobbles) [GLACIAL DEPOSIT]	(2.00)		
			22/11/2005	1700				
			7.00	7.00				
					EXPLORATORY HOLE ENDS AT 7.00 m	7.00 +99.40		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 7.00 Remained at 7.00 m after 20 minutes Slight seepage -					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/7 Sheet 1 of 1	

Scale 1:50

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Drilled MY Logged AF Checked AF	Start 15/11/2005 End 17/11/2005	Equipment, Methods and Remarks Pitcon 1500 Machine excavation GL - 5.60m (TPBH5/8) then backfilled to GL. Light cable percussion GL - 13.00m. Cutter stuck in re-bars at 5.90m, pulled casing & re-drill (4.75hrs). Terminated on engineer's instruction.	Depth from 0.00m to 13.00m Diameter 250mm Casing Depth 13.00m	Ground Level +103.23 mOD Coordinates E 306512.00 N 183771.18 Chainage			
Samples and Tests			Strata				
Depth	Type & No	Records	Date Casing Time Water	Description	Depth, Level / (Thickness)	Legend	Backfill / Instruments
		0.00-5.60 m Open holed	15/11/2005 0800	Backfilled trial pit arisings. (Refer to TPBH5/8 for details)	(5.60)		
			15/11/2005 1545 4.60 dry				
			16/11/2005 0800 4.60 dry				
5.60-8.60 5.60-8.60	B 1 ES 2			MADE GROUND: Dark grey brown clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular cobbles of sandstone. Occasional fragments of 10mm re-bar.	5.60 +97.63		
					(3.60)		
8.60-10.20 8.60-10.20	B 3 ES 4						
9.20-9.50	B 5			MADE GROUND: recovered as dark grey silty very sandy angular to sub-angular fine to coarse GRAVEL of concrete & sandstone with occasional angular	9.20 +94.03		
					(1.00)		
Depth	Type & No	Records	Date Casing Time Water	Stratum continues to 10.20 m			
Groundwater Entries No. Struck Post strike behaviour				Depth sealed (m)	Chiselling Depths (m) Time Tools used		
				Depth Related Remarks *	From to (m)		
					5.60-6.10 120 mins Chisel 6.50-7.00 60 mins Chisel 8.50-9.00 45 mins Chisel 9.00-9.20 30 mins Chisel 9.20-9.60 45 mins Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Borehole BH5/8 Sheet 1 of 2		

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF		Start 15/11/2005 End 17/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.60m (TPBH5/8) then backfilled to GL. Light cable percussion GL - 13.00m. Cutter stuck in re-bars at 5.90m, pulled casing & re-drill (4.75hrs). Terminated on engineer's instruction.		Depth from 0.00m to 13.00m Diameter 250mm Casing Depth 13.00m	Ground Level Coordinates National Grid Chainage	+103.23 mOD E 306512 00 N 183771 18	
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness)	Legend	Backfill/ Instruments
10.20-10.50	B 6				cobbles of concrete.	10.20 +93.03 (0.30)		SP
11.20-11.50	B 7				Firm to stiff dark grey mottled brown slightly sandy slightly gravelly organic CLAY with some fibrous organic material and roots. Gravel is angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	10.50 +92.73		
			16/11/2005 12 00	1700 dry				
			17/11/2005 12 00	0800 8 90				
			17/11/2005 13 00	1130 10.10				
					EXPLORATORY HOLE ENDS AT 13.00 m	13.00 +90.23		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour 1 12 00 Rose to 8.90m overnight					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/8 Sheet 2 of 2	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 08/11/2005 End 10/11/2005	Equipment Methods and Remarks Pilcon 1500 Machine excavation GL - 2.20m (TPBH5/9), then backfilled to GL. Light cable percussion GL - 17.50m. Terminated on engineer's instruction.		Depth from 0.00m to 17.50m Diameter 250mm Casing Depth 17.50m	Ground Level Coordinates National Grid +103.64 mOD E 306599.39 N 183833.10
Samples and Tests				Strata	
Depth	Type & No	Records	Date Casing	Time Water	Description
		0.00-2.20 m Open holed	08/11/2005	1300	Backfilled trial pit arisings (Refer to TPBH5/9 for details)
2.20-5.20 2.20-5.20	B 1 ES 2				
			08/11/2005 4.60	1730 dry	
			08/11/2005 4.60	0900 3.20	
5.20-8.20 5.20-8.20	B 3 ES 4				MADE GROUND: Soft locally soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone & brick. 3.00-4.60 m driller notes much timber
8.20-11.20 8.20-11.20	B 5 ES 6				MADE GROUND: Brown grey locally dark grey brown clayey and very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick and concrete with occasional locally some sub-angular cobbles of sandstone concrete & brick. 8.20-11.20 m with some timber fragments.
Stratum continues to 11.20 m					
Groundwater Entries No. Struck Post strike behaviour 1 4.60 Rose to 3.20m overnight			Depth sealed (m) -		Depth Related Remarks * From to (m) 3.20 17.50 Water added to assist drilling
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Chiselling Depths (m) Time Tools used 3.00-3.30 60 mins Chisel 4.30-4.60 45 mins Chisel 4.60-5.00 60 mins Chisel 5.40-6.00 90 mins Chisel 7.50-8.00 60 mins Chisel 9.60-10.00 60 mins Chisel
Scale 1:50 (c) MESC 358 v1.20a/06/12/2005 17:19:20			Borehole BH5/9 Sheet 1 of 2		

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 08/11/2005 End 10/11/2005	Equipment, Methods and Remarks Pilon 1500 Machine excavation GL - 2.20m (TPBt-H5/9), then backfilled to GL. Light cable percussion GL - 17.50m. Terminated on engineer's instruction.	Depth from 0.00m to 17.50m Diameter 250mm Casing Depth 17.50m	Ground Level +103.64 mOD Coordinates E 306599.39 National Grid N 183833.10	
Samples and Tests			Strata		
Depth	Type & No	Records	Date Casing Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness) Legend Backfill/ Instruments
11.20-14.20 11.20-14.20	B 7 ES 8		09/11/2005 1730 11.50	MADE GROUND: Brown grey locally dark grey brown clayey and very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick and concrete with occasional locally some sub-angular cobbles of sandstone, concrete & brick	11.20 +92.44
			10/11/2005 0800 11.50 7.90	MADE GROUND: Brown grey silty sandy angular to sub-angular fine to coarse GRAVEL and COBBLES of sandstone, brick & concrete. With some timber and roofing felt	(3.30)
14.50	B 9		10/11/2005 1730 17.50	Firm to stiff grey mottled brown slightly sandy gravelly CLAY with occasional sub-angular cobbles of sandstone. Gravel is angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	14.50 +89.14
				EXPLORATORY HOLE ENDS AT 17.50 m	(3.00)
Depth	Type & No	Records	Date Casing Time Water		
Groundwater Entries No. Struck Post strike behaviour			Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 10.80 -11.20 60 mins Chisel 11.50 -12.10 90 mins Chisel 13.10 -13.50 60 mins Chisel 13.50 -14.20 90 mins Chisel 16.80 -17.20 60 mins Chisel
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Borehole BH5/9 Sheet 2 of 2	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 25/10/2005 End 26/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.00m (TPBH5/10), then backfilled to GL Light cable percussion GL - 6.40m Terminated on engineer's instruction.		Depth from 0.00m to 6.40m Diameter 250mm Casing Depth 6.40m	Ground Level +95.11 mOD Coordinates E 306578.27 National Grid N 183909.65 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-5.00 m Open holed			Backfilled trial pit arisings. (Refer to TPBH5/10 for details)			
5.00	B 1							
5.40	KRH	k=4.2-10 m/s			Firm grey mottled brown slightly sandy locally sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]	5.40 +89.71		SPI
5.40	B 2					(1.00)		SP
					EXPLORATORY HOLE ENDS AT 6.40 m	6.40 +88.71		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m)		Depth Related Remarks * From to (m)	Chiselling Depths (m) 4.30-4.50 30 mins Chisel 5.10-5.30 30 mins Chisel	Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/10 Sheet 1 of 1			

Borehole Log

Drilled MY Logged AF Checked AF	Start 26/10/2005 End 27/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 4.20m (TPBH5/11), then backfilled to GL Light cable percussion GL - 8.40m Terminated on engineer's instruction.	Depth from 0.00m to 8.40m Diameter 250mm Casing Depth 8.40m	Ground Level +93.36 mOD Coordinates E 306680.33 National Grid N 184024.89 Chainage
Samples and Tests			Strata	
Depth	Type & No	Records	Date Casing	Time Water
			26/10/2005	1230
			Backfilled trial pit arisings. (Refer to TPBH5/11 for details)	
4.20	B 1			
				MADE GROUND: Dark grey clayey sandy angular to sub-rounded fine to coarse GRAVEL of brick, sandstone & concrete with some sub-angular cobbles of sandstone, brick & concrete. Occasional timber fragments.
5.40	KRH	k=3.5E-9 m/s		
5.40	B 2			Firm grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]
				Firm brown grey slightly sandy locally sandy gravelly CLAY with occasional sub-angular cobbles of sandstone. Gravel is angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]
7.50	B 3		26/10/2005	1730 dry
			27/10/2005	0800 7.70 6.40
			27/10/2005	1100 8.40
			EXPLORATORY HOLE ENDS AT 8.40 m	
Depth	Type & No	Records	Date Casing	Time Water
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m) 7.70 8.40 Water added to assist drilling	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	
Scale 1:50 (c) MESG 358 v1.20a08/12/2005 17:16:45			Borehole BH5/11 Sheet 1 of 1	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 27/10/2005 End 28/10/2005	Equipment, Methods and Remarks Pilon 1500 Machine excavation GL - 4.50m (TPBH5/12), then backfilled to GL Light cable percussion GL - 13.50m. Terminated on engineer's instruction.				Depth from 0.00m to 13.50m Diameter 250mm Casing Depth 13.50m	Ground Level +100.05 mOD Coordinates E 306697.82 National Grid N 183963.76 Chainage		
Samples and Tests					Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
		0.00-4.50 m Open holed	27/10/2005	1200	Backfilled trial pit arisings. (Refer to TPBH5/12) for details)				
4.50 4.50	ES 1 B 2					(4.50)			
					MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, concrete & brick with occasional locally some sub-angular cobbles of concrete and sandstone.	4.50 +95.55			
7.50 7.50	ES 3 B 4		27/10/2005 7.60	1800		(6.00)			
			27/10/2005 7.60	0800 6.20	7.60-10.50 m Driller notes large proportion of building rubble.				
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 10.50 m				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m) 3.00 7.60		Depth Related Remarks * From to (m) 3.00 7.60 Water added to assist drilling		Chiselling Depths (m) Time Tools used 5.40-5.60 30 mins Chisel 6.70-6.90 30 mins Chisel 6.90-7.40 60 mins Chisel 8.10-8.40 45 mins Chisel 9.60-9.90 45 mins Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/12 Sheet 1 of 2		

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF		Start 27/10/2005 End 28/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 4.50m (TPBH5/12), then backfilled to GL. Light cable percussion GL - 13.50m. Terminated on engineer's instruction.		Depth from 0.00m to 13.50m Diameter 250mm Casing Depth 13.50m	Ground Level +100.05 mOD Coordinates E 306697.82 National Grid N 183963.76 Chainage		
Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness)	Legend	Backfill/ Instruments
10.50 10.50 10.50	KRH ES 5 B 6	k=1.1E-9 m/s			MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, concrete & brick with occasional locally some sub-angular cobbles of concrete and sandstone. Firm to stiff grey mottled brown slightly sandy slightly gravelly CLAY with occasional locally some sub-angular cobbles of sandstone. Gravel is sub-angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]	10.50 +89.55		
13.50 13.50	ES 7 B 8		27/10/2005 13.50	1700	EXPLORATORY HOLE ENDS AT 13.50 m	13.50 +86.55		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour None observed (see Key Sheet)					Depth Related Remarks * From to (m) 10.50 13.50 Water added to assist drilling		Chiselling Depths (m) Time Tools used 12.50-13.10 75 mins Chisel 13.10-13.50 60 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/12 Sheet 2 of 2	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 02/11/2005 End 03/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/13), then backfilled to GL. Light cable percussion GL - 8.40m. Unable to advance casing below 8.00m (obstruction). Terminated on engineer's instruction. Relocated borehole 2m NW (BH5/13A)				Depth from 0.00m to 8.40m Diameter 250mm Casing Depth 8.00m	Ground Level +105.24 mOD Coordinates E 306668.92 National Grid N 183789.81 Chainage	
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-5.90 m Open holed	02/11/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/13 for details)	(5.90)		
			02/11/2005	1700				
			4.20	dry				
			03/11/2005	0800				
			4.20	4.00				
5.90-8.40	B 1					5.90	+99.34	
5.90-8.40	ES 2				MADE GROUND: Recovered as brown grey very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular cobbles of sandstone.	(2.50)		
			03/11/2005	1500		8.40	+96.84	
			8.00		EXPLORATORY HOLE ENDS AT 8.40 m			
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 4.20 Rose to 4.00m overnight					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used 6.50-7.40 120 mins Chisel 7.40-7.90 60 mins Chisel 7.90-8.40 150 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/13 Sheet 1 of 1	

Borehole Log



Soil Mechanics

Drilled MY Logged MY Checked AF	Start 04/11/2005 End 07/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.90m (TPBH5/13), then backfilled to GL. Light cable percussion GL - 7.90m. Unable to advance borehole below 7.90m (timber obstruction). Borehole terminated on engineer's instruction.		Depth from 0.00m	to 7.90m	Diameter 250mm	Casing Depth 7.90m	Ground Level +105.24 mOD Coordinates E 306668.26 National Grid N 183900.92 Chainage
Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
		0.00-7.90 m Open holed	04/11/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/13 for details)			
			04/11/2005	1700				
			4.00	dry				
			07/11/2005	0800				
			4.00	1.80				
					MADE GROUND: Mixed fill **	5.90 +99.34		
						(2.00)		
			07/11/2005	1700				
			7.90		EXPLORATORY HOLE ENDS AT 7.90 m	7.90 +97.34		
					7.90 m Driller notes much timber.			
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 4.00 Rose to 1.80m over weekend -					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used 4.20 -5.00 120 mins Chisel 6.00 -6.50 60 mins Chisel 6.80 -7.00 60 mins Chisel 7.00 -7.90 150 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/13A Sheet 1 of 1	
Scale 1:50 (c) MESG 358 v1.20a08/12/2005 17:18:18 AGS								

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 31/10/2005 End 02/11/2005	Equipment, Methods and Remarks Pilon 1500 Machine excavation GL - 6.00m (TPBH5/14), then backfilled to GL. Light cable percussion GL - 11.90m. Terminated on engineer's instruction.	Depth from 0.00m to 11.90m Diameter 250mm Casing Depth 11.90m	Ground Level +105.07 mOD Coordinates E 306734.90 National Grid N 183773.73 Chainage				
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
		0.00-6.00 m Open holed	31/10/2005	1300	Backfilled trial pit arisings. (Refer to TPBH5/14 for details)			
						(6.00)		
					4.50-6.00 m mainly rubble fill **			
6.00	ES 1		31/10/2005	1730		6.00	+99.07	
6.00	B 2		6.10	dry				
			01/11/2005	0800	MADE GROUND: Recovered as soft dark grey sandy gravelly CLAY with occasional locally some angular to sub-angular cobbles of brick, sandstone & insulation blocks. Gravel is angular to sub-angular fine to coarse of sandstone brick limestone & concrete.			
			6.10	4.40				
						(3.00)		
9.00	ES 3				MADE GROUND: Dark grey slightly clayey locally clayey slightly sandy gravelly angular COBBLES of limestone & sandstone. Gravel is angular fine to coarse of sandstone & limestone.	9.00	+96.07	
9.00	B 4							
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 11.90 m			
Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 6.10 Rose to 4.40m overnight -					Depth Related Remarks * From to (m) 6.10 11.50 Water added to assist drilling		Chiselling Depths (m) Time Tools used 4.90 - 5.20 45 mins Chisel 5.80 - 6.10 45 mins Chisel 6.20 - 6.70 75 mins Chisel 7.50 - 7.90 75 mins Chisel 9.60 - 10.50 120 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/14 Sheet 1 of 2	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 31/10/2005 End 02/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 6.00m (TPBH5/14), then backfilled to GL. Light cable percussion GL - 11.90m Terminated on engineer's instruction.	Depth from 0.00m to 11.90m Diameter 250mm Casing Depth 11.90m	Ground Level +105.07 mOD Coordinates E 306734 90 National Grid N 183773 73 Chainage	
Samples and Tests			Strata		
Depth	Type & No	Records	Date Casing Time Water	Description (Continued from Sheet 1)	Depth, Level/ (Thickness) Legend Backfill/ Instruments
11.90	B 5		01/11/2005 1730 11.50 dry 02/11/2005 0800 02/11/2005 1045 11.50 dry 11.90 dry	MADE GROUND: Dark grey slightly clayey locally clayey slightly sandy gravelly angular COBBLES of limestone & sandstone. Gravel is angular fine to coarse of sandstone & limestone. 11.50-11.90 m slightly clayey EXPLORATORY HOLE ENDS AT 11.90 m	(2.90) 11.90 +93.17 SPIE SP
Depth	Type & No	Records	Date Casing Time Water		
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 10.50 - 11.50 120 mins Chisel 11.50 - 11.90 120 mins Chisel
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Borehole BH5/14 Sheet 2 of 2	

Trial Pit Log



Soil Mechanics

Logged AF/CJ Checked AF		Start 18/10/2005 End 18/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m	Dimensions and Orientation Width 1.40 m Length 5.80 m 		Ground Level +104.79 mOD Coordinates E 306438.88 National Grid N 183720.38	
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description		Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.50	ES 1	0830	1 MADE GROUND: Soft to firm brown slightly sandy slightly gravelly CLAY with occasional angular cobbles of brick & sandstone. Gravel is angular to sub-angular fine to coarse of brick, sandstone & limestone. Occasional rootlets.		(0.80)		
1.50	ES 2		2 MADE GROUND: Soft brown and orange brown sandy slightly gravelly CLAY/SILT with occasional angular cobbles of brick and sandstone. Occasional pockets of clayey sand. Gravel is angular to subangular fine to coarse of sandstone, brick & concrete. Occasional pockets of topsoil with roots & rootlets. Rare 10mm re-bars.		0.80 +103.99 (0.75)		
2.10	ES 3		3 MADE GROUND: Firm and stiff grey brown slightly sandy slightly gravelly locally gravelly CLAY with occasional angular to subangular cobbles of sandstone. Gravel is angular to subrounded fine to coarse of sandstone, brick & concrete. Occasional pockets of topsoil with roots & rootlets. Rare 10mm re-bars.		1.55 +103.24 (1.25)		
3.20	ES 4		4 MADE GROUND: Soft to firm brown slightly sandy gravelly CLAY with occasional angular to subangular cobbles and boulders of concrete & sandstone. Gravel is angular to subrounded fine to coarse of sandstone, brick & concrete.		2.80 +101.99 (2.70)		
4.50	ES 5		4.00-5.50 m very soft and soft locally dark grey organic clay with some rootlets.				
Depth Type & No. Records Date Stratum continues to 5.50 m							
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 0.50 Slight seepage Face A			Depth Related Remarks * From to (m)		Stability Slight spalling. Shoring Nil Weather Dry overcast		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TP5/1 Sheet 1 of 2		

Trial Pit Log



Soil Mechanics

Logged AF/CJ Checked AF		Start 18/10/2005 End 18/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m.		Dimensions and Orientation Width 1.40 m Length 5.80 m 		Ground Level +104.79 mOD Coordinates E 306438.86 National Grid N 183720.38	
Samples and Tests			Strata					
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments
			4 MADE GROUND: Soft to firm brown slightly sandy gravelly CLAY with occasional angular to subangular cobbles and boulders of concrete & sandstone. Gravel is angular to subrounded fine to coarse of sandstone brick & concrete.					
5.80	ES 6	18/10/2005	5 MADE GROUND: Dark brown grey clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick, concrete & tarmac with some subangular cobbles of brick, sandstone, concrete and tarmac. Occasional cobbles size pockets of firm grey slightly sandy slightly gravelly clay. Occasional timber fragments (Slight bituminous odour).			5.50 +99.29		
5.80	B 7	1030 dry				(0.50)		
			EXPLORATORY HOLE ENDS AT 6.00 m			6.00 +98.79		
Depth	Type & No.	Records Date						
Groundwater Entries No. Struck Post Strike Behaviour (m)			Depth Related Remarks * From to (m)			Stability Slight spalling Shoring Nil Weather Dry overcast		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council			Trial Pit TP5/1 Sheet 2 of 2		

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF	Start 18/10/2005 End 18/10/2005	Equipment Methods and Remarks JCB JS130 Machine excavation GL - 6.00m	Dimensions and Orientation Width 1.20 m Length 6.20 m 	Ground Level +105.84 mOD Coordinates E 308450.29 National Grid N 183612.39 Chainage		
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00 0.00-3.00	ES 1 B 2	1045	1 MADE GROUND: Brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone with some subangular cobbles of sandstone and occasional sandstone boulders (400mm x 400mm).	(0.70)		
			2 MADE GROUND: Light brown clayey gravelly SAND with some subangular to subrounded cobbles of sandstone and occasional boulders of sandstone (>200mm x 200mm). Gravel is subangular to subrounded fine to coarse of sandstone with fragments of polystyrene and metal.	0.70 +105.14 (0.70)		
			3 MADE GROUND: Soft to firm red brown and grey brown sandy slightly gravelly CLAY with occasional subangular cobbles of sandstone. Gravel is subangular fine to coarse of sandstone (slightly organic).	1.40 +104.44 (0.90)		
			4 MADE GROUND: Red black slightly clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick, concrete and occasional steel bars.	2.30 +103.54 (0.70)		
3.00-5.10 3.00-5.10	ES 3 B 4		5 MADE GROUND: Brown slightly clayey sandy angular to subangular fine to coarse GRAVEL of sandstone and concrete with some subangular cobbles of tarmac concrete and occasional boulders of sandstone (400mm x 500mm) (concrete post and occasional kerbstone).	3.00 +102.84 (1.00)		
			6 MADE GROUND: Firm grey brown slightly sandy gravelly CLAY with occasional subangular cobbles and boulders of concrete and tarmac. Gravel is angular to subangular fine to coarse of sandstone concrete and tarmac with occasional fragments of plastic.	4.00 +101.84 (0.40)		
			7 MADE GROUND: Firm grey slightly sandy slightly gravelly CLAY with occasional subangular cobbles and boulders of concrete and tarmac. Gravel is angular to subangular fine to coarse of sandstone, concrete and tarmac with occasional fragments of plastic.	4.40 +101.44 (0.70)		
Depth	Type & No.	Records Date	Stratum continues to 5.10 m			
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slight instability Shoring Nil Weather Overcast light rain.	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TP5/2 Sheet 1 of 2	



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Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 18/10/2005 End 18/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 4.70m. Terminated in natural ground on engineer's instruction.		Dimensions and Orientation Width 1.40 m Length 6.10 m 095 (Deg)		Ground Level +105.73 mOD Coordinates E 306513.81 National Grid N 193583.85	
Samples and Tests			Strata						
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments			
0.00-3.00 0.00-3.00	ES 1 B 2	1330	1 MADE GROUND: Soft black brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles of sandstone. Gravel is subangular fine to coarse of sandstone. Occasional rootlets.	(0.30)					
			2 MADE GROUND: Soft brown mottled yellow sandy slightly gravelly CLAY with occasional subrounded cobbles of sandstone. Gravel is subangular fine to coarse of sandstone and brick. Occasional plastic fragments and wooden logs.	0.30 +105.43 (1.40)					
			3 MADE GROUND: Brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and tarmac with occasional angular cobbles and boulders of sandstone and concrete (< 300 x 200 x 200mm). Plastic fencing & timber noted (Slight organic odour).	1.70 +104.03 (2.30)					
4.00-4.70	B 3		4 Firm light grey mottled orange brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of sandstone	4.00 +101.73 (0.70)					
		18/10/2005 1500 dry							
			EXPLORATORY HOLE ENDS AT 4.70 m	4.70 +101.03					
Depth	Type & No.	Records Date							
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slight instability Shoring Nil Weather Overcast dry				
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TP5/3 Sheet 1 of 1				

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 18/10/2005 End 18/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 3.00m. Trial pit terminated at 3.00m due to pit collapse.	Dimensions and Orientation Width 2.60 m Length 6.30 m 	Ground Level +103.80 mOD Coordinates E 306551.12 National Grid N 183771.16	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00 0.00-3.00	ES 1 B 2	1530	1 MADE GROUND: Soft brown black slightly gravelly CLAY with occasional subrounded cobbles of sandstone and occasional subangular boulders of sandstone (500mm x 300mm), with occasional fragments of cloth. Gravel is angular fine to coarse of sandstone, brick & concrete.	(0.70)		
			2 MADE GROUND: Light brown clayey gravelly SAND with occasional subangular to subrounded cobbles of sandstone and brick. Gravel is angular to sub-angular fine to coarse of sandstone & brick.	0.70 +103.10 (1.70)		
		18/10/2005 1700	3 MADE GROUND: Soft brown black slightly sandy gravelly CLAY with occasional subrounded cobbles and boulders of sandstone, brick, concrete, woodboard and tarmac with occasional plastic tape. Gravel is sub-angular fine to coarse of sandstone, brick & concrete.	2.40 +101.40 (0.60)		
			EXPLORATORY HOLE ENDS AT 3.00 m	3.00 +100.80		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.80 Slight seepage			Depth Related Remarks * From to (m)		Stability Very unstable Shoring Nil Weather Overcast dry	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TP5/4 Sheet 1 of 1	

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Logged CJ	Start 19/10/2005	Equipment, Methods and Remarks JCB JS130	Dimensions and Orientation	Ground Level +104.88 mOD
Checked AF	End 19/10/2005	Machine excavation GL - 5.80m	Width 1.20 m Length 6.00 m  090 (Deg)	Coordinates E 306521 48 National Grid N 183771 43

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Logged CJ
Checked AF

Start	19/10/2005
End	19/10/2005

Equipment, Methods and Remarks
JCB JS130
Machine excavation GL - 5.80m.

Dimensions and Orientation

Width 1.30 m

Length 5.00 m



Ground Level

+104.58 mOD⁺

Coordinates

E 306621.48

National Grid

N 183771.43

[illegible]

Trial Pit Log



Soil Mechanics

Logged MJ Checked AF		Start 19/10/2005 End 19/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m	Dimensions and Orientation Width 1.40 m Length 6.10 m 	Ground Level +99.40 mOD Coordinates E 306512.27 National Grid N 183902.04	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00 0.00-3.00	ES 1 B 2		1 MADE GROUND: Firm brown slightly sandy gravelly CLAY with occasional sub-angular cobbles of sandstone, clay pipe and brick. Gravel is angular fine to coarse of sandstone.	(0.50)		
			2 MADE GROUND: Firm grey slightly sandy gravelly CLAY with occasional sub-angular cobbles of sandstone and brick. Occasional fragments of plastic and steel. Gravel is angular to sub-angular of sandstone & brick.	0.50 +98.90 (1.60)		
			3 MADE GROUND: Grey slightly clayey slightly sandy angular to sub-angular fine to coarse GRAVEL of sandstone brick concrete clay pipe & steel	2.10 +97.30 (0.90)		
3.00-5.80 3.00-5.80	ES 3 B 4		4 MADE GROUND: Grey slightly clayey slightly sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick, clay pipe, steel & concrete with many angular cobbles of brick & concrete	3.00 +96.40 (0.80)		
			5 MADE GROUND: Firm grey slightly sandy gravelly CLAY with occasional cobbles and boulders of sandstone. Gravel is angular to sub-angular fine to coarse of sandstone brick and concrete. Occasional glass and plastic.	3.80 +95.60 (2.10)		
Depth	Type & No.	Records Date	Stratum continues to 5.90 m.			
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.30 Fast flow			Depth Related Remarks * From to (m)		Stability Stable Shoring Unstable Weather Overcast	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TP5/6 Sheet 1 of 2	

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Logged	MJ	Start	19/10/2005	Equipment, Methods and Remarks	Dimensions and Orientation	Ground Level	+99.40 mOD
Checked	AF	End	19/10/2005	JCB JS130 Machine excavation GL - 5.90m.	Width 1.40 m Length 6.10 m	Coordinates	E 306512.27
						N 183902.04	

Φ

Logged MJ	Start 19/10/2005	Equipment, Methods and Remarks JCB JS130	Dimensions and Orientation	Ground Level Coordinates National Grid	+95.47 mOD E 306845 51 N 183969 65
Checked AF	End 19/10/2005	Machine excavation GL - 6.00m.	Width 1.50 m Length 6.00 m  005 (Deg)		

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Φ

Logged MJ Checked AF		Start 19/10/2005 End 19/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m		Dimensions and Orientation Width 1.50 m Length 6.00 m 		Ground Level Coordinates National Grid		+95.47 mOD E 305645 51 N 183969 65
Samples and Tests			Strata							
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments				
			3 MADE GROUND: Firm red brown clayey slightly sandy angular to sub-angular fine to coarse GRAVEL of sandstone, concrete & brick with occasional angular to sub-angular cobbles and boulders of sandstone, brick and concrete Occasional fragments of plastic and wood.							
			EXPLORATORY HOLE ENDS AT 6.00 m	6.00 +89.47						
Depth	Type & No.	Records Date								
Groundwater Entries No. Struck Post Strike Behaviour (m)			Depth Related Remarks * From to (m)				Stability Slight instability Shoring None Weather Overcast			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. 			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council				Trial Pit TP5/7 Sheet 2 of 2			
Scale 1:25 (c) MESS 358 v1.20a08/12/2005 16:46:20										

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 19/10/2005 End 19/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m	Dimensions and Orientation Width 1.40 m Length 6.70 m 	Ground Level +104.74 mOD Coordinates E 306729 34 National Grid N 183678 07	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00	ES 1 B 2		1 MADE GROUND: Firm grey mottled brown sandy gravelly CLAY with occasional cobbles of sandstone, brick, concrete, fragments of plastic and wood. Gravel is angular to sub-rounded fine to coarse of sandstone, brick & concrete	(0.70)		
			2 MADE GROUND: Firm grey black slightly sandy slightly gravelly CLAY. Gravel is sub-angular fine to coarse of brick, concrete, sandstone and steel.	0.70 +104.04		
			3 MADE GROUND: Firm sandy gravelly CLAY with some sub-angular cobbles and occasional boulders of sandstone, brick and concrete (500x600mm). Gravel is angular to sub-angular fine to coarse of sandstone limestone, concrete, brick, clay pipe and plastic.	0.90 +103.84		
				(2.30)		
3.00-6.00	ES 3 B 4		4 MADE GROUND: Black clayey slightly sandy GRAVEL with occasional angular cobbles of sandstone. Gravel is sub-rounded to sub-angular fine to coarse of sand stone, brick, concrete, wood and plant fragments (organic odour)	3.20 +101.54		
			5 MADE GROUND: Brown clayey slightly sandy angular to sub-angular fine to coarse GRAVEL of brick, concrete sandstone, limestone & clay pipe with some sub-angular cobbles and boulders of steel reinforced concrete (800 x 700 x 120mm). Occasional plastic and metal fragments.	4.00 +100.74		
				(0.80)		
Depth	Type & No.	Records Date	Stratum continues to 6.00 m			
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)	Stability Stable Shoring None Weather Overcast showers		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation Project No. (Ty Garreg Landfill) H6141 Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TP5/8 Sheet 1 of 2		

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Logged CJ Checked AF		Start 19/10/2005 End 19/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m		Dimensions and Orientation Width 1.40 m Length 6.70 m 		Ground Level Coordinates National Grid +104.74 mOD E 306729.34 N 183878.07	
Samples and Tests			Strata						
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments	
			5 MADE GROUND: Brown clayey slightly sandy angular to sub-angular fine to coarse GRAVEL of brick concrete sandstone, limestone & clay pipe with some sub-angular cobbles and boulders of steel reinforced concrete (800 x 700 x 120mm). Occasional plastic and metal fragments.			(2.00)			
			EXPLORATORY HOLE ENDS AT 6.00 m			6.00 +98.74			
Depth	Type & No.	Records Date							
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)			Stability Stable Shoring None Weather Overcast showers			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation Project No. (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council			Trial Pit TP5/8 Sheet 2 of 2			

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF	Start 20/10/2005 End 20/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.80m	Dimensions and Orientation Width 1.20 m Length 4.00 m D93 (Deg)	Ground Level Coordinates National Grid	+100.22 mOD E 306383 94 N 183785 51
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Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00 0.00-3.00	ES 1 B 2		1 MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles of sandstone tarmac and brick. Gravel is angular to subangular fine to coarse of sandstone, brick and tarmac. Wood plastic and steel bars noted	(0.80)		
			2 MADE GROUND: Soft black grey sandy gravelly CLAY with some angular to subangular cobbles of sandstone brick concrete and tarmac occasional angular boulders of concrete (<500mm x 600mm x 50 mm). Gravel is subangular to subrounded fine to coarse of sandstone brick & concrete. (Slight hydrocarbon odour)	0.80 +99.42		
				(3.20)		
3.00-5.80 3.00-5.80	ES 3 B 4		3 MADE GROUND: Firm multicoloured slightly sandy gravelly CLAY with some angular to subangular cobbles of sandstone, brick, concrete and tarmac and occasional subangular boulders of concrete (<200 x 200 x 40mm) Gravel is angular to subangular fine to coarse of sandstone, brick & concrete. Steel bars wood and electric cable noted	4.00 +96.22		
				(1.80)		
Depth	Type & No.	Records Date	Stratum continues to 5.80 m			

Groundwater Entries
No. Struck Post Strike Behaviour
(m)
None observed (see Key Sheet)

Depth Related Remarks *
From to (m)

Stability Stable

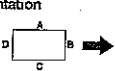
Shoring None
Weather Overcast/showers

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Project Church Village Bypass - Phase 5 Ground Investigation
(Ty Garreg Landfill)
Project No. H5141
Carried out for Rhondda Cynon Taff County Borough Council

Trial Pit
TPBH5/2
Sheet 1 of 2

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Logged CJ Checked AF		Start 20/10/2005 End 20/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.80m		Dimensions and Orientation Width 1.20 m Length 4.00 m  093 (Deg)		Ground Level Coordinates National Grid +100.22 mOD E 306383.94 N 183785.51	
Samples and Tests			Strata						
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instrument	
		20/10/2005	3 MADE GROUND: Firm multicoloured slightly sandy gravelly CLAY with some angular to subangular cobbles of sandstone, brick, concrete and tarmac and occasional subangular boulders of concrete (<200 x 200 x 40mm) Gravel is angular to subangular fine to coarse of sandstone, brick & concrete. Steel bars wood and electric cable noted						
			EXPLORATORY HOLE ENDS AT 5.80 m			5.80 +94.42			
Depth	Type & No.	Records Date							
Groundwater Entries a. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)			Stability Stable Shoring None Weather Overcast/showers			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council			Trial Pit TPBH5/2 Sheet 2 of 2			

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 20/10/2005 End 20/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m.	Dimensions and Orientation Width 1.40 m Length 4.20 m 		Ground Level +102.56 mOD Coordinates E 306413.77 National Grid N 183767.54	
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0.00-3.00 0.00-3.00	ES 1 B 2		1 MADE GROUND: Firm brown sandy gravelly CLAY with some angular to subangular cobbles of sandstone brick and concrete some angular boulders of concrete (<400mm x 300mm x 200mm) Gravel is angular to subangular of sandstone brick and concrete	(2.00)			
			2 MADE GROUND: Black grey clayey slightly sandy GRAVEL with some angular to subangular cobbles of sandstone brick & concrete with occasional subangular boulders of sandstone (<200mm x 200mm x 300mm) Gravel is angular fine to coarse of sandstone, brick and concrete. Plastic and wood noted (Slight bituminous odour)	2.00 +100.56 (1.50)			
3.00-5.90 3.00-5.90	ES 3 B 4		3 MADE GROUND: Soft grey brown sandy gravelly CLAY with occasional subangular to subrounded cobbles of sandstone and concrete. Gravel is angular to subangular of sandstone brick and concrete. Wood, metal sheets and barbed wire noted	3.50 +99.06 (1.40)			
				4.90 +97.66			
Depth	Type & No.	Records Date	Stratum continues to 5.90 m				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)			Stability Slight instability Shoring None Weather Partially cloudy dry	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council			Trial Pit TPBH5/3 Sheet 1 of 2	

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Logged CJ	Start 20/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m.	Dimensions and Orientation		Ground Level Coordinates National Grid	+102.56 mOD E 306413.77 N 183767.54
Checked AF	End 20/10/2005		Width 1.40 m Length 4.20 m	 090 (Deg)		

Trial Pit
TPBH5/3
Sheet 2 of 2

Φ

Logged MJ Checked AF	Start 24/10/2005 End 24/10/2005	Equipment, Methods and Remarks JCB JS130 Tracked excavator. Machine excavation GL - 4.20m	Dimensions and Orientation Width 0.90 m Length 4.20 m 	Ground Level Coordinates National Grid +95.96 mOD E 306479 32 N 183834 13
Samples and Tests			Strata	
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness) Legend Backfill/Instrument
0.00-3.00	B 1		1 MADE GROUND: Grey brown clayey sandy sub-angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular cobbles of brick & concrete. Occasional rooflets.	(0.60) 0.60 +95.36
			2 MADE GROUND: Dark grey brown clayey slightly sandy sub-angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with occasional locally some sub-angular cobbles and boulders (300 x 400 x 300mm) of concrete, brickwork and sandstone. Occasional plastic, wood, metal and tarmac.	(2.60)
3.00-3.20	B 2			
3.20-4.20	B 3		3 Firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles of sandstone. Gravel is sub-angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]	3.20 +92.76 (1.00)
			EXPLORATORY HOLE ENDS AT 4.20 m	4.20 +91.76
Depth	Type & No.	Records Date		
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)	Stability Slight spalling. Shoring None Weather Wet and windy
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/4 Sheet 1 of 1

Trial Pit Log



Soil Mechanics

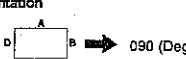
Logged CJ Checked AF		Start 20/10/2005 End 20/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m.	Dimensions and Orientation Width 0.80 m Length 4.50 m 	Ground Level +105.91 mOD Coordinates E 906462.25 National Grid N 183701.36
Samples and Tests			Strata		
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend Backfill/ Instruments
0.00-3.00	ES 1 B 2		1 MADE GROUND: Black slightly clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, brick & concrete with some subangular cobbles of concrete	(0.40)	
			2 MADE GROUND: Orange brown clayey gravelly SAND with subangular cobbles of sandstone. Gravel is angular to subangular fine to coarse of sandstone brick and concrete	0.40 +105.51	
				(2.10)	
3.00-5.90	ES 3 B 4		3 MADE GROUND: Firm brown grey slightly sandy gravelly CLAY with occasional angular to subangular cobbles of sandstone, brick, concrete and slag, with occasional subangular boulders of concrete kerbstones and masonry (<500mm x 400mm x 200mm). Gravel is angular to subangular fine to coarse of sandstone, brick and concrete.	2.50 +103.41	
				(3.40)	
Depth	Type & No.	Records Date	Stratum continues to 5.90 m		
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 0.40 Seepage			Depth Related Remarks * From to (m)		Stability Stable Shoring None Weather Overcast/dry
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation Project No. (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/5 Sheet 1 of 2

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Logged CJ	Start 20/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m.	Dimensions and Orientation		Ground Level Coordinates National Grid	+105.91 mOD E 306462.25 N 183701.36
Checked AF	End 20/10/2005		Width 0.80 m Length 4.50 m			

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Logged CJ Checked AF	Start 21/10/2005 End 21/01/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.30m	Dimensions and Orientation Width 1.60 m Length 4.10 m 		Ground Level Coordinates National Grid Chainage	+102.75 mOD E 306512.71 N 183654.08
Samples and Tests			Strata			
Depth 0 00-3 00 0 00-3 00	Type & No. ES 1 B 2	Date Records	Description 1 MADE GROUND: Very soft brown clayey sandy slightly gravelly organic CLAY/SILT (TOPSOIL)	Depth, Level/ (Thickness) (0 60)	Legend 	Backfill/ Instrument
			2 MADE GROUND: Soft brown grey slightly sandy slightly gravelly CLAY with occasional subangular cobbles of sandstone. Gravel is angular fine to coarse of sandstone, concrete & brick China steel bands and electric cable noted	0 60 +102 15 (1 60)		
			3 MADE GROUND: Black brown mottled orange sandy gravelly CLAY with some subangular cobbles of sandstone, brick and concrete, with occasional subangular boulders of concrete (<600mm x 300mm x 300mm). Gravel is angular to sub-angular fine to coarse of sandstone brick & concrete Metal and wire noted.	2 20 +100 55 (0 80)		
3 00-5 30 3 00-5 30	ES 3 B 4		4 MADE GROUND: Soft black sandy gravelly CLAY with some angular to subangular cobbles of sandstone brick and concrete. Some angular to subangular boulders (<1000mm x 800mm x 200mm). Wood plastic and metal noted. Gravel is angular to subangular fine to coarse of sandstone brick and concrete.	3 00 +99 75 (1 20)		
			5 MADE GROUND: Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional angular to subangular cobbles of sandstone and brick. Gravel is angular to subangular of sandstone brick and concrete.	4 20 +98 55 (1 10)		
Depth	Type & No.	Records Date	Stratum continues to 5.30 m			
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 4.50			Depth Related Remarks * From to (m)	Stability Unstable Shoring None Weather Overcast/dry		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/6 Sheet 1 of 2		

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Logged CJ Checked AF	Start 21/10/2005 End 21/01/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.30m.	Dimensions and Orientation Width 1.60 m Length 4.10 m 		Ground Level +102.75 mOD Coordinates E 306512 71 National Grid N 183654 08 Chainage
Samples and Tests			Strata		
Depth	Type & No.	Date Records	Description	Depth, Level/ (Thickness)	Legend Backfill/ Instruments
		21/10/2005	5 MADE GROUND: Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional angular to subangular cobbles of sandstone and brick. Gravel is angular to subangular of sandstone brick and concrete. EXPLORATORY HOLE ENDS AT 5.30 m	5.30 +97.45	 
Depth	Type & No.	Records Date			
Groundwater Entries No. Struck Post Strike Behaviour (m)			Depth Related Remarks * From to (m)	Stability Unstable Shoring None Weather Overcast/dry	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/6 Sheet 2 of 2	

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 20/10/2005 End 20/10/2005	Equipment Methods and Remarks JCB JS130 Machine excavation GL - 4.50m	Dimensions and Orientation Width 1.20 m Length 5.20 m 	Ground Level +106.40 mOD Coordinates E 306489 07 National Grid N 183581 04			
Samples and Tests			Strata					
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments		
0.00-3.00	ES 1		1 MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles of sandstone and concrete. Gravel is angular to subangular fine to coarse of sandstone, brick and concrete. Steel wire and plastic pipes noted	(1.30)				
0.00-3.00	B 2			2 MADE GROUND: Firm to stiff brown black slightly sandy gravelly CLAY with occasional angular to subangular cobbles of sandstone and concrete. Occasional angular boulders of concrete (<700mm x 700mm x 1100mm). Gravel is angular to subangular fine to coarse of sandstone, brick and concrete. Glass noted			1.30 +105.10	(1.00)
				3 MADE GROUND: Soft orange brown sandy gravelly CLAY with occasional sub-angular cobbles of brick and concrete. Occasional subangular boulders of concrete (<200mm x 250mm). Gravel is angular to subangular fine to coarse of sandstone, brick and concrete			2.30 +104.10	(1.30)
3.00-4.50	ES 3		4 Firm fibrous slightly clayey slightly sandy PEAT [RECENT DEPOSIT]	3.60 +102.80				
3.00-4.50	B 4		5 Firm grey slightly sandy organic CLAY with occasional plant remains & rootlets. [GLACIAL DEPOSIT]	3.80 +102.60			(0.70)	
			EXPLORATORY HOLE ENDS AT 4.50 m	4.50 +101.90				
Depth	Type & No.	Records Date						
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)	Stability Stable Shoring None Weather Overcast/dry				
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/7 Sheet 1 of 1				

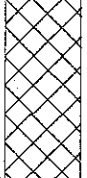
Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 21/10/2005 End 21/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.60m	Dimensions and Orientation Width 1.20 m Length 4.20 m 	Ground Level +103.23 mOD Coordinates E 306512.00 National Grid N 183771.18	
Samples and Tests			Strata	Depth, Level (Thickness) Legend Backfill/ Instruments		
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0 00-3 00 0 00-3 00	ES 1 B 2		1 MADE GROUND: Soft brown slightly sandy gravelly CLAY with occasional angular to subrounded cobbles of sandstone and brick. Gravel is angular to subrounded fine to coarse of sandstone and brick. Plastic and wood noted.	(0 70)		
			2 MADE GROUND: Grey brown clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone & brick with occasional subangular to subrounded cobbles of sandstone and concrete. Some subangular boulders of sandstone and concrete (<400mm x 400mm x 200mm).	0.70 +102.53		
3 00-5 60 3 00-5 60	ES 3 B 4		3.40-4.40 m Many boulders (<700mm x 600mm x 400mm)	(4 90)		
Depth	Type & No.	Records Date	Stratum continues to 5.60 m			
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slightly unstable Shoring None Weather Overcast/Dry	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/8 Sheet 1 of 2	

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Logged C.J. Checked AF		Start 21/10/2005 End 21/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.60m.		Dimensions and Orientation Width 1.20 m Length 4.20 m 		Ground Level Coordinates National Grid		+103.23 mOD E 306512.00 N 183771.18
Samples and Tests			Strata							
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments				
		21/10/2005	2 MADE GROUND: Grey brown clayey sandy angular to sub-rounded fine to coarse GRAVEL of sandstone & brick with occasional subangular to subrounded cobbles of sandstone and concrete. Some subangular boulders of sandstone and concrete (<400mm x 400mm x 200mm).	5.60 +97.53						
			EXPLORATORY HOLE ENDS AT 5.60 m							
Depth	Type & No.	Records Date								
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slightly unstable Shoring None Weather Overcast/Dry					
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) MESSG 338 v1.20e08/12/2005 16:47:56 			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/8 Sheet 2 of 2					

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 21/10/2005 End 21/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 2.20m. Pit terminated due to heavy water flow in pit at 2.20m	Dimensions and Orientation Width 1.20 m Length 4.20 m 	Ground Level +103.64 mOD Coordinates E 308599.39 National Grid N 183833.10	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-2.20	B 1		1 MADE GROUND: Firm brown sandy gravelly CLAY with some subangular to subrounded cobbles of sandstone, brick, concrete, tarmac and thermolite blocks. Gravel is angular to subrounded fine to coarse of sandstone, brick, concrete and tarmac.	(2.20)		
			EXPLORATORY HOLE ENDS AT 2.20 m	2.20 +101.44		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.20 -			Depth Related Remarks * From to (m)	Stability Stable Shoring None Weather Overcast/Dry		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/9 Sheet 1 of 1		

Trial Pit Log



Soil Mechanics

Logged MJ Checked AF		Start 24/10/2005 End 24/10/2005	Equipment Methods and Remarks JCB JS130 Tracked excavator. Machine excavation GL - 5.00m	Dimensions and Orientation Width 1.00 m Length 4.20 m 		Ground Level +95.11 mOD Coordinates E 306578.27 National Grid N 183909.65	
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0.00-3.00	B 1		1 MADE GROUND: Soft to firm grey brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles of brick, concrete & sandstone. Occasional rootlets. Gravel is angular to sub-rounded fine to coarse of sandstone, brick & concrete.	(0.60)			
			2 MADE GROUND: Dark grey brown clayey slightly sandy sub-angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some angular to sub-angular cobbles and boulders (300 x 400 x 300mm) of concrete, brick and sandstone.	0.60 +94.51			
3.00-5.00	B 2			(4.40)			
			EXPLORATORY HOLE ENDS AT 5.00 m				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slight spalling. Shoring None Weather Wet and windy		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/10 Sheet 1 of 1		

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Logged MJ Checked AF		Start 24/10/2005 End 24/10/2005		Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 4.50m		Dimensions and Orientation Width 1.50 m Length 4.50 m 		Ground Level Coordinates National Grid +100.05 mOD E 306697.82 N 183963.76	
Samples and Tests			Strata						
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0.00-3.00	B 1		1 MADE GROUND: Brown clayey slightly sandy sub-angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some sub-angular to sub-rounded cobbles of sandstone, brick and concrete 2 MADE GROUND: Dark grey clayey slightly sandy sub-angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with many sub-angular to sub-rounded cobbles of sandstone and boulders (300 x 400 x 500mm) of brick and concrete Occasional plastic, wood and metal.			(0.30) 0.30 +99.75			
3.00-4.50	B 2								
		24/10/2005 1700							
			EXPLORATORY HOLE ENDS AT 4.50 m			4.50 +95.55			
Depth	Type & No.	Records Date							
Groundwater Entries o. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)			Stability Stable Shoring None Weather Very wet and windy			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council			Trial Pit TPBH5/12 Sheet 1 of 1			

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 21/10/2005 End 21/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m. GL - 2.00m very soft (tracked excavator sinking 0.50m)	Dimensions and Orientation Width 1.20 m Length 4.30 m 345 (Deg)		Ground Level +105.24 mOD Coordinates E 308668.92 National Grid N 183799.81	
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0 00-3 00 0 00-3 00	ES 1 B 2		1 MADE GROUND: Very soft brown slightly sandy slightly gravelly CLAY with occasional subangular cobbles of sandstone and brick occasional subangular boulders of concrete (<700mm x 400mm). Gravel is angular to subangular fine to coarse of sandstone and brick.	(2.40)			
3 00-5 90 3 00-5 90	ES 3 B 4		2 MADE GROUND: Firm to stiff light brown sandy gravelly CLAY with occasional cobbles of sandstone and concrete. Gravel is angular to subangular fine to coarse of sandstone brick and concrete. Metal tape noted	2.40 +102.84 (1.30)			
			3 MADE GROUND: Firm to stiff multicoloured slightly sandy gravelly CLAY with occasional subangular cobbles of sandstone and brick. Gravel is angular to subangular fine to coarse of sandstone brick and concrete. Fragments of plastic membrane noted	3.70 +101.54 (2.20)			
Depth	Type & No.	Records Date	Stratum continues to 5.90 m				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slight instability Shoring None Weather Overcast/ dry		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Project No. Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/13 Sheet 1 of 2		

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Logged CJ Checked AF	Start 21/10/2005 End 21/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 5.90m. GL - 2.00m very soft (tracked excavator sinking 0.50m)	Dimensions and Orientation Width 1.20 m Length 4.30 m		Ground Level Coordinates National Grid	+105.24 mOD E 306668.92 N 183799.81
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/Instrument
			3 MADE GROUND: Firm to stiff multicoloured slightly sandy gravelly CLAY with occasional subangular cobbles of sandstone and brick. Gravel is angular to subangular fine to coarse of sandstone brick and concrete. Fragments of plastic membrane noted.			
			EXPLORATORY HOLE ENDS AT 5.90 m	5.90 +99.34		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Slight instability Shoring None Weather Overcast/ dry	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Trial Pit TPBH5/13 Sheet 2 of 2	

Trial Pit Log



Soil Mechanics

Logged CJ Checked AF		Start 21/10/2005 End 21/10/2005	Equipment, Methods and Remarks JCB JS130 Machine excavation GL - 6.00m.	Dimensions and Orientation Width 1.40 m Length 4.90 m 	Ground Level +105.07 mOD Coordinates E 308734 90 National Grid N 183773 73	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-3.00 0.00-3.00	ES 1 B 2		1 MADE GROUND: Very soft brown sandy slightly gravelly organic CLAY/SILT. Gravel is angular to subangular of sandstone and concrete (TOPSOIL) 2 MADE GROUND: Soft to firm brown sandy gravelly CLAY with occasional subangular cobbles of sandstone and concrete occasional subangular boulders of concrete (<500mm x 300mm x 200mm). Gravel is angular to subrounded fine to coarse of sandstone and concrete	0.20 +104.87 (1.10)		
		3 MADE GROUND: Firm locally soft brown black sandy gravelly CLAY with some subangular to subrounded cobbles of concrete. Occasional subangular to sub-rounded boulders of concrete (<500mm x 400mm x 300mm). Gravel is subangular to subrounded fine to coarse of sandstone and concrete.	1.30 +103.77 (2.40)			
3.00-6.00 3.00-6.00	ES 3 B 4		4 MADE GROUND: Black clayey slightly sandy angular to sub-rounded fine to coarse GRAVEL of sandstone, brick & concrete with some angular to subangular cobbles of sandstone, brick, concrete and tarmac. Occasional angular boulders of concrete (<500mm x 400mm)	3.70 +101.37 (1.00)		
			5 MADE GROUND: Black brown slightly sandy gravelly SILT with some angular to subangular cobbles of sandstone, brick and tarmac. Occasional angular	4.70 +100.37		
			Stratum continues to 6.00 m			
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 1.20			Depth Related Remarks * From to (m)	Stability Seepage at 1.20m undermining pit stability Shoring None Weather Overcast/ heavy rain.		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) HS141 Project No. Carried out for Rhondda Cynon Taff County Borough Council	Trial Pit TPBH5/14 Sheet 1 of 2		

Φ [illegible]

Borehole	BH5/1	BH5/2	BH5/3	BH5/4	BH5/5A	BH5/6	BH5/7	BH5/8	BH5/9	BH5/10	BH5/11	BH5/12	BH5/14	X01	X01	X03	X03	BH15	BH15	BH17(E)	BH17(W)	BH17A (W)	BH17A (E)	BH20A	BH20A	BH21	BH21A	BH21A	BH22A	BH22A	BH23A	BH23B(E)	BH23B(W)	
Date Installed	25/11/2005	29/11/2005	24/10/2005	25/10/2005	21/11/2005	23/11/2005	22/11/2005	17/11/2005	11/11/2005	26/10/2005	27/10/2005	28/10/2005	02/11/2005	11/03/2004	11/03/2004	15/03/2004	15/03/2004	17/07/2002	17/07/2002	27/06/2002	27/06/2002					14/08/2002	14/08/2002	14/08/2002	13/08/2002	13/08/2002	14/08/2002	04/07/2002	04/07/2002	
Installation diameter (mm)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	50	19	50	50	50	50	19	50	19	19	50	19	50	19	50	50	
Depth to base from GL (m)	5.90	6.80	8.80	3.00	13.20	6.60	3.60	10.00	14.30	5.20	5.20	10.30	11.70	9.00	35.00	9.00	26.00	11.89	31.58	10.40	12.30	9.45	11.14	19.00	11.30	14.84	18.08	2.50	25.80	7.80	2.40	10.52	7.83	
Ground Level (m AOD)	102.32	100.22	102.56	95.96	105.91	102.75	106.40	103.23	103.64	95.11	93.36	100.05	105.07	98.95	98.95	97.81	97.81	104.73	104.72	104.06	104.04	100.51	100.51	100.45	100.45	103.99	104.71	104.71	104.24	104.24	105.61	105.71	105.72	
Date	Depth of groundwater below existing ground level (m)																																	
27 October 2005			5.90	Dry						1.87	Dry							8.91	8.68	7.88	7.95						11.62	9.00	2.50	2.83	4.91			
28 October 2005			5.65	Dry						2.24	3.85							8.91	8.88	7.90	7.91						13.12	9.09	NR	3.07	NR	Dry	NR	5.56
31 October 2005			4.78	Dry						2.50	4.20	8.72						8.91	8.70	7.47	7.40						12.73	9.14	1.03	3.10	NR	Dry	7.57	5.73
01 November 2005			4.86	Dry						2.52	4.29	8.71						8.88	8.90	7.83	7.83						13.05	9.76	1.59	3.10	NR	Dry	7.82	5.76
02 November 2005			4.81	Dry						2.51	4.26	8.63						8.84	8.82	7.87	7.84						10.95	9.86	1.57	3.08	5.17	Dry	7.77	5.57
03 November 2005			4.85	Dry						2.51	4.30	8.62	6.20					8.86	8.83	7.81	7.87						12.91	9.83	1.54	3.08	5.11	Dry	7.72	5.53
04 November 2005			4.70	Dry						2.64	4.25	8.80	5.15					8.94	8.92	7.87	7.85						12.98	9.86	1.56	2.95	5.52	Dry	7.91	5.63
07 November 2005			4.53	Dry						2.68	4.16	8.78	6.36					8.89	8.88	7.83	7.80						12.98	9.60	1.50	2.99	5.10	Dry	7.87	5.62
08 November 2005			4.47	Dry						2.48	4.26	8.60	6.17					8.76	8.77	7.76	7.73						11.82	9.69	1.47	3.01	5.10	Dry	7.67	5.48
10 November 2005			4.47	Dry						2.43	4.24	8.81	5.21					8.92	8.90	7.82	7.80						12.94	9.07	1.52	2.89	5.49	Dry	8.06	5.72
11 November 2005			5.94	Dry						2.42	4.02	8.62	6.93					8.76	8.85	7.60	7.56						11.84	8.95	1.25	2.85	NR	Dry	7.81	5.70
14 November 2005			4.59	Dry						2.69	4.12	8.77	7.15					8.83	8.82	7.74	7.72						11.86	9.03	1.07	3.04	5.12	Dry	7.87	5.86
16 November 2005			4.24	Dry					7.24	2.63	4.10	8.81	7.25					8.80	8.78	7.71	7.72	8.04	8.02	10.11	9.21	11.77	8.90	1.55	2.91	6.25	Dry	7.81	6.11	
22 November 2005			4.71	Dry	8.38	4.25	Dry			7.51	2.69	4.24	8.80	8.16				8.86	8.83	7.78	7.75	7.98	8.12		9.21		9.07	1.51	2.95	6.25	Dry	7.93	6.66	
23 November 2005										7.51	4.24																12.25	9.09	1.51					
29 November 2005		Dry	5.03	Dry	8.77	4.70	Dry	7.64	7.16				8.23					8.80	8.74	7.76	7.78	8.20	8.20	10.23	9.34	13.08	10.12	1.75	2.95		Dry			
30 November 2005	4.90	Dry																8.73	8.71	7.76	7.79	8.21	8.19	10.22	9.36	13.01	10.10	1.66	2.97	6.17	Dry	7.80	6.40	
01 December 2005	4.80	Dry	5.10	Dry	9.78	4.79	Dry	7.57	6.92	2.68	4.25	8.81	8.28									8.17	8.20	10.23	9.38									
05 December 2005	4.87	Dry	5.21	Dry	9.84	4.93	Dry	7.69	7.07	2.60	4.29	8.81	8.34					8.89	8.78	7.78	7.76	8.09	8.21	10.23	9.43	12.93	10.22	1.78	2.93	6.24	Dry	8.02	6.70	
																											</							

APPENDIX D

ANALYTICAL RESULTS

Soil results
Leachate results
Groundwater results
Surface water results
Waste acceptance criteria results
Gas results
Gas radiocarbon dating

APPENDIX C

STANDPIPE READINGS

Soil Analysis		
Analyte:	Method Code:	Units:
Cyanide (Free)	BGCN22	mg/kg
SO4-- (acid sol)	ICPACIDS	mg/kg
Arsenic (MS)	ICPMSS	mg/kg
Cadmium (MS)	ICPMSS	mg/kg
Chromium (MS)	ICPMSS	mg/kg
Copper (MS)	ICPMSS	mg/kg
Lead (MS)	ICPMSS	mg/kg
Manganese (MS)	ICPMSS	mg/kg
Mercury (MS)	ICPMSS	mg/kg
Nickel (MS)	ICPMSS	mg/kg
Selenium (MS)	ICPMSS	mg/kg
Zinc (MS)	ICPMSS	mg/kg
Iron	ICPSOIL	mg/kg
SO4-- (H2O sol) mg/l	ICPWSS	mg/kg
CN- (total)	ICTSCN28	mg/kg
Sulphide	ICTSCN28	mg/kg
Thiocyanate	SCNCR6	mg/kg
Tot.Moisture @ 105°C	TMSS	%
TPH GC/FID (AR)	TPHFID	mg/kg
pH units	WSLM3	pH Units
Phenol Index	WSLM4	mg/kg
Boron	ICPBOR	mg/kg
Asbestos Fibres %		% M/M

Guideline Value

20(CLEA)
30(CLEA)
200(CLEA)
445(CLEA)
450(CLEA)

15(CLEA)
75(CLEA)
280(CLEA)
2000(CLEA)

CL/0526691	CL/0526692	CL/0526694	CL/0526693	CL/0526935	CL/0526936	CL/0526937	CL/0526938	CL/0527011	CL/0527012	CL/0527720	CL/0529955	CL/0527717	CL/0527716
TP5/1 5-5.8	TP5/2 0.0-3.0	TP5/3 0.0-3.0	TP5/4 0.0-3.0	TP5/5 3.0-5.8	TP5/6 3.0-5.8	TP5/7 0.0-3.0	TP5/8 0.0-3.0	TPBH5/2 3.0 - 5.8	TPBH5/3 3.0 - 5.8	TPBH5/6 3.0 - 5.3	TPBH5/8 3.0 - 5.6	TPBH5/4 0 - 3.0	TPBH5/10 0 - 3.0
18-Oct-05	18-Oct-05	18-Oct-05	18-Oct-05	19-Oct-05	19-Oct-05	19-Oct-05	19-Oct-05	20-Oct-05	20-Oct-05	21-Oct-05	21-Oct-05	24-Oct-05	24-Oct-05
<1		<1	<1	<1	<1	<1	<1					<1	
1830		229	523		1030	970	1100			1350			
11.8	9.4	8.1	10.5	9	10.6	16.2	9.6		11.4	8.6	7.9	1490	
4.5	1.6	0.21	0.4	0.3	0.54	0.69	0.81		0.38	0.2	0.48	9.7	
19	14.8	16.1	28.5	23.1	40.5	518.6	25.8		25.6	21.6	14	18.2	
23.8	11.9	8	30.4	17.8	19.7	40.1	23.3		23.5	13.9	17.5	45	
71.6	39.1	16.1	32.7	29.2	63	84.4	64		46	37.1	66.7	335.9	
1016.9	978.6	344	990.8	918.4	1225	1257.2	818.9		1094.4	749	752.7	961.2	
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.26	<0.1	<0.1	
17.7	16.9	20.9	35.8	26	23	227.1	23.9		27.9	19.4	18.7	15.4	
1.28	1.23	<0.5	0.68	0.57	0.89	1.27	0.7		0.65	0.67	0.84	0.54	
119.3	116.8	56	113.5	83.8	133.6	106.2	115		114.3	89	98.5	134.5	
28200	22800	29500	41500	35900	36100	23700	28900		44700	24300	2320	27300	
1110	79.9			107.4	291	190.3	291						
<1	<1			<1	<1	<1	<1		<1			<1	
12		<5	<5	<5	32	9	22					49	
1.4	0.8			1.3	3.5	5.4	4.1						
18.5	15	15.6	16.9	18	21.7	16	16.1	29.9	22.4	23.8	10.5	18.3	18.2
1240								108					139
8.2	8.8	8	8.5	8.3	9.5	10.1	9.4		8.8	8.8	9.1	9.1	
<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6					
0.6	<0.5	<0.5	<0.5	0.5	1	1.3	1.7		0.8	1.2	0.5	0.9	
<0.001				<0.001	<0.001	<0.001	<0.001		<0.001		NBFO	<0.001	

Soil Analysis		
Analyte:	Method Code:	Units:
Cyanide (Free)	BGCN22	mg/kg
SO4-- (acid sol)	ICPACIDS	mg/kg
Arsenic (MS)	ICPMSS	mg/kg
Cadmium (MS)	ICPMSS	mg/kg
Chromium (MS)	ICPMSS	mg/kg
Copper (MS)	ICPMSS	mg/kg
Lead (MS)	ICPMSS	mg/kg
Manganese (MS)	ICPMSS	mg/kg
Mercury (MS)	ICPMSS	mg/kg
Nickel (MS)	ICPMSS	mg/kg
Selenium (MS)	ICPMSS	mg/kg
Zinc (MS)	ICPMSS	mg/kg
Iron	ICPSOIL	mg/kg
SO4-- (H2O sol) mg/l	ICPWSS	mg/kg
CN- (total)	ICTSCN28	mg/kg
Sulphide	ICTSCN28	mg/kg
Thiocyanate	SCNCR6	mg/kg
Tot.Moisture @ 105°C	TMSS	%
TPH GC/FID (AR)	TPHFID	mg/kg
pH units	WSLM3	pH Units
Phenol Index	WSLM4	mg/kg
Boron	ICPBOR	mg/kg
Asbestos Fibres %		% M/M

Guideline Value

CL/0527719	CL/0527718	CL/0528732	CL/0528205	CL/0528397	CL/0528398	CL/0530890	CL/0530254	CL/0530255	CL/0529636	CL/0530764	CL/0531306	CL/0531307	CL/0531308
TPBH5/11 0 - 3.0	TPBH5/12 3.0 - 4.5	BH5/3 5.9 - 9	BH5/11 4.2	BH5/12 7.5	BH5/12 13.5	BH5/5A 5.9 - 8.9	BH5/9 2.2 - 5.2	BH5/9 11.2 - 14.2	BH5/13 5.9	BH5/8 8.6 - 10.2	BH5/5A 11.9 - 13.4	BH5/6 5.3 - 6.8	BH5/7 4.5 - 5
24-Oct-05	24-Oct-05	24-Oct-05	27-Oct-05	28-Oct-05	28-Oct-05	02-Nov-06	09-Nov-06	09-Nov-06	10-Nov-05	17-Nov-06	22-Nov-06	23-Nov-06	23-Nov-06
		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	895	241	1210	121	579	798	6420	569	692	1360			1090
	9.8	8.2	7.9	2.4	6.9	7.7	8.4	3	4.8	10.3	7.8		13.1
	0.8	0.21	0.38	0.17	0.13	0.24	0.35	0.14	0.3	0.17	0.22		0.42
	16.2	15.9	13.5	7.4	14.4	15.5	15.9	7	11.4	16.2	13.6		17
	23.8	11.2	15.6	3.3	13.2	12	13.6	5.8	7	26	18.7		15.2
	55.6	16.9	37.1	9.5	11.7	29.2	36.8	8.9	24.1	35.3	27.2		42.3
	996.6	223.7	815.2	452.3	195	692	840.5	403.2	451	697.4	472.1		414.7
	0.14	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
	18.5	14.8	14.8	6.1	21.4	18	17.3	10.6	13.7	17.7	22.7		16
	0.68	0.68	0.74	0.7	<0.5	0.6	0.89	0.96	0.86	0.62	0.61		<0.6
	344.6	47.7	90.2	25.1	57.6	73.6	74.5	37.3	60	81.9	70.8		77.1
	25000	33900	19800	11100	30900	25000	29300	19400	31600	28800	25600		23600
		71.7	873	1360	48.4	90.3	193.8	232	204.4	344	819	155	339
	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1		<1
	71	<5	33		<5	8	33	38	<6	93	13	<5	11
		5.3	1.3	<0.5	<0.5	0.6	0.8	0.8	0.9	<0.5	1.4	0.7	2.2
17.5	20.9	24	17.4	19.9	12.7	18.1	18.6	18.1	20.9	14.6	19		32.7
310			392	<11.5	131		200	466	126	130	82	262	
	8.4		9.2		7.3	8.6	8.5	9.7	8.8	8.7	8.7		8
<0.5		<0.5	<0.5	<0.5	<0.5		1.1	0.5	<0.6	<0.5	<0.5	<0.5	<0.6
	0.8	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.5	<0.6	1.1	<0.5		0.6
	<0.001		NBFO		NBFO	NBFO	<0.001	<0.001	<0.001	NBFO		<0.001	

Soil Analysis		
Analyte:	Method Code:	Units:
Cyanide (Free)	BGCN22	mg/kg
SO4-- (acid sol)	ICPACIDS	mg/kg
Arsenic (MS)	ICPMSS	mg/kg
Cadmium (MS)	ICPMSS	mg/kg
Chromium (MS)	ICPMSS	mg/kg
Copper (MS)	ICPMSS	mg/kg
Lead (MS)	ICPMSS	mg/kg
Manganese (MS)	ICPMSS	mg/kg
Mercury (MS)	ICPMSS	mg/kg
Nickel (MS)	ICPMSS	mg/kg
Selenium (MS)	ICPMSS	mg/kg
Zinc (MS)	ICPMSS	mg/kg
Iron	ICPSOIL	mg/kg
SO4-- (H2O sol) mg/l	ICPWSS	mg/kg
CN- (total)	ICTSCN28	mg/kg
Sulphide	ICTSCN28	mg/kg
Thiocyanate	SCNCR6	mg/kg
Tot.Moisture @ 105°C	TMSS	%
TPH GC/FID (AR)	TPHFID	mg/kg
pH units	WSLM3	pH Units
Phenol Index	WSLM4	mg/kg
Boron	ICPBOR	mg/kg
Asbestos Fibres %		% M/M

Guideline Value

BH23A 7.8	BH27 0.5	TP7 1	TP7 3	TP8 2	TP9 1	TP11 1.2	TP12 1	TP12 2.2	TP14 1	TP14A 2.9
01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02	01-Jun-02
4	4	3	3	3	3	3	3	3	3	3
18	12	16	18	26	10	12	14	28	20	16
2	2	2	2	2	2	2	2	2	2	2
42	38	40	42	36	44	32	44	50	34	32
58	34	26	26	56	64	24	32	62	34	40
132	50	72	80	124	152	68	122	288	72	88
1	1	1	1	1	1	1	1	1	1	1
48	44	50	52	50	84	38	50	66	34	48
1.88	1	1	1	1	1	1	1	1	1	1
196	114	142	156	196	150	114	252	334	120	168
686	114	470	178	872	148	474	184	370	718	460
1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1.2	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0	0

Statistical Analysis									
No. samples	Min	Max	Mean	Std dev	CV	t	UCL 95%	t	UCL 99%
51	1	4	2.58824	1.3882	0.5363	1.676	2.914006	2.403272	3.055395
20	121	6420	1145.15	1322.5	1.1549	1.729	1656.506	2.539483	1896.151
55	2.4	32	13.0655	6.0411	0.4624	1.674	14.42872	2.39741	15.01835
55	0.13	4.5	1.35164	0.9245	0.684	1.674	1.560262	2.39741	1.650496
55	7	518.6	38.0709	67.311	1.768	1.674	53.2605	2.39741	59.83025
55	2	102	32.2982	21.667	0.6708	1.674	37.18765	2.39741	39.30243
55	8.9	335.9	81.2527	63.266	0.7786	1.674	95.52961	2.39741	101.7046
25	195	1257.2	795.076	302.09	0.411	1.711	838.4449	2.492159	885.6484
55	0.1	1.2	0.59891	0.4521	0.7549	1.674	0.700938	2.39741	0.745067
55	4	227.1	37.36	31.457	0.842	1.674	44.4586	2.39741	47.52887
55	0.5	5.48	1.28345	0.8737	0.6807	1.674	1.480609	2.39741	1.565882
55	25.1	344.6	141.025	73.869	0.5238	1.674	157.695	2.39741	164.9049
25	2320	44700	26872.8	8743.2	0.3254	1.711	29864.5	2.492159	31230.67
19	48.4	1360	363.937	383.03	1.0524	1.734	516.3125	2.55238	588.2195
20	1	1	1	0	0	1.729	1	2.539483	1
21	5	93	22.3333	24.076	1.078	1.725	31.39452	2.527977	35.61462
19	0.5	5.4	1.74737	1.6105	0.9217	1.734	2.388064	2.55238	2.690412
28	10.5	32.7	19.0714	4.5988	0.2411	1.703	20.55174	2.47266	21.22039
43	11.5	7440	608.453	1174.6	1.9304	1.682	909.7226	2.41847	1041.647
23	7.3	10.1	8.73043	0.6168	0.0706	1.717	8.951268	2.508325	9.053015
50	0.5	1.4	0.826	0.253	0.3063	1.677	0.885964	2.404892	0.912043
55	0.5	5.4	1.06909	0.8371	0.783	1.674	1.257988	2.39741	1.339689
43	0	0.001	0.0003	0.0005	1.5371	1.682	0.000422	2.41847	0.000474

Leachate Analysis			EXR/0522117	EXR/0522115	EXR/0522118	EXR/0522116	EXR/0522471	EXR/0522472	EXR/0522473	EXR/0522474	EXR/0522487	EXR/0522488	EXR/0522774	EXR/0522777	EXR/0522776	EXR/0522779	EXR/0522775	EXR/0522778	EXR/0523157	EXR/0523168	EXR/0523191	EXR/0523192	EXR/0523195	EXR/0523196	EXR/0524011		
			TPS/1 5-5.8	TPS/1 5-5.8	TPS/1 5-5.8	TPS/4 0.0-3.0	TPS/4 0.0-3.0	TPS/8 0.0-3.0	TPS/8 0.0-3.0	TPS/8/7 3.0 - 4.5	TPS/8/7 3.0 - 4.5	TPS/8/6 3.0 - 5.3	TPS/8/6 3.0 - 5.3	TPS/8/10 0 - 3.0	TPS/8/10 0 - 3.0	TPS/8/12 3.0 - 4.45	TPS/8/12 3.0 - 4.45	TPS/8/4 0 - 3.0	TPS/8/4 0 - 3.0	BH5/11 4.2	BH5/11 4.2	BH5/12 13.5	BH5/12 13.5	BH5/14 9	BH5/14 9	BH5/9 2.2 - 5.2	
Analyte			Method Code	Units	Guideline Value	18-Oct	18-Oct	18-Oct	18-Oct	19-Oct	20-Oct	20-Oct	21-Oct	21-Oct	24-Oct	24-Oct	24-Oct	24-Oct	24-Oct	24-Oct	27-Oct	27-Oct	28-Oct	28-Oct	02-Nov	02-Nov	05-Nov
pH units						8.1	8.2	7.8	8	8.3	7.8	6.9	6.7	8.1	8	8.3	8.6	8.3	8	8.3	8.2	8.1	7.6	8.4	8.1	8.2	
Conductivity uS/cm @ 25C			WSLM2	uS/cm	2500 @20°C(UKD)	3	6	4	20	17	4	5	29	5	43	7	11	3	14	3	20	4	74	11	19	2	
Chloride as Cl w			KONENS	mg/L	250(EQS)	34	249	19.9	139	154.0	21.3	23	3.6	310	44.6	195	32.7	440	66.2	233	36.5	131	31.3	23.8	6.63	67.2	
Total Sulphur as SO4 (Dissolved)			ICPWATER	mg/L	250(UKD)																						
Calcium as Ca (Dissolved)			ICPWATER	mg/L	50(UKD)																						
Magnesium as Mg (Dissolved)			ICPWATER	mg/L	170(EQS)																						
Sodium as Na (Dissolved)			ICPWATER	mg/L	12(UKD)																						
Potassium as K (Dissolved)			ICPWATER	mg/L	0.02(UKD)																						
Nickel as Ni (Dissolved)			ICPMSW	mg/L	0.02(UKD)																						
Chromium as Cr (Dissolved)			ICPMSW	mg/L	0.2(EQS)																						
Cadmium as Cd (Dissolved)			ICPMSW	mg/L	0.005(EQS)																						
Copper as Cu (Dissolved)			ICPMSW	mg/L	0.01(EQS)																						
Lead as Pb (Dissolved)			ICPMSW	mg/L	0.125(EQS)																						
Zinc as Zn (Dissolved)			ICPMSW	mg/L	0.25(EQS)																						
Manganese as Mn (Dissolved)			ICPMSW	mg/L	0.05(UKD)																						
Iron as Fe (Dissolved)			ICPWATER	mg/L	1(EQS)																						
Arsenic as As (Dissolved)			ICPMSW	mg/L	0.05(EQS)																						
Boron as B (Dissolved)			ICPWATER	mg/L	2(EQS)																						
Mercury as Hg (Dissolved)			ICPMSW	mg/L	0.001(EQS)																						
Selenium as Se (Dissolved)			ICPMSW	mg/L	0.001(UKD)																						
Ammoniacal Nitrogen as N			KONENS	mg/L	0.25(RAO)																						
Nitrate as N			KONENS	mg/L	50(UKD)																						
Nitrate as N			KONENS	mg/L	0.05(UKD)																						
Thiocyanate as SCN			ICPMSW	mg/L	0.05(UKD)																						
Cyanide (Total) as CN			ICTSCN28	mg/L	0.05(UKD)																						
Phosphate as P			KONENS	mg/L	0.05(UKD)																						
Sulphide (Free) as S			ISESW24	mg/L	0.03(EQS)																						
Phenol Index as C6H5OH			SFAP1	mg/L																							
						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	

Leachate Analysis			EXR/0522117	EXR/0522118	EXR/0522471	EXR/0522472	EXR/0522487	EXR/0522774	EXR/0522776	EXR/0522775	EXR/0523167	EXR/0523191	EXR/0523196	EXR/0524011
			TPS/1 5-5.8	TPS/1 5-5.8	TPS/4 0.0-3.0	TPS/8 0.0-3.0	TPS/8/7 3.0 - 4.5	TPS/8/7 3.0 - 4.5	TPS/8/10 0 - 3.0	TPS/8/12 3.0 - 4.45	TPS/8/4 0 - 3.0	BH5/11 4.2	BH5/12 13.5	BH5/14.9
Analyte			Method Code	Units	18-Oct	19-Oct	20-Oct	21-Oct	24-Oct	24-Oct	24-Oct	28-Oct	02-Nov	05-Nov
Chloride as Cl w			KONENS	mg/L	36	59	63	76	112	39	43	59	184	39
Total Sulphur as SO4 (Dissolved)			ICPWATER	mg/L	593	339		732.9	617.9	1069.2	596.2	430.3	66.6	152
Calcium as Ca (Dissolved)			ICPWATER	mg/L										
Magnesium as Mg (Dissolved)			ICPWATER	mg/L										
Sodium as Na (Dissolved)			ICPWATER	mg/L										
Potassium as K (Dissolved)			ICPWATER	mg/L										
Nickel as Ni (Dissolved)			ICPMSW	mg/L										
Chromium as Cr (Dissolved)			ICPMSW	mg/L										
Cadmium as Cd (Dissolved)			ICPMSW	mg/L										
Copper as Cu (Dissolved)			ICPMSW	mg/L										
Lead as Pb (Dissolved)			ICPMSW	mg/L										
Zinc as Zn (Dissolved)			ICPMSW	mg/L										
Manganese as Mn (Dissolved)			ICPMSW	mg/L										
Iron as Fe (Dissolved)			ICPWATER	mg/L										
Arsenic as As (Dissolved)			ICPMSW	mg/L										
Boron as B (Dissolved)			ICPWATER	mg/L										
Mercury as Hg (Dissolved)			ICPMSW	mg/L										
Selenium as Se (Dissolved)			ICPMSW	mg/L										
Ammoniacal Nitrogen as N			KONENS	mg/L										
Nitrate as N			KONENS	mg/L										
Nitrate as N			KONENS	mg/L										
Thiocyanate as SCN			ICPMSW	mg/L										
Cyanide (Total) as CN			ICTSCN28	mg/L										
Phosphate as P			KONENS	mg/L										
Sulphide (Free) as S			ISESW24	mg/L										
Phenol Index as C6H5OH			SFAP1	mg/L										

Guideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueGuideline ValueNo. Occurrences
greater than UCLNo. Occurrences
greater than UCL

Soil (SVOC) Analysis

Analyte	Method Code	Units	CL/0526691	CL/0526936	CL/0526938	CL/0527011	CL/0527716	CL/0527719	CL/0528397	CL/0528398	CL/0528205	CL/0530254	CL/0530295	CL/0529636	CL/0530764	CL/0531306	CL/0531307
			TP5/1 5-5.8	TP5/1 3.0-5.8	TP5/1 0.0-3.0	TPBHS/2 3.0 - 5.8	TPBHS/10 0 - 3.0	TPBHS/11 0 - 3.0	BHS/12 7.5	BHS/12 13.6	BHS/11 4.2	BHS/9 2.2 - 5.2	BHS/9 11.2 - 14.2	BHS/13 5.9	BHS/8 8.6 - 10.2	BHS/5A 11.9 - 13.4	BHS/6 5.3 - 6.8
Phenol	SVOCSW	ug/kg	<49.0	207.4	38.4	<57.0	<57.0	281.8	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
bis(2-Chlorophenyl)ether	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2-Chlorophenol	SVOCSW	ug/kg	<49.0	15.3	7.1	<57.0	<57.0	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
1,3-Dichlorobenzene	SVOCSW	ug/kg	<12.0	5.1	5.4	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
1,4-Dichlorobenzene	SVOCSW	ug/kg	<12.0	7.2	5.2	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Benzyl alcohol	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.0	<10.0	<12.0	<12.0	<12.0	<61.7
1,2-Dichlorobenzene	SVOCSW	ug/kg	<12.0	5.9	0.1	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2-Methylphenol	SVOCSW	ug/kg	<12.0	11.7	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
bis(2-Chloroisopropyl)ether	SVOCSW	ug/kg	<12.0	6.4	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Hexachloroethane	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
N-Nitroso-di-n-propylamine	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
3- & 4-Methylphenol	SVOCSW	ug/kg	63.9	89	44.5	<57.0	<48.5	76.1	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
Nitrobenzene	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Isophorone	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2-Nitrophenol	SVOCSW	ug/kg	<49.0	<51.0	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
2,4-Dimethylphenol	SVOCSW	ug/kg	<49.0	14.2	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
Benzoic Acid	SVOCSW	ug/kg	<245.0	<8514.3	<7936.5	<285.0	<244.5	<242.4	<242.4	<242.4	<245.7	<40.0	<48.5	<47.0	<48.5	<47.0	<48.5
bis(2-Chloroethoxy)methane	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2,4-Dichlorophenol	SVOCSW	ug/kg	<49.0	<51.0	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
1,2,4-Trichlorobenzene	SVOCSW	ug/kg	<12.0	6.9	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
4-Chlorophenol	SVOCSW	ug/kg	<49.0	<51.0	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
4-Chloroaniline	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Hexachlorobutadiene	SVOCSW	ug/kg	<12.0	6.5	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
4-Chloro-3-methylphenol	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2-Methylnaphthalene	SVOCSW	ug/kg	265.3	278.2	190.7	270.5	243.0	175.8	<1.0	<0.2	<0.2	207.6	24.5	454.1	<1.0	204.4	272.6
1-Methylnaphthalene	SVOCSW	ug/kg	165.4	174.7	94.5	138.4	198.1	108.7	<1.0	<0.2	<0.2	113.7	9.4	346	<1.0	78.4	202.8
Hexachlorocyclopentadiene	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<13.0	<161.6	<2.9	<0.6	<0.6	<61.0	<50.0	<12.0	<12.0	<12.0	<61.7
2,4,6-Trichlorophenol	SVOCSW	ug/kg	<49.0	11.7	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
2,4,5-Trichlorophenol	SVOCSW	ug/kg	<49.0	11.3	<48.0	<57.0	<48.5	<48.5	<48.5	<48.5	<47.0	<48.5	<48.5	<47.0	<48.5	<47.0	<48.5
2-Chloronaphthalene	SVOCSW	ug/kg	<5.0	<5.0	0.1	<6.0	<5.0	<5.0	<1.0	<0.2	<0.2	<25.0	<4.0	<1.0	<1.0	<1.0	<25.0
Biphenyl	SVOCSW	ug/kg	96.2	87.8	68.9	116.9	68.4	68.4	<1.0	<0.2	<0.2	72.8	9.1	91.3	<1.0	70.9	89.4
Diphenyl ether	SVOCSW	ug/kg	<5.0	2.8	<5.0	<6.0	<5.0	<5.0	<1.0	<0.2	<0.2	<25.0	<4.0	<1.0	<1.0	<1.0	<25.0
2-Nitroaniline	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Dimethylphthalate	SVOCSW	ug/kg	<12.0	7.4	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2,6-Dinitrotoluene	SVOCSW	ug/kg	<12.0	<13.0	1	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<123.0	<20.0	<12.0	<12.0	<12.0	<123.5
3-Nitroaniline	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
2,4-Dinitrophenol	SVOCSW	ug/kg	<25.0	<8514.3	<7936.5	<28.0	<163.0	<161.6	<6.0	<1.0	<1.0	<123.0	<100.0	<13.0	<117.0	<117.0	<617.3
Dibenzofuran	SVOCSW	ug/kg	216.4	112.9	101.3	197.7	89	77.7	<2.9	<0.6	<0.6	74.1	25.3	164.6	<3.2	21.4	238.4
4-Nitrophenol	SVOCSW	ug/kg	<123.0	<8514.3	<7936.5	<143.0	<163.0	<161.6	<6.0	<1.0	<1.0	<14.2	<100.0	<122.1	<117.0	<117.0	<617.3
2,4-Dinitrotoluene	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Diethylphthalate	SVOCSW	ug/kg	<12.0	12.8	4.9	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
4-Chlorophenyl-phenyl ether	SVOCSW	ug/kg	<12.0	1.4	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
4,6-Dinitro-2-methylphenol	SVOCSW	ug/kg	<123.0	<4257.1	<3968.3	<143.0	<161.6	<161.6	<6.0	<1.0	<1.0	<123.0	<100.0	<122.1	<117.0	<117.0	<617.3
4-Nitroaniline	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<123.0	<20.0	<12.0	<12.0	<12.0	<123.5
N-Nitrosodiphenylamine	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
4-Bromophenyl-phenyl ether	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Hexachlorobenzene	SVOCSW	ug/kg	<12.0	<13.0	<12.0	<14.0	<12.0	<12.0	<2.9	<0.6	<0.6	<61.4	<10.0	<12.0	<12.0	<12.0	<61.7
Pentachlorophenol	SVOCSW	ug/kg	<123.0	95.3	4.7	<143.0	<122.3	<121.2	<25.0	<6.0	<1.0	<14.2	<100.0	<122.1	<117.0	<117.0	<617.3
Di-n-butylphthalate	SVOCSW	ug/kg	93.6	80.2	64.4	118.2	<12.0	27.8	<2.9	<0.6	<0.6	<61.4	53.1	<12.0	<3.2	15.2	<61.7
Butylbenzylphthalate	SVOCSW	ug/kg	24.1	20.7	16.2	35.2	<12.0	<12.0	<2.9	<0.6	<0.6	<25.0	<20.0	<12.0	<3.2	<23.0	<123.5
3,3'-Dichlorobenzidine	SVOCSW	ug/kg	<48.0	<8514.3	<7936.5	<57.0	<163.0	<161.6	<11.0	<2.0	<2.0	<245.7	<40.0	<48.5	<13.0	<47.0	<246.9
bis(2-Ethylhexyl)phthalate	SVOCSW	ug/kg	183.7	120.9	121.7	116.8	131.2	1797.5	<2.9	<0.6	0.7	1119.5	341.8	1858.5	<3.2	1946	813
Di-n-octylphthalate	SVOCSW	ug/kg	<5.0	<5.0	<5.0	<6.0	<5.0	<12.0	<1.0	<0.2	<0.2	<49.0	<40.0	<5.0	<1.0	<47.0	<246.9

No sample	Min	Max	Statistical Analysis						No Occurrences greater than UCL					
			Mean	Std dev	CV	t	UCL 95%	t	UCL 99%	t	UCL 95%			
15	2	281.8	89.3	100.0642	1.12054	1.78131	134.808	2.6245	157.1078	1.78131	24.64357	2.6245	28.89922	4
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	2	246.9	58.81333	78.65357	1.337342	1.78131	54.59248	2.6245	112.1123	1.78131	24.64357	2.6245	112.1123	2
15	0.6	61.7	14.99333	19.44845	1.29714	1.78131	23.83767	2.6245	28.17241	1.78131	24.64357	2.6245	28.17241	2
15	0.6	61.7	15.12	19.38682	1.282197	1.78131	23.93651	2.6245	28.25731	1.78131	24.64357	2.6245	28.25731	2
15	0.6	308.6	38.18333	77.53311	2.030017	1.78131	73.45294	2.6245	90.73298	1.78131	24.64357	2.6245	90.73298	2
15	0.6	61.7	14.75333	19.60714	1.328997	1.78131	23.67004	2.6245	28.03994	1.78131	24.64357	2.6245	28.03994	2
15	0.6	61.7	15.87333	19.11183	1.204201	1.78131	24.56479	2.6245	28.6243	1.78131	24.64357	2.6245	28.6243	2
15	0.6	61.7	15.52	19.24304	1.239887	1.78131	24.27112	2.6245	28.55888	1.78131	24.64357	2.6245	28.55888	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	17.7	15.96	19.69242	1.112566	1.78131	24.04357	2.6245	31.0444	1.78131	24.64357	2.6245	31.0444	2
15	2	246.9	68.65333	76.2868	1.11934	1.78131	103.3516	2.6245	120.3588	1.78131	24.64357	2.6245	120.3588	2
15	0.6	123.5	19.05333	29.63907	1.566081	1.78131	32.62319	2.6245	39.27352	1.78131	24.64357	2.6245	39.27352	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	2	246.9	53.92	74.4519	1.196086	1.78131	98.80798	2.6245	115.727	1.78131	24.64357	2.6245	115.727	2
15	2	246.9	61.46667	77.47966	1.200515	1.78131	86.97106	2.6245	113.8701	1.78131	24.64357	2.6245	113.8701	2
15	0.2	454.1	138.5527	280.5193	2.026087	1.78131	158.5093	2.6245	328.5939	1.78131	24.64357	2.6245	328.5939	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	2	246.9	63.92	76.4519	1.196056	1.78131	98.6879	2.6245	115.727	1.78131	24.64357	2.6245	115.727	2
15	0.6	61.7	15.56333	19.22654	1.236168	1.78131	24.26985	2.6245	28.58203	1.78131	24.64357	2.6245	28.58203	2
15	2	246.9	63.92	76.4519	1.196056	1.78131	98.6879	2.6245	115.727	1.78131	24.64357	2.6245	115.727	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.2	454.1	172.9	138.1522	0.790929	1.78131	235.7272	2.6245	266.5176	1.78131	24.64357	2.6245	266.5176	2
15	0.2	348	108.8333	100.113	0.919875	1.78131	154.3616	2.6245	176.6741	1.78131	24.64357	2.6245	176.6741	2
15	0.6	308.6	50.23333	67.65061	1.502248	1.78131	88.08633	2.6245	117.8374	1.78131	24.64357	2.6245	117.8374	2
15	0.6	246.9	61.3	74.4519	1.205765	1.78131	103.3516	2.6245	120.3588	1.78131	24.64357	2.6245	120.3588	2
15	2	246.9	61.27333	77.60554	1.288612	1.78131	98.58785	2.6245	113.8648	1.78131	24.64357	2.6245	113.8648	2
15	0.1	25	6.166667	7.94478	1.288343	1.78131	6.779701	2.6245	11.65036	1.78131	24.64357	2.6245	11.65036	2
15	0.2	116.9	58.22667	41.5545	0.730053	1.78131	75.12434	2.6245	84.39572	1.78131	24.64357	2.6245	84.39572	2
15	0.2	25	6.346667	7.82723	1.232262	1.78131	6.906243	2.6245	11.65072	1.78131	24.64357	2.6245	11.65072	2
15	0.6	123.5	19.05333	29.63907	1.566081	1.78131	32.62319	2.6245	39.27352	1.78131	24.64357	2.6245	39.27352	2
15	0.6	61.7	15.66667	19.21089	1.232521	1.78131	24.04357	2.6245	31.0444	1.78131	24.64357	2.6245	31.0444	2
15	0.6	123.5	24.85333	40.53772	1.631078	1.78131	43.28861	2.6245	52.32337	1.78131	24.64357	2.6245	52.32337	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	1	8514.3	185.9327	2880.082	3.391519	1.78131	2486.601	2.6245	3134.306	1.78131	24.64357	2.6245	3134.306	2
15	0.6	238.4	81.87333	83.01524	0.938059	1.78131	128.226	2.6245	144.7279	1.78131	24.64357	2.6245	144.7279	2
15	0.6	8514.3	1245.9567	2842.197	2.281676	1.78131	2538.208	2.6245	3171.657	1.78131	24.64357	2.6245	3171.657	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	61.7	15.87333	19.28861	1.246571	1.78131	24.25816	2.6245	28.5841	1.78131	24.64357	2.6245	28.5841	2
15	0.6	61.7	15.16667	19.45445	1.281022	1.78131	24.03393	2.6245	28.36981	1.78131	24.64357	2.6245	28.36981	2
15	8	4257.1	688.4867	1405.32	2.047119	1.78131	1325.582	2.6245	1638.79	1.78131	24.64357	2.6245	1638.79	2
15	0.6	123.5	25.07333	40.38168	1.608398	1.78131	43.43759	2.6245	52.43755	1.78131	24.64357	2.6245	52.43755	2
15	0.6	61.7	18.86	21.5903	1.144767	1.78131	24.04357	2.6245	31.0444	1.78131	24.64357	2.6245	31.0444	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	61.7	15.96	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	61.7	15.86	19.09449	1.196397	1.78131	24.64357	2.6245	28.89922	1.78131	24.64357	2.6245	28.89922	2
15	0.6	617.3	148.2067	196.1901	1.323761	1.78131	237.4277	2.6245	281.1532	1.78131	24.64357	2.6245	281.1532	2
15	0.6	118.2	41.12367	39.95332	0.948506	1.78131	88.86888	2.6245	67.59087	1.78131	24.64357	2.6245	67.59087	6
15	0.6	123.5	25	63.5231	1.356864	1.78131	35.9763	2.6245	42.22032	1.78131	24.64357	2.6245	42.22032	2
15	0.2	8514.3	1169.187	2888.082	2.453577	1.78131	2737.5	2.6245	3455.994	1.78131	24.64357	2.6245	3455.994	2
15	0.6	1946	557.2	739.4396	1.327063	1.78131	893.4737	2.6245	1058.275	1.78131	24.64357	2.6245	1058.275	2
15	0.2	246.9	28.55333	62.81907	2.200061	1.78131	67.12148	2.6245	71.12214	1.78131	24.64357	2.6245	71.12214	1

Soil (PAH) Analysis		
Analyte	Method Code	Units
Naphthalene	SVOCSW	ug/kg
Acenaphthylene	SVOCSW	ug/kg
Acenaphthene	SVOCSW	ug/kg
Fluorene	SVOCSW	ug/kg
Phenanthrene	SVOCSW	ug/kg
Anthracene	SVOCSW	ug/kg
Fluoranthene	SVOCSW	ug/kg
Pyrene	SVOCSW	ug/kg
Benzo(a)anthracene	SVOCSW	ug/kg
Chrysene	SVOCSW	ug/kg
Benzo(b)fluoranthene	SVOCSW	ug/kg
Benzo(k)fluoranthene	SVOCSW	ug/kg
Benzo(a)pyrene	SVOCSW	ug/kg
Indeno(1,2,3-cd)pyrene	SVOCSW	ug/kg
Dibenz(a,h)anthracene	SVOCSW	ug/kg
Benzo(g,h,i)perylene	SVOCSW	ug/kg
Total PAH		ug/kg

Guideline Value

1000(CLEA)

CL0526981	CL0526936	CL0526938	CL0527011	CL0527716	CL0527719	CL0528387	CL0528398	CL0528205	CL0530254	CL0530255	CL0529636	CL0530764	CL0531306	CL0531307
TP5/1 5-5.8	TP5/6 3.0-5.8	TP5/8 0.0-3.0	TPB5/2 3.0-5.8	TPB5/10 0-3.0	TPB5/11 0-3.0	BH5/12 7.5	BH5/12 13.5	BH5/11 4.2	BH5/9 2.2-5.2	BH5/9 11.2-14.2	BH5/13 5.9	BH5/8 8.6-10.2	BH5/5A 11.9-13.4	BH5/6 5.3-6.8
18-Oct	19-Oct	19-Oct	20-Oct	24-Oct	24-Oct	28-Oct	28-Oct	27-Oct	09-Nov	09-Nov	10-Nov	17-Nov	22-Nov	23-Nov
183.5	191.5	162.6	294.7	140.3	167	<1.0	<0.2	<0.2	159.9	28.6	284.9	<1.0	61.7	283.3
65.8	38.5	29	71.5	25	49.8	<1.0	<0.2	<0.2	<25.0	26.5	8	<1.0	<5.0	284.4
309.6	89.3	78.1	328.1	95.9	72	<1.0	<0.2	<0.2	64.9	28.6	77.2	<1.0	26.5	435.9
204.5	98.8	86	337.6	104.9	96.6	<1.0	<0.2	<0.2	64.6	37.6	98.8	<1.0	44.2	449.3
1848.9	547	958.7	1394.4	480.4	595.6	<1.0	<0.2	0.5	409.3	397.9	601.8	1.4	94.5	2790.6
627.6	192.3	253	434.1	76.9	127.2	<1.0	<0.2	<0.2	191.1	242.6	98.7	<1.0	19.3	749.3
2749.9	1024.5	1422.8	2101.4	712.5	1131.7	<1.0	<0.2	0.5	591.3	1120.7	423.1	<1.0	139	6386.2
2788.5	851	1258.3	1903.9	801.3	1143.1	<1.0	<0.2	0.5	509.6	1087.8	338.8	<1.0	123.8	6808.5
1833.9	756	1000.1	1805.5	596.8	811.4	<1.0	<0.2	0.4	369.3	1030.4	269.9	<1.0	117.3	6150.9
1924.3	788.4	999.3	1814	748.7	948.1	<1.0	<0.2	0.4	439.4	967.4	331.1	<1.0	173	6481
2778	882	1277.3	2508.6	866.4	1031.7	<1.0	<0.2	0.5	500.5	1068.8	356.8	<1.0	184.3	8328.6
1305.4	342	442	1205.4	321.9	540	<1.0	<0.2	<0.2	249.7	451.8	295.9	<1.0	46.1	4488.4
2214.1	638.3	835.4	1822.4	599	506.2	<1.0	<0.2	0.4	345	626.1	276.4	<1.0	88.3	6162.8
1898.2	413.2	564.7	1291.5	398.9	451	<1.0	<0.2	<0.2	239.8	419.4	124	<1.0	54.8	3420.6
492.6	168.1	189.1	802.4	117.8	136.4	<1.0	<0.2	<0.2	81.1	169.7	45.4	<1.0	22.1	1131.6
1529.7	329.8	447.9	1084.4	350.5	395.9	<1.0	<0.2	<0.2	227	299.2	120.9	<1.0	51.3	2803
22536.9	7349	10021.3	18890.9	6327.8	8201.7	18	3.2	5.1	4276.5	7984.1	3642.7	16.4	1248	56947.4

Statistical Analysis											No. Occurrences	
No. samples	Min	Max	Mean	Std dev.	CV	1	UCL 95%	1	UCL 99%	95%	greater than UCL	
15	0.2	285.3	131.74	106.125	0.8059	1.7613	160.002	2.6245	203.6544	6		
15	0.2	284.4	40.727	68.1794	1.625	1.7613	70.823	2.6245	85.67256	2		
15	0.2	435.9	106.5	136.977	1.2862	1.7613	168.793	2.6245	189.9211	3		
15	0.2	449.3	108.35	129.933	1.1992	1.7613	167.443	2.6245	186.4011	3		
15	0.2	2790.6	674.88	793.77	1.1782	1.7613	1035.88	2.6245	1212.771	3		
15	0.2	749.3	194.74	235.588	1.2098	1.7613	301.878	2.6245	354.3844	3		
15	0.2	6386.2	1181.1	1656.26	1.4024	1.7613	1934.28	2.6245	2303.426	3		
15	0.2	6808.5	1158.4	1703.25	1.4703	1.7613	1892.99	2.6245	2312.802	2		
15	0.2	6150.9	982.94	1554.6	1.5816	1.7613	1689.92	2.6245	2036.403	3		
15	0.2	6481	1040.9	1627.58	1.5637	1.7613	1781.06	2.6245	2143.805	3		
15	0.2	8328.6	1331	2120.34	1.593	1.7613	2295.31	2.6245	2767.879	3		
15	0.2	4499.4	640.8	1142.08	1.7623	1.7613	1160.18	2.6245	1414.72	3		
15	0.2	6162.8	920.37	1592.1	1.7298	1.7613	1844.41	2.6245	1899.247	3		
15	0.2	3420.6	605.23	920.469	1.5208	1.7613	1023.83	2.6245	1228.881	3		
15	0.2	1131.6	203.91	303.114	1.4685	1.7613	341.76	2.6245	409.316	3		
15	0.2	2803	509.47	768.562	1.5046	1.7613	858.075	2.6245	1028.921	3		
15	3.2	56947	9831.1	14679	1.4931	1.7613	16506.6	2.6245	19778.18	3		

Soil (VOC) Analysis

Analyte	Method Code	Units	CL/0526691	CL/0526936	CL/0526936	CL/0527011	CL/0527716	CL/0527719	CL/0528205	CL/0528397	CL/0528398	CL/0530254	CL/0530255	CL/0528636	CL/0530764	CL/0531306	CL/0531307	No. Occurrences greater than UCL 95%
			TP5/1 6-5.8 18-Oct	TP5/6 3.0-5.8 19-Oct	TP5/6 0.0-3.0 19-Oct	TPBH5/2 3.0 - 5.8 20-Oct	TPBH5/10 0 - 3.0 24-Oct	TPBH5/11 0 - 3.0 24-Oct	BH5/11 4.2 27-Oct	BH5/12 7.5 28-Oct	BH5/12 13.5 28-Oct	BH5/9 2.2 - 5.2 09-Nov	BH5/9 11.2 - 14.2 09-Nov	BH5/13 5.9 10-Nov	BH5/8 8.6 - 10.2 17-Nov	BH5/6A 11.9 - 13.4 22-Nov	BH5/6 5.3 - 6.8 23-Nov	
Dichlorodifluoromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Chloromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Vinyl Chloride	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Bromomethane	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
Chloroethane	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
Trichlorofluoromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1-Dichloroethene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
trans 1,2-Dichloroethene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1-Dichloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
2,2-Dichloropropane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
cis 1,2-Dichloroethene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Bromochloromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Chloroform	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1,1-Trichloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Carbon Tetrachloride	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1-Dichloropropene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Benzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2-Dichloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Trichloroethene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2-Dichloropropane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Dibromomethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Bromodichloromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
cis 1,3-Dichloropropene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Toluene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
trans 1,3-Dichloropropene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1,2-Trichloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Tetrachloroethene	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
1,3-Dichloropropane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Dibromochloromethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2-Dibromomethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Chlorobenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Ethylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1,1,2-Tetrachloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
m and p-Xylene	VOCSW	ug/kg	<6	<6	<6	8	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
o-Xylene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Styrene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Bromoform	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
iso-Propylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,1,2,2-Tetrachloroethane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Propylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
Bromobenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2,3-Trichloropropane	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
2-Chlorotoluene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,3,5-Trimethylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
4-Chlorotoluene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
tert-Butylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2,4-Trimethylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	8	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
iso-Butylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	2
p-Isopropyltoluene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	504	<6	<6	1
1,3-Dichlorobenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,4-Dichlorobenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
n-Butylbenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2-Dichlorobenzene	VOCSW	ug/kg	<6	<6	<6	<7	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	1
1,2-Dibromo-3-chloropropane	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
1,2,4-Trichlorobenzene	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
Hexachlorobutadiene	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
Naphthalene	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3
1,2,3-Trichlorobenzene	VOCSW	ug/kg	<31	<32	<30	<36	<31	<30	<29	<31	<31	<25	<31	<32	<29	<29	<31	3

Statistical Analysis										No. samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 95%
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	25	36	30.6	2.26148	0.0739	1.7613	31.6284	2.6245	32.1325	15	25	36	30.6	2.26148	0.0739	1.7613	31.6284	2.6245	32.1325
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612
15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.25612	15	5	7	6	0.37796	0.06299	1.7613	6.17189	2.6245	6.2

Soil (TPH) Analysis

Analyte:	Method Code:	Units:	SSAC (mg/kg)
>C8 - C10	TPHFID STD	mg/kg	42
>C10 - C12	TPHFID STD	mg/kg	218
>C12 - C16	TPHFID STD	mg/kg	2609
>C16 - C21	TPHFID STD	mg/kg	2859
>C21 - C35	TPHFID STD	mg/kg	3044

CL/0526691	CL/0526936	CL/0526938	CL/0527011	CL/0527716	CL/0527719	CL/0528205	CL/0528397	CL/0528398	CL/0530254
TP5/1 5-5.8	TP5/6 3.0-5.8	TP5/8 0.0-3.0	TPBH5/2 3.0 - 5.8	TPBH5/10 0 - 3.0	TPBH5/11 0 - 3.0	BH5/11 4.2	BH5/12 7.5	BH5/12 13.5	BH5/9 2.2 - 5.2
18-Oct	19-Oct	19-Oct	20-Oct	24-Oct	24-Oct	27-Oct	28-Oct	28-Oct	09-Nov
<4.23	<0.88	<0.82	1.175	<0.84	<0.84	5.41	0.9	1.1	2.36
<4.23	1.7	2	1.5	2.14	1.62	6.97	1.29	0.913	2.9
47.4	10.08	7.7	5.79	12	7.87	31.4	21.5	6.59	8.87
227	33.3	27.1	15.4	27	27.4	60.8	3.72	<2.15	22.6
859	139	163	80.3	88.9	239	229	57.5	31.7	141

Soil (TPH) Analysis

Analyte:	Method Code:	Units:	SSAC (mg/kg)
>C8 - C10	TPHFID STD	mg/kg	42
>C10 - C12	TPHFID STD	mg/kg	218
>C12 - C16	TPHFID STD	mg/kg	2609
>C16 - C21	TPHFID STD	mg/kg	2859
>C21 - C35	TPHFID STD	mg/kg	3044

CL/0530255	CL/0529636	CL/0530764	CL/0531306	CL/0531307
BH5/9 11.2 - 14.2	BH5/13 5.9	BH5/8 8.6 - 10.2	BH5/5A 11.9 - 13.4	BH5/6 5.3 - 6.8
09-Nov	10-Nov	17-Nov	22-Nov	23-Nov
<6.9	3.09	1.73	<0.81	1.96
<6.9	3.38	1.91	1.8	2.78
<13.8	10.5	7.6	5.73	9.37
24.7	21	19	14.8	35.6
363	84	76.1	54	196

Statistical Analysis										No Occurrences greater than UCL
No samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 99%	95%
15	0.81	6.9	2.2037	1.90596	0.865	1.761	3.07044	2.624	3.495225	4
15	0.913	6.97	2.8022	1.88209	0.672	1.761	3.65811	2.624	4.07758	3
15	5.73	47.4	13.747	11.5324	0.839	1.761	18.9912	2.624	21.5615	3
15	2.15	227	37.438	54.2412	1.449	1.761	62.1052	2.624	74.19409	1
15	31.7	859	186.77	206.086	1.103	1.761	280.488	2.624	326.4188	2

Surface Water Analysis

Analyte:	Method Code:	Units:
pH units	WSLM3	
Chloride as Cl w	KONENS	mg/l
Total Sulphur as SO4 (Dissolved)	ICPWATER	mg/l
Calcium as Ca (Dissolved)	ICPWATER	mg/l
Magnesium as Mg (Dissolved)	ICPWATER	mg/l
Sodium as Na (Dissolved)	ICPWATER	mg/l
Potassium as K (Dissolved)	ICPWATER	mg/l
Nickel as Ni (Dissolved)	ICPMSW	mg/l
Chromium as Cr (Dissolved)	ICPMSW	mg/l
Cadmium as Cd (Dissolved)	ICPMSW	mg/l
Copper as Cu (Dissolved)	ICPMSW	mg/l
Lead as Pb (Dissolved)	ICPMSW	mg/l
Zinc as Zn (Dissolved)	ICPMSW	mg/l
Manganese as Mn (Dissolved)	ICPMSW	mg/l
Iron as Fe (Dissolved)	ICPWATER	mg/l
Arsenic as As (Dissolved)	ICPMSW	mg/l
Boron as B (Dissolved)	ICPWATER	mg/l
Mercury as Hg (Dissolved)	ICPMSW	mg/l
Selenium as Se (Dissolved)	ICPMSW	mg/l
Ammoniacal Nitrogen as N	KONENS	mg/l
Nitrite as N	KONENS	mg/l
Nitrate as N	KONENS	mg/l
Thiocyanate as SCN	KONENS	mg/l
Cyanide (Total) as CN	ICTSCN28	mg/l
Phosphate as P	KONENS	mg/l
Sulphide (Free) as S	ISESW24	mg/l
Chemical Oxygen Demand	WSLM11	mg/l
Biochemical Oxygen Demand	WSLM20	mg/l
GRO-HSA	GROHSA	mg/l
TPH GC	TPHFID	mg/l
Total Dissolved Solids	WSLM27	mg/l
Phenol Index as C6H5OH	SFAPI	mg/l
Phenol	SVOCSW	ug/l
bis(2-Chloroethyl)ether	SVOCSW	ug/l
2-Chlorophenol	SVOCSW	ug/l
1,3-Dichlorobenzene	SVOCSW	ug/l
1,4-Dichlorobenzene	SVOCSW	ug/l
Benzyl alcohol	SVOCSW	ug/l
1,2-Dichlorobenzene	SVOCSW	ug/l
2-Methylphenol	SVOCSW	ug/l
bis(2-Chloroisopropyl)ether	SVOCSW	ug/l
Hexachloroethane	SVOCSW	ug/l
N-Nitroso-di-n-propylamine	SVOCSW	ug/l
3- & 4-Methylphenol	SVOCSW	ug/l
Nitrobenzene	SVOCSW	ug/l
Isophorone	SVOCSW	ug/l
2-Nitrophenol	SVOCSW	ug/l
2,4-Dimethylphenol	SVOCSW	ug/l
Benzoic Acid	SVOCSW	ug/l
bis(2-Chloroethoxy)methane	SVOCSW	ug/l
2,4-Dichlorophenol	SVOCSW	ug/l
1,2,4-Trichlorobenzene	SVOCSW	ug/l
4-Chlorophenol	SVOCSW	ug/l
4-Chloroaniline	SVOCSW	ug/l
Hexachlorobutadiene	SVOCSW	ug/l
4-Chloro-3-methylphenol	SVOCSW	ug/l
2-Methylnaphthalene	SVOCSW	ug/l
1-Methylnaphthalene	SVOCSW	ug/l
Hexachlorocyclopentadiene	SVOCSW	ug/l
2,4,6-Trichlorophenol	SVOCSW	ug/l
2,4,5-Trichlorophenol	SVOCSW	ug/l
2-Chloronaphthalene	SVOCSW	ug/l
Biphenyl	SVOCSW	ug/l
Diphenyl ether	SVOCSW	ug/l
2-Nitroaniline	SVOCSW	ug/l
Dimethylphthalate	SVOCSW	ug/l
2,6-Dinitrotoluene	SVOCSW	ug/l
3-Nitroaniline	SVOCSW	ug/l
2,4-Dinitrophenol	SVOCSW	ug/l
Dibenzofuran	SVOCSW	ug/l
4-Nitrophenol	SVOCSW	ug/l
2,4-Dinitrotoluene	SVOCSW	ug/l
Diethylphthalate	SVOCSW	ug/l
4-Chlorophenyl-phenylether	SVOCSW	ug/l
4,6-Dinitro-2-methylphenol	SVOCSW	ug/l
4-Nitroaniline	SVOCSW	ug/l
N-Nitrosodiphenylamine	SVOCSW	ug/l

Guideline Value

EX/0522580	EX/0522581	EX/0522582	EX/0522583	EX/0522584	EX/0524747	EX/0524748	EX/0524749
SW1	SW2	SW3	SW5	SW6	SW7	SW8	SW9
02-Nov	02-Nov	02-Nov	02-Nov	02-Nov	29-Nov	29-Nov	29-Nov
7.7	7.5	7.4	7.8	7.7	7.5	7.4	6.7
15	13	11	9	9	26	15	11
123	21.9	14.6	12.3	12.1	100	16.3	22.4
					236	49	62.1
					17.7	6.85	5.06
					13.8	10.1	6.1
					8.12	2.24	1.54
0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001
0.004	0.003	0.002	0.004	0.004	0.007	0.003	0.002
<0.0001	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
0.004	0.002	0.002	0.002	0.002	<0.001	<0.001	0.005
0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
0.006	0.006	0.007	<0.002	0.002	0.004	0.025	0.016
0.008	0.028	0.026	0.023	0.016	0.803	0.048	0.817
0.14	0.18	0.53	0.13	0.1	0.01	0.67	<0.01
<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	<0.05
<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
0.03	0.19	0.03	0.01	0.01	9.6	0.02	0.03
<0.01	<0.01	0.02	<0.01	<0.01	0.06	0.07	<0.01
0.2	0.8	0.3	<0.2	<0.2	1.8	1.3	0.7
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<0.2	<0.2	<0.2	<0.2	<0.2	<0.05	<0.05	0.06
23	14	16	9	4	28	10	<5
<2.0	<2.0	<2.0	<2.0	<2.0	2	2	<2.0
<0.10	<0.10	<0.10	<0.10	<0.10			
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
417	199	143	259	734	755	211	232
<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.500	<0.500	<0.500
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<2.000	<2.000	<2.000	<2.000	<2.000	<2.000	<2.000	<2.000
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
0.218	0.274	0.268	<0.100	<0.100	<0.100	<0.100	<0.122
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
0.048	0.053	0.049	0.052	0.054	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.100	<0.100	<0.100	<0.100	<0.100	<0.500	<0.500	<0.500
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.200	<0.200	<0.200	<0.200	<0.200	<1.000	<1.000	<1.000
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	0.103	<0.100	<0.100
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000
<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200
<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100

Statistical Analysis

No samples	Min	Max	Mean	Std dev	CV	t	UCL 95%	t	UCL 99%	95%
8	6.7	7.8	7.4625	0.342	0.0458	1.8946	7.691584	2.998	7.824999	3
8	9	26	13.625	5.52753	0.4057	1.8946	17.32753	2.998	19.48383	1
8	12.1	123	40.325	44.5262	1.1042	1.8946	70.15019	2.998	87.51992	2
3	49	236	115.7	104.389	0.9022	2.92	291.6839	6.9646	535.4452	0
3	5.06	17.7	9.87	6.83979	0.693	2.92	21.40089	6.9646	37.37271	0
3	6.1	13.8	10	3.85097	0.3851	2.92	16.49218	6.9646	25.48472	0
3	1.54	8.12	3.9667	3.61388	0.9111	2.92	10.05914	6.9646	18.49804	0
8	0.001	0.003	0.0019	0.00064	0.3418	1.8946	0.002304	2.998	0.002554	1
8	0.002	0.007	0.0036	0.0016	0.4408	1.8946	0.004695	2.998	0.005319	1
8	0.0001	0.0007	0.0002	0.00021	1.2122	1.8946	0.000317	2.998	0.0004	0
8	0.001	0.005	0.0024	0.00141	0.5928	1.8946	0.003318	2.998	0.003867	2
8	0.001	0.001	0.001	0	0	1.8946	0.001	2.998	0.001	0
8	0.002	0.025	0.0085	0.008	0.9412	1.8946	0.013859	2.998	0.016979	2
8	0.008	0.817	0.2211	0.36366	1.6446	1.8946	0.464717	2.998	0.606581	2
8	0.01	0.67	0.2213	0.24416	1.1035	1.8946	0.364795	2.998	0.48004	2
8	0.001	0.001	0.001	0	0	1.8946	0.001	2.998	0.001	0
8	0.05	0.22	0.0713	0.0601	0.8436	1.8946	0.111151	2.998	0.134956	1
8	0.0001	0.0001	0.0001	1.4E-20	1E-16	1.8946	0.0001	2.998	0.0001	0
8	0.001	0.001	0.001	0	0	1.8946	0.001	2.998	0.001	0
8	0.01	9.6	1.24	3.37847	2.7246	1.8946	3.503019	2.998	4.820966	1
8	0.01	0.07	0.025	0.02507	1.0029	1.8946	0.041794	2.998	0.051574	2
8	0.2	1.8	0.6875	0.59627	0.8673	1.8946	1.086901	2.998	1.319506	2
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.01	0.05	0.015	0.01414	0.9428	1.8946	0.024473	2.998	0.02999	1
8	0.05	0.2	0.145	0.07597	0.5239	1.8946	0.195887	2.998	0.225523	2
8	4	28	13.625	8.46737	0.6215	1.8946	19.29674	2.998	22.59987	2
8	2	2	2	0	0	1.8946	2	2.998	2	0
5	0.1	0.1	0.1	0	0	2.1318	0.1	3.7469	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	143	755	368.75	245.046	0.6645	1.8946	532.8904	2.998	628.4833	2
8	0.05	0.05	0.05	7.4E-18	1E-16	1.8946	0.05	2.998	0.05	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.5	0.25	0.20702	0.8281	1.8946	0.388669	2.998	0.469428	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.1	0.2	0.1375	0.05175	0.3764	1.8946	0.172167	2.998	0.192357	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	2	2	2	0	0	1.8946	2	2.998	2	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.1	0.274	0.1603	0.07916	0.494	1.8946	0.213276	2.998	0.244158	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.04	0.054	0.047	0.00612	0.1302	1.8946	0.051098	2.998	0.053485	3
8	0.04	0.04	0.04	0	0	1.8946	0.04	2.998	0.04	0
8	0.1	0.5	0.25	0.20702	0.8281	1.8946	0.388669	2.998	0.469428	3
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.4	0.4	0.4	5.9E-17	1E-16	1.8946	0.4	2.998	0.4	0
8	0.04	0.04	0.04	0	0	1.8946	0.04	2.998	0.04	0
8	0.04	0.04	0.04	0	0	1.8946	0.04	2.998	0.04	0
8	0.1	0.2	0.1375	0.05175	0.3764	1.8946	0.172167	2.998	0.192357	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.2	0.1375	0.05175	0.3764	1.8946	0.172167	2.998	0.192357	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.2	1	0.5	0.41404	0.8281	1.8946	0.777338	2.998	0.938855	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	1	1	1	0	0	1.8946	1	2.998	1	0
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	0.1	0.103	0.1004	0.00106	0.0106	1.8946	0.101085	2.998	0.101499	1
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0
8	1	1	1	0	0	1.8946	1	2.998	1	0
8	0.1	0.2	0.1375	0.05175	0.3764	1.8946	0.172167	2.998	0.192357	3
8	0.1	0.1	0.1	1.5E-17	1E-16	1.8946	0.1	2.998	0.1	0

Analyte:	Method Code:	Units:
4-Bromophenyl-phenylether	SVOCSW	ug/l
Hexachlorobenzene	SVOCSW	ug/l
Pentachlorophenol	SVOCSW	ug/l
Di-n-butylphthalate	SVOCSW	ug/l
Butylbenzylphthalate	SVOCSW	ug/l
3,3'-Dichlorobenzidine	SVOCSW	ug/l
bis(2-Ethylhexyl)phthalate	SVOCSW	ug/l
Di-n-octylphthalate	SVOCSW	ug/l
>C8 - C10	TPHFD STD	mg/l
>C10 - C12	TPHFD STD	mg/l
>C12 - C16	TPHFD STD	mg/l
>C16 - C21	TPHFD STD	mg/l
>C21 - C35	TPHFD STD	mg/l
Dichlorodifluoromethane	VOCSW	ug/l
Chloromethane	VOCSW	ug/l
Vinyl Chloride	VOCSW	ug/l
Bromomethane	VOCSW	ug/l
Chloroethane	VOCSW	ug/l
Trichlorofluoromethane	VOCSW	ug/l
1,1-Dichloroethene	VOCSW	ug/l
trans 1,2-Dichloroethene	VOCSW	ug/l
1,1-Dichloroethane	VOCSW	ug/l
2,2-Dichloropropane	VOCSW	ug/l
cis 1,2-Dichloroethene	VOCSW	ug/l
Bromochloromethane	VOCSW	ug/l
Chloroform	VOCSW	ug/l
1,1,1-Trichloroethane	VOCSW	ug/l
Carbon Tetrachloride	VOCSW	ug/l
1,1-Dichloropropene	VOCSW	ug/l
Benzene	VOCSW	ug/l
1,2-Dichloroethane	VOCSW	ug/l
Trichloroethene	VOCSW	ug/l
1,2-Dichloropropane	VOCSW	ug/l
Dibromomethane	VOCSW	ug/l
Bromodichloromethane	VOCSW	ug/l
cis 1,3-Dichloropropene	VOCSW	ug/l
Toluene	VOCSW	ug/l
trans 1,3-Dichloropropene	VOCSW	ug/l
1,1,2-Trichloroethane	VOCSW	ug/l
Tetrachloroethene	VOCSW	ug/l
1,3-Dichloropropane	VOCSW	ug/l
Dibromochloromethane	VOCSW	ug/l
1,2-Dibromoethane	VOCSW	ug/l
Chlorobenzene	VOCSW	ug/l
Ethylbenzene	VOCSW	ug/l
1,1,1,2-Tetrachloroethane	VOCSW	ug/l
m and p-Xylene	VOCSW	ug/l
o-Xylene	VOCSW	ug/l
Styrene	VOCSW	ug/l
Bromoform	VOCSW	ug/l
iso-Propylbenzene	VOCSW	ug/l
1,1,2,2-Tetrachloroethane	VOCSW	ug/l
Propylbenzene	VOCSW	ug/l
Bromobenzene	VOCSW	ug/l
1,2,3-Trichloropropane	VOCSW	ug/l
2-Chlorotoluene	VOCSW	ug/l
1,3,5-Trimethylbenzene	VOCSW	ug/l
4-Chlorotoluene	VOCSW	ug/l
tert-Butylbenzene	VOCSW	ug/l
1,2,4-Trimethylbenzene	VOCSW	ug/l
sec-Butylbenzene	VOCSW	ug/l
p-Isopropyltoluene	VOCSW	ug/l
1,3-Dichlorobenzene	VOCSW	ug/l
1,4-Dichlorobenzene	VOCSW	ug/l
n-Butylbenzene	VOCSW	ug/l
1,2-Dichlorobenzene	VOCSW	ug/l
1,2-Dibromo-3-chloropropane	VOCSW	ug/l
1,2,4-Trichlorobenzene	VOCSW	ug/l
Hexachlorobutadiene	VOCSW	ug/l
Naphthalene	VOCSW	ug/l
1,2,3-Trichlorobenzene	VOCSW	ug/l

Guideline Value	EX/0522580	EX/0522581	EX/0522582	EX/0522583	EX/0522584	EX/0524747	EX/0524748	EX/0524749
	SW1 02-Nov	SW2 02-Nov	SW3 02-Nov	SW5 02-Nov	SW6 02-Nov	SW7 29-Nov	SW8 29-Nov	SW9 29-Nov
0.03(EQS) 2(EQS)	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000	<1.000
	0.434	0.57	0.555	0.498	0.469	0.384	0.319	0.508
	<0.100	<0.100	<0.100	<0.100	<0.100	<0.200	<0.200	<0.200
	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
	0.657	1.783	2.395	0.62	1.135	0.562	0.445	1.569
	<0.040	<0.040	<0.040	<0.040	<0.040	<0.400	<0.400	<0.400
	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
	<0.007	<0.007	<0.007	<0.007	<0.007	0.019	<0.007	<0.007
	<0.014	<0.014	<0.014	<0.014	<0.014	0.018	<0.014	<0.014
	<0.017	<0.017	<0.017	<0.017	<0.017	0.026	<0.017	<0.017
<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	
30(WHO)	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	2	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<5	<5	<5	<5	<5	<5	<5	<5
	<5	<5	<5	<5	<5	<5	<5	<5
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
12(EQS) 2000(EQS) 12(EQS)	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
30(EQS) 10(EQS) 10(EQS) 20(EQS)	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
20(WHO) 50(EQS) 20(EQS) 400(EQS) 10(EQS)	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
10(EQS) 30(EQS) 50(EQS)	<10	<10	<10	<10	<10	<5	<5	<5
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
300(WHO) 1000(WHO)	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1	<1	<1	<1
0.1(EQS) 10(EQS)	<5	<5	<5	<5	<5	<5	<5	<5
	<5	<5	<5	<5	<5	<5	<5	<5
	<5	<5	<5	<5	<5	<5	<5	<5

[illegible]

Surface Water (PAH) Analysis

Analyte:	Method Code:	Units:
Naphthalene	SVOC	ug/l
Acenaphthylene	SVOC	ug/l
Acenaphthene	SVOC	ug/l
Fluorene	SVOC	ug/l
Phenanthrene	SVOC	ug/l
Anthracene	SVOC	ug/l
Fluoranthene	SVOC	ug/l
Pyrene	SVOC	ug/l
Benzo[a]anthracene	SVOC	ug/l
Chrysene	SVOC	ug/l
Benzo[b]fluoranthene	SVOC	ug/l
Benzo[k]fluoranthene	SVOC	ug/l
Benzo[a]pyrene	SVOC	ug/l
Indeno[1,2,3-cd]pyrene	SVOC	ug/l
Dibenzo[a,h]anthracene	SVOC	ug/l
Benzo[g,h,i]perylene	SVOC	ug/l
Total PAH		ug/l

Guideline Value

10(EQS)

0.01(UKD)

0.2(UKD)

EX/0522580	EX/0522581	EX/0522582	EX/0522583	EX/0522584	EX/0524747	EX/0524748	EX/0524749
SW1	SW2	SW3	SW5	SW6	SW7	SW8	SW9
02-Nov	02-Nov	02-Nov	02-Nov	02-Nov	29-Nov	29-Nov	29-Nov
0.222	0.264	0.277	0.23	0.245	0.078	0.103	0.109
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
0.059	0.069	0.06	0.074	0.091	0.054	0.043	0.07
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
0.045	<0.040	<0.040	0.051	0.076	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	0.043	0.063	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
0.846	0.893	0.897	0.878	0.955	0.732	0.746	0.779

Statistical Analysis									
No samples	Min	Max	Mean	Std dev	CV	t	UCL 95%	t	UCL 99%
8	0.078	0.277	0.191	0.0805	0.4215	1.895	0.244921	2.998	0.276323
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.043	0.091	0.065	0.0145	0.2225	1.895	0.074687	2.998	0.080329
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.076	0.0465	0.0126	0.2701	1.895	0.054912	2.998	0.059811
8	0.04	0.063	0.04325	0.008	0.1861	1.895	0.048641	2.998	0.051781
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.08	0.055	0.0207	0.3764	1.895	0.068867	2.998	0.076943
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.04	0.04	0.04	0	0	1.895	0.04	2.998	0.04
8	0.732	0.955	0.84075	0.0802	0.0953	1.895	0.894444	2.998	0.925715

No. Occurrences
greater than UCL
95%

3
0
0
0
1
0
1
1
0
0
3
0
0
0
0
0
2

Analyte:	Method Code:	Units:
pH units	WSLM3	
Chloride as Cl w	KONENS	mg/l
Total Sulphur as SO ₄ (Dissolved)	ICPWATER	mg/l
Calcium as Ca (Dissolved)	ICPWATER	mg/l
Magnesium as Mg (Dissolved)	ICPWATER	mg/l
Sodium as Na (Dissolved)	ICPWATER	mg/l
Potassium as K (Dissolved)	ICPWATER	mg/l
Nickel as Ni (Dissolved)	ICPMSW	mg/l
Chromium as Cr (Dissolved)	ICPMSW	mg/l
Cadmium as Cd (Dissolved)	ICPMSW	mg/l
Copper as Cu (Dissolved)	ICPMSW	mg/l
Lead as Pb (Dissolved)	ICPMSW	mg/l
Zinc as Zn (Dissolved)	ICPMSW	mg/l
Manganese as Mn (Dissolved)	ICPMSW	mg/l
Iron as Fe (Dissolved)	ICPWATER	mg/l
Arsenic as As (Dissolved)	ICPMSW	mg/l
Boron as B (Dissolved)	ICPWATER	mg/l
Mercury as Hg (Dissolved)	ICPMSW	mg/l
Selenium as Se (Dissolved)	ICPMSW	mg/l
Ammoniacal Nitrogen as N	KONENS	mg/l
Nitrite as N	KONENS	mg/l
Nitrate as N	KONENS	mg/l
Thiocyanate as SCN	KONENS	mg/l
Cyanide (Total) as CN	ICTSCN28	mg/l
Phosphate as P	KONENS	mg/l
Sulphide (Free) as S	ISESW24	mg/l
Chemical Oxygen Demand	WSLM11	mg/l
Biochemical Oxygen Demand	WSLM20	mg/l
TPH GC	TPHFD	mg/l
Total Dissolved Solids	WSLM27	mg/l
Phenol Index as C6H5OH	SFAP1	mg/l

0.05(-2.0(EQS))
0.2(EQS)
0.005(EQS)
0.01(EQS)
0.125(EQS)
0.25(EQS)
0.05(UKD)

1(EQS)
0.05(EQS)
2(EQS)
0.001(EQS)
0.01(UKD)
0.25(EQS)
0.5(UKD)
50(UKD)

0.05(UKD)

0.0025(EQS)

0.03(EQS)

[illegible]

Groundwater Analysis

Analyte:	Method Code:	Units:	Guideline Value
pH units	WSLM3		
Chloride as Cl w	KONENS	mg/l	250(EQS)
Total Sulphur as SO4 (Dissolved)	ICPWATER	mg/l	250(UKD)
Calcium as Ca (Dissolved)	ICPWATER	mg/l	250(UKD)
Magnesium as Mg (Dissolved)	ICPWATER	mg/l	50(UKD)
Sodium as Na (Dissolved)	ICPWATER	mg/l	170(EQS)
Potassium as K (Dissolved)	ICPWATER	mg/l	12(UKD)
Nickel as Ni (Dissolved)	ICPMSW	mg/l	0.05 - 2.0(EQS)
Chromium as Cr (Dissolved)	ICPMSW	mg/l	0.2(EQS)
Cadmium as Cd (Dissolved)	ICPMSW	mg/l	0.005(EQS)
Copper as Cu (Dissolved)	ICPMSW	mg/l	0.01(EQS)
Lead as Pb (Dissolved)	ICPMSW	mg/l	0.125(EQS)
Zinc as Zn (Dissolved)	ICPMSW	mg/l	0.25(EQS)
Manganese as Mn (Dissolved)	ICPMSW	mg/l	0.05(UKD)
Iron as Fe (Dissolved)	ICPWATER	mg/l	1(EQS)
Arsenic as As (Dissolved)	ICPMSW	mg/l	0.05(EQS)
Boron as B (Dissolved)	ICPWATER	mg/l	2(EQS)
Mercury as Hg (Dissolved)	ICPMSW	mg/l	0.001(EQS)
Selenium as Se (Dissolved)	ICPMSW	mg/l	0.01(UKD)
Ammoniacal Nitrogen as N	KONENS	mg/l	0.25(EQS)
Nitrite as N	KONENS	mg/l	0.5(UKD)
Nitrate as N	KONENS	mg/l	50(UKD)
Thiocyanate as SCN	KONENS	mg/l	
Cyanide (Total) as CN	ICTSCN28	mg/l	0.05(UKD)
Phosphate as P	KONENS	mg/l	
Sulphide (Free) as S	ISESW24	mg/l	0.0025(EQS)
Chemical Oxygen Demand	WSLM11	mg/l	
Biochemical Oxygen Demand	WSLM20	mg/l	
TPH GC	TPHFID	mg/l	
Total Dissolved Solids	WSLM27	mg/l	
Phenol Index as C6H5OH	SFAP1	mg/l	0.03(EQS)

EX/0524919	EX/0525282	EX/0525283	EX/0525284			
BH5/6	BH5/8	BH17(East)	BH17(West)	BH15	BH17	BH22A
01-Dec	05-Dec	05-Dec	05-Dec	May-04	May-04	May-04
7.5	7.5	7.6	7.6	6.7	7.3	7.2
110	71	34	13	45	43	62
181	39.6	71.3	119	20.7	71.3	6.82
136	144	131	114			
23.3	27.4	22.3	10.3			
110	62.2	30.1	15.7			
20.8	25.1	15.8	5.86			
0.005	0.005	0.011	0.015	0.012	0.006	0.028
0.004	0.005	0.004	0.003	0.012	0.001	0.018
<0.0001	<0.0001	<0.0001	<0.0001	0.001	0.001	0.001
0.003	<0.001	0.002	0.004			
<0.001	<0.001	0.001	0.001	0.001	0.001	0.001
0.017	0.01	0.006	0.025	0.225	0.01	0.018
0.118	0.741	0.583	0.153			
0.05	0.03	0.12	<0.01			
0.005	0.006	0.004	0.001	0.002	0.009	0.003
0.27	0.31	0.22	0.1	0.05	0.22	0.15
<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0001
0.002	0.002	0.002	0.001	0.001	0.001	0.003
3.6	5.8	2.8	0.08			
<0.01	<0.01	<0.01	<0.01			
<0.2	<0.2	<0.2	0.3			
0.1	0.1	<0.1	<0.1			
<0.1	<0.1	<0.1	<0.1	0.03	0.03	0.03
0.03	0.08	0.01	0.05			
5.09	8.43	0.47	<0.05			
114	62	61	39	47	69	220
15	4	3	<2.0	3	3	32
1.5	0.4	0.2	0.1			
968	1070	701	759			
<0.05	<0.05	<0.05	<0.05			

Statistical Analysis									
No samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 99%
23	6.7	8	7.387	0.27519	0.0373	1.717	7.485489	2.508	7.530889
23	13	237	76.522	62.3749	0.8151	1.717	98.85502	2.508	109.1452
23	3.77	161	71.346	54.2436	0.7603	1.717	90.76797	2.508	99.71666
12	82.3	213	143.44	36.1111	0.2517	1.796	162.1627	2.718	171.776
12	10.3	45.6	26.167	10.539	0.4028	1.796	31.63035	2.718	34.43598
12	13.4	170	77.358	54.2778	0.7016	1.796	105.4974	2.718	119.947
12	5.81	41.1	18.431	9.48721	0.5147	1.796	23.34926	2.718	25.87489
23	0.001	0.028	0.0078	0.00566	0.7278	1.717	0.009811	2.508	0.010745
19	0.001	0.018	0.0047	0.0047	0.9923	1.734	0.006607	2.552	0.007489
23	0.0001	0.001	0.0002	0.0003	1.2496	1.717	0.000352	2.508	0.000403
20	0.001	0.014	0.0037	0.00296	0.7994	1.729	0.004844	2.539	0.005379
23	0.001	0.006	0.0012	0.00104	0.8564	1.717	0.001591	2.508	0.001763
23	0.002	0.225	0.0294	0.04572	1.5554	1.717	0.04576	2.508	0.053302
20	0.025	2.69	0.939	0.80792	0.8604	1.729	1.251379	2.539	1.397774
20	0.01	0.6	0.106	0.14587	1.3761	1.729	0.1624	2.539	0.188831
23	0.001	0.021	0.0049	0.00412	0.839	1.717	0.006389	2.508	0.007069
19	0.05	0.45	0.1753	0.11534	0.6581	1.734	0.221149	2.552	0.242803
23	0.0001	0.0004	0.0001	6.5E-05	0.554	1.717	0.000141	2.508	0.000151
23	0.001	0.005	0.0026	0.00134	0.5234	1.717	0.003046	2.508	0.003267
20	0.01	17.3	5.3995	4.43944	0.8222	1.729	7.115992	2.539	7.920419
20	0.01	0.14	0.0195	0.03052	1.565	1.729	0.031299	2.539	0.036829
20	0.2	0.3	0.205	0.02236	0.1091	1.729	0.213646	2.539	0.217697
16	0.1	0.2	0.1188	0.04031	0.3395	1.753	0.136417	2.602	0.144977
23	0.03	0.1	0.0909	0.0241	0.2653	1.717	0.0995	2.508	0.103477
20	0.01	0.16	0.04	0.03798	0.9494	1.729	0.054683	2.539	0.061564
16	0.05	8.43	3.0825	2.85105	0.9249	1.753	4.33201	2.602	4.937452
23	6	410	97.913	88.9371	0.9083	1.717	129.7569	2.508	144.4291
23	2	32	4.5	6.57647	1.4614	1.717	6.854702	2.508	7.939639
19	0.1	1.5	0.3105	0.31954	1.029	1.734	0.437646	2.552	0.497634
16	494	1330	860.5	242.461	0.2818	1.753	966.7615	2.602	1018.25
15	0.05	0.05	0.05	7.2E-18	1E-16	1.761	0.05	2.624	0.05

No Occurrences
greater than UCL
95%

9
5
8
4
4
4
3
7
4
3
4
1
2

4
4
4
5
2
7
5
2
1
3
20
5
7
4
2
3
6
0

Groundwater (PAH) Analysis

Analyte:	Method Code:	Units:
Naphthalene	SVOCSW	ug/l
Acenaphthylene	SVOCSW	ug/l
Acenaphthene	SVOCSW	ug/l
Fluorene	SVOCSW	ug/l
Phenanthrene	SVOCSW	ug/l
Anthracene	SVOCSW	ug/l
Fluoranthene	SVOCSW	ug/l
Pyrene	SVOCSW	ug/l
Benzo[a]anthracene	SVOCSW	ug/l
Chrysene	SVOCSW	ug/l
Benzo[b]fluoranthene	SVOCSW	ug/l
Benzo[k]fluoranthene	SVOCSW	ug/l
Benzo[a]pyrene	SVOCSW	ug/l
Indeno[1,2,3-cd]pyrene	SVOCSW	ug/l
Dibenzo[a,h]anthracene	SVOCSW	ug/l
Benzo[g,h,i]perylene	SVOCSW	ug/l
Total PAH		ug/l

Guideline Values
10(EQS)

0.01(UKD)

0.1(UKD)

EX/0519952	EX/0519953	EX/0519954	EX/0519955	EX/0523846	EX/0524343	EX/0524344	EX/0524345	EX/0524810	EX/0524811	EX/0524812	EX/0524813	EX/0524916	EX/0524917
BH15	BH17	BH17A	BH20	BH5/3	BH5/11	BH5/14	BH5/12	BH15	BH23B (East)	BH23B (West)	BH22A	BH5/5A	BH5/1
22-Sep	22-Sep	22-Sep	22-Sep	16-Nov	22-Nov	22-Nov	22-Nov	30-Nov	30-Nov	30-Nov	30-Nov	01-Dec	01-Dec
<0.50	<0.50	<0.50	<0.50	0.04	0.372	0.71	2.373	<0.040	0.092	0.207	0.127	0.231	0.082
<1.00	<1.00	<1.00	<1.00	<0.040	<0.040	0.05	0.044	<0.040	<0.040	0.09	<0.040	<0.040	<0.040
0.23	0.99	<0.05	<0.05	<0.040	0.264	0.291	0.529	<0.040	0.042	0.173	0.109	0.175	<0.040
<0.05	0.25	<0.05	<0.05	<0.040	0.145	0.297	0.355	<0.040	<0.040	0.172	0.077	0.127	0.046
<0.05	0.07	<0.05	<0.05	<0.040	0.192	0.965	0.692	<0.040	0.119	0.564	0.149	0.411	0.198
<0.05	<0.05	<0.05	<0.05	<0.040	0.056	0.253	0.278	<0.040	0.043	0.344	0.042	0.124	<0.040
<0.05	0.22	<0.05	<0.05	<0.040	0.053	0.792	0.551	0.061	0.115	0.441	0.185	0.498	0.051
<0.05	0.1	<0.05	<0.05	<0.040	0.062	0.597	0.451	0.056	0.1	0.363	0.14	0.461	0.083
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.457	0.302	<0.040	0.235	0.404	0.261	0.33	<0.040
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.544	0.365	<0.040	0.078	0.257	0.11	0.383	0.1
<0.05	<0.05	<0.05	<0.05	<0.080	<0.080	0.51	0.358	<0.080	<0.080	0.332	0.086	0.468	<0.080
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.255	0.168	<0.040	0.06	0.126	0.084	0.169	<0.040
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.348	0.277	<0.040	0.046	0.204	0.071	0.289	<0.040
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.256	0.21	<0.040	0.059	0.198	0.085	0.26	<0.040
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.065	0.062	<0.040	<0.040	0.041	<0.040	0.058	<0.040
<0.05	<0.05	<0.05	<0.05	<0.040	<0.040	0.219	0.204	<0.040	0.048	0.162	0.069	0.23	<0.040
2.38	3.58	2.2	2.2	0.68	1.544	6.609	7.219	0.717	1.237	4.078	1.675	4.254	1

Groundwater (PAH) Analysis

Analyte:	Method Code:	Units:
Naphthalene	SVOC SW	ug/l
Acenaphthylene	SVOC SW	ug/l
Acenaphthene	SVOC SW	ug/l
Fluorene	SVOC SW	ug/l
Phenanthrene	SVOC SW	ug/l
Anthracene	SVOC SW	ug/l
Fluoranthene	SVOC SW	ug/l
Pyrene	SVOC SW	ug/l
Benzo[a]anthracene	SVOC SW	ug/l
Chrysene	SVOC SW	ug/l
Benzo[b]fluoranthene	SVOC SW	ug/l
Benzo[k]fluoranthene	SVOC SW	ug/l
Benzo[a]pyrene	SVOC SW	ug/l
Indeno[1,2,3-cd]pyrene	SVOC SW	ug/l
Dibenzo[a,h]anthracene	SVOC SW	ug/l
Benzo[g,h,i]perylene	SVOC SW	ug/l
Total PAH		ug/l

Guideline Values
10(EQS)

0 01(UKD)

0 1(UKD)

EX/0524918	EX/0524919	EX/0525282	EX/0525283	EX/0525284
BH5/10	BH5/6	BH5/8	BH17(East)	BH17(West)
01-Dec	01-Dec	05-Dec	05-Dec	05-Dec
0.467	1.615	0.458	0.085	0.102
<0.050	0.073	0.07	<0.040	<0.040
0.212	1.337	2.307	0.483	<0.040
0.174	0.857	1.265	0.088	<0.040
0.569	1.89	1.032	0.112	0.075
0.132	0.425	0.219	0.057	<0.040
0.601	1.656	0.38	0.14	0.041
0.741	0.689	0.393	0.103	0.053
0.459	0.443	0.148	0.048	<0.040
0.484	0.52	0.173	0.047	<0.040
0.645	1.058	0.212	<0.080	<0.080
0.222	0.419	0.111	<0.040	<0.040
0.424	0.708	0.159	<0.040	<0.040
0.386	0.639	0.137	0.041	<0.040
0.093	0.195	<0.040	<0.040	<0.040
0.395	0.595	0.134	0.044	<0.040
6.054	13.119	7.238	1.488	0.791

Statistical Analysis									
No samples	Min	Max	Mean	Std dev	CV	t	UCL 95%	t	UCL 99%
19	0.040	2.373	0.474	0.587	1.24	1.734	0.707	2.552	0.82
19	0.040	1.000	0.249	0.399	1.60	1.734	0.408	2.552	0.48
19	0.040	2.307	0.390	0.580	1.49	1.734	0.620	2.552	0.73
19	0.040	1.265	0.219	0.319	1.45	1.734	0.346	2.552	0.41
19	0.040	1.890	0.383	0.484	1.27	1.734	0.575	2.552	0.67
19	0.040	0.425	0.123	0.120	0.98	1.734	0.171	2.552	0.19
19	0.040	1.656	0.314	0.400	1.27	1.734	0.474	2.552	0.55
19	0.040	0.741	0.241	0.242	1.00	1.734	0.337	2.552	0.38
19	0.040	0.459	0.184	0.167	0.91	1.734	0.250	2.552	0.28
19	0.040	0.544	0.180	0.184	1.02	1.734	0.253	2.552	0.29
19	0.050	1.058	0.233	0.272	1.17	1.734	0.341	2.552	0.39
19	0.040	0.419	0.108	0.101	0.93	1.734	0.148	2.552	0.17
19	0.040	0.708	0.156	0.182	1.16	1.734	0.228	2.552	0.26
19	0.040	0.639	0.141	0.158	1.12	1.734	0.203	2.552	0.23
19	0.040	0.195	0.057	0.036	0.64	1.734	0.071	2.552	0.08
19	0.040	0.595	0.132	0.148	1.13	1.734	0.190	2.552	0.22
19	0.7	13.1	3.6	3.2	0.90	1.734	4.9	2.552	5.47

No Occurrences
greater than UCL
95%

3
4
3
3
4
5
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5
5
5
2
5
5

Analyte:	Method Code:	Units:
Dichlorodifluoromethane	VOC5W	ug/l
Chloromethane	VOC5W	ug/l
Vinyl Chloride	VOC5W	ug/l
Bromomethane	VOC5W	ug/l
Chloroethane	VOC5W	ug/l
Trichlorofluoromethane	VOC5W	ug/l
1,1-Dichloroethene	VOC5W	ug/l
trans 1,2-Dichloroethene	VOC5W	ug/l
1,1-Dichloroethane	VOC5W	ug/l
2,2-Dichloropropane	VOC5W	ug/l
cis 1,2-Dichloroethene	VOC5W	ug/l
Bromochloromethane	VOC5W	ug/l
Chloroform	VOC5W	ug/l
1,1,1-Trichloroethane	VOC5W	ug/l
Carbon Tetrachloride	VOC5W	ug/l
1,1-Dichloropropene	VOC5W	ug/l
Benzene	VOC5W	ug/l
1,2-Dichloroethane	VOC5W	ug/l
Trichloroethene	VOC5W	ug/l
1,2-Dichloropropane	VOC5W	ug/l
Dibromomethane	VOC5W	ug/l
Bromodichloromethane	VOC5W	ug/l
cis 1,3-Dichloropropene	VOC5W	ug/l
Toluene	VOC5W	ug/l
trans 1,3-Dichloropropene	VOC5W	ug/l
1,1,1-Trichloroethane	VOC5W	ug/l
Tetrachloroethane	VOC5W	ug/l
1,3-Dichloropropane	VOC5W	ug/l
Dibromochloromethane	VOC5W	ug/l
1,2-Dibromoethane	VOC5W	ug/l
Chlorobenzene	VOC5W	ug/l
Ethylbenzene	VOC5W	ug/l
1,1,2-Tetrachloroethane	VOC5W	ug/l
m and p-Xylene	VOC5W	ug/l
o-Xylene	VOC5W	ug/l
Styrene	VOC5W	ug/l
Bromoforn	VOC5W	ug/l
iso-Propylbenzene	VOC5W	ug/l
1,1,2,2-Tetrachloroethane	VOC5W	ug/l
Propylbenzene	VOC5W	ug/l
Bromobenzene	VOC5W	ug/l
1,2,3-Trichloropropane	VOC5W	ug/l
2-Chloroethanol	VOC5W	ug/l
1,3,5-Trimethylbenzene	VOC5W	ug/l
4-Chlorobenzene	VOC5W	ug/l
tert-Butylbenzene	VOC5W	ug/l
1,2,4-Trimethylbenzene	VOC5W	ug/l
sec-Butylbenzene	VOC5W	ug/l
p-isopropyltoluene	VOC5W	ug/l
1,3-Dichlorobenzene	VOC5W	ug/l
1,4-Dichlorobenzene	VOC5W	ug/l
n-Butylbenzene	VOC5W	ug/l
1-Dichlorobenzene	VOC5W	ug/l
1,2-Dibromo-3-chloropropane	VOC5W	ug/l
1,2,4-Trichlorobenzene	VOC5W	ug/l
Hexachlorobutadiene	VOC5W	ug/l
Naphthalene	VOC5W	ug/l
1,2,3-Trichlorobenzene	VOC5W	ug/l

[illegible][illegible]

Groundwater (TPH) Analysis

			EX/0523846	EX/0524343	EX/0524344	EX/0524345	EX/0524810	EX/0524811	EX/0524812	EX/0524813	EX/0524916	EX/0524917	EX/0524918	EX/0524919	EX/0525282	EX/0525283	EX/0525284
			BH5/3	BH5/11	BH5/14	BH5/12	BH15	BH23B (East)	BH23B (West)	BH22A	BH5/5A	BH5/1	BH5/10	BH5/6	BH5/8	BH17(East)	BH17(West)
Analyte:	Method Code:	Units:	16-Nov	22-Nov	22-Nov	22-Nov	30-Nov	30-Nov	30-Nov	30-Nov	01-Dec	01-Dec	01-Dec	01-Dec	05-Dec	05-Dec	05-Dec
>C8 - C10	TPHFID STD	mg/l	0.009	0.008	0.01	0.018	<0.007	<0.008	<0.008	<0.007	<0.007	<0.007	0.01	0.025	<0.007	<0.007	<0.007
>C10 - C12	TPHFID STD	mg/l	0.013	0.029	0.013	0.027	<0.007	<0.008	0.023	<0.007	0.016	<0.007	0.017	0.283	0.019	0.008	<0.007
>C12 - C16	TPHFID STD	mg/l	0.03	0.041	0.025	0.066	<0.014	<0.016	0.053	0.019	0.022	<0.014	0.034	0.26	0.065	0.02	<0.014
>C16 - C21	TPHFID STD	mg/l	0.047	0.07	0.035	0.098	0.017	0.032	0.123	0.033	0.042	<0.017	0.053	0.141	0.13	0.05	0.028
>C21 - C35	TPHFID STD	mg/l	0.125	0.12	0.097	0.194	<0.048	0.079	0.253	0.093	0.381	<0.048	0.125	0.809	0.212	0.09	0.073
Total		mg/l	0.224	0.288	0.18	0.403	0.017	0.111	0.482	0.145	0.481	0	0.252	1.528	0.425	0.168	0.101

Statistical Analysis													No. Occurrences greater than UCL 95%			
No samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 95%							
15	0.007	0.025	0.01	0.005077	0.5217	1.761	0.01204	2.6245	0.013174				2			
15	0.007	0.293	0.033	0.072332	2.1963	1.761	0.06583	2.6245	0.081949				1			
15	0.014	0.26	0.046	0.081774	1.3371	1.761	0.07428	2.6245	0.089061				1			
15	0.017	0.141	0.062	0.04174	0.6761	1.761	0.08072	2.6245	0.090018				4			
15	0.048	0.809	0.183	0.194718	1.0621	1.761	0.27188	2.6245	0.315282				2			

WAC Soil Analysis																	
		Location	TP5/1 0 - 6	TP5/4 0 - 3	TP5/8 3 - 6	TPBH5/4 0 - 3	TPBH5/6 3 - 6	TPBH5/7 3 - 4.5	TPBH5/10 0 - 3	TPBH5/12 3 - 4.5	TPBH5/13 3 - 5.9	BH 5/2 5.8 - 7	BH 5/5A 11.9 - 13.4	BH5/8 8.6 - 10.2	BH5/9 2.2 - 5.2	BH5/11 4.2	BH5/12 13.5
Analyte:	Method Code:	Units:															
Total Organic Carbon		%	2.38	1.5	3.65	1.06	3.67	1.53	1.49	0.61	2.62	1.49	2.56	1.91	1.23	2.34	0.62
Loss on Ignition			5.3	3.6	7.4	2.9	9.5	4.2	6.7	6.1	4.5	3.5	5.3	3.7	2.8	5.1	2.3
BTEX		mg/kg	<0.154	<0.06	<0.15	<1.53	<0.065	<1.25	<0.154	<0.159	<0.061	<0.155	<0.146	<0.159	<0.061	<0.151	<0.05
PCB		mg/kg	<0.035	<0.04	<0.042	<0.035	<0.035	<0.035	<0.042	<0.035	<0.036	<0.035	<0.035	<0.039	<0.035	<0.073	<0.035
Mineral Oil		mg/kg	1240	54	219	647	1050	33	139	965	312	119	82	130	200	392	105
PAH		mg/kg	22.54	1.73	7.35	64.18	<41.2	0.212	7.21	54.4	5.33	<5.065	<1.25	<28.4	<4.275	<5.1	<6.4
pH			8.2	8.5	9.4	9.1	8.8	8.8		8.4	8.8	8.3	8.7	8.7	8.5	9.2	7.3
Acid Neutralisation Capacity			29.9	9.23	19.9	72.1	7.19	3.2	18.6	3.73	24.4	13.52	25.9	40	44.4	35.8	4.8

WAC Soil Analysis			
		Location	BH5/14 9 - 12
Analyte:	Method Code:	Units:	
Total Organic Carbon		%	2.57
Loss on Ignition			5.4
BTEX		mg/kg	<0.154
PCB		mg/kg	<0.035
Mineral Oil		mg/kg	106
PAH		mg/kg	2.8
pH			8.7
Acid Neutralisation Capacity			14.09

Statistical Analysis

Inert	Non-hazardous	Hazardous	No. samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 99%	No. Occurrences greater than UCL95	No. Occurrences greater than Inert Limit	No. Occurrences greater than Non-hazardous Limit	No. Occurrences greater than Hazardous Limit
3	5	6	16	0.61	3.67	1.95	0.93	0.48	1.753	2.354	2.602	2.55	6	2	0	0
		10	16	2.30	9.50	4.89	1.89	0.39	1.753	5.722	2.602	6.12	4	0	0	0
			16	0.05	1.53	0.28	0.44	1.58	1.753	0.471	2.602	0.56	2	0	0	0
6			16	0.04	0.07	0.04	0.01	0.24	1.753	0.043	2.602	0.04	1	0	0	0
1		1000	16	33.00	1240.00	358.38	393.62	1.10	1.753	530.883	2.602	614.470	4	4	0	2
500			16	0.21	64.18	15.98	20.40	1.28	1.753	24.9	2.602	29.26	4	0	0	0
100			15	7.30	9.40	8.63	0.49	0.06	1.761	8.85	2.624	8.96	3	0	0	0
			16	3.20	72.10	22.92	18.46	0.81	1.753	31.0	2.602	34.93	4	0	0	0

WAC Leachate Analysis

		Location	TP5/1 0 - 6	TP5/4 0 - 3	TP5/8 3 - 6	TPBH5/4 0 - 3	TPBH5/6 3 - 6	TPBH5/7 3 - 4.5	TPBH5/10 0 - 3	TPBH5/12 3 - 4.5	TPBH5/13 3 - 5.9	BH 5/2 5.8 - 7	BH 5/5A 11.9 - 13.4	BH5/8 8.6 - 10.2	BH5/9 2.2 - 5.2	BH5/11 4.2	BH5/12 13.5
Analyte:	Method Code:	Units:															
Chloride as Cl w	KONENS	mg/kg	36	59	113	43	76	63	112	39	29	104	42	79	39	59	184
Total Sulphur as SO4 (Dissolved)	ICPWATER	mg/kg	593.0	339.0	678.5	596.0	733.0	56.0	518.0	1089.0	482.6	356.1	1335	409	152	430.3	86.5
Nickel as Ni (Dissolved)	ICPMSW	mg/kg	0.02	0.01	0.04	0.05	0.02	0.04	0.05	0.02	0.01	0.01	<0.01	<0.01	0.01	0.02	<0.01
Chromium as Cr (Dissolved)	ICPMSW	mg/kg	0.03	0.05	0.03	0.02	0.03	0.04	0.03	0.01	0.02	0.01	0.01	0.02	0.03	0.02	0.02
Cadmium as Cd (Dissolved)	ICPMSW	mg/kg	<0.001	<0.001	0.155	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper as Cu (Dissolved)	ICPMSW	mg/kg	0.06	0.05	0.09	0.05	0.03	0.09	0.19	0.06	0.03	0.37	<0.01	<0.02	0.03	0.02	0.01
Lead as Pb (Dissolved)	ICPMSW	mg/kg	<0.01	<0.01	0.21	<0.01	0.11	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
Zinc as Zn (Dissolved)	ICPMSW	mg/kg	0.32	0.17	12.09	0.50	0.35	1.41	0.23	0.49	0.22	<0.09	0.46	<0.08	0.15	0.33	0.43
Arsenic as As (Dissolved)	ICPMSW	mg/kg	0.01	0.03	0.07	0.02	0.02	0.01	0.23	0.02	0.02	0.08	<0.01	0.02	0.01	0.02	<0.01
Mercury as Hg (Dissolved)	ICPMSW	mg/kg	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	0.006	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium as Se (Dissolved)	ICPMSW	mg/kg	0.04	0.02	0.02	<0.01	<0.01	<0.01	0.01	0.01	0.02	0.07	<0.01	0.01	<0.01	0.01	0.01
Phenol Index as C6H5OH	SFAPI	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5
Fluoride	ISEF	mg/kg	4	5	6	6	4	2	6	12	7	4.00	4.00	4	5	4	3
Molybdenum	ICPMSW	mg/kg	0.03	0.05	0.07	0.19	0.11	<0.01	0.14	0.13	0.04	0.15	0.04	0.06	0.04	0.007	<0.01
Antimony	ICPMSW	mg/kg	0.01	0.01	0.02	0.005	0.04	<0.01	0.038	0.006	<0.01	0.16	<0.01	0.04	<0.01	0.002	<0.01
DOC	WSLM13	mg/kg	105	42	67	12	40	296	20	13	74	91	46	42	64	10	47
TDS	WSLM27	mg/kg	2653	1442	2347	622	2585	2839	796	983	1848	1990	3063	1726	1602	223	1084

WAC Leachate Analysis

		Location	BH5/14 9 - 12
Analyte:	Method Code:	Units:	
Chloride as Cl w	KONENS	mg/kg	40
Total Sulphur as SO4 (Dissolved)	ICPWATER	mg/kg	171
Nickel as Ni (Dissolved)	ICPMSW	mg/kg	0.01
Chromium as Cr (Dissolved)	ICPMSW	mg/kg	0.02
Cadmium as Cd (Dissolved)	ICPMSW	mg/kg	<0.001
Copper as Cu (Dissolved)	ICPMSW	mg/kg	0.03
Lead as Pb (Dissolved)	ICPMSW	mg/kg	0.01
Zinc as Zn (Dissolved)	ICPMSW	mg/kg	0.11
Arsenic as As (Dissolved)	ICPMSW	mg/kg	0.01
Mercury as Hg (Dissolved)	ICPMSW	mg/kg	<0.001
Selenium as Se (Dissolved)	ICPMSW	mg/kg	<0.01
Phenol Index as C6H5OH	SFAP1	mg/kg	<0.5
Fluoride	ISEF	mg/kg	4.0
Molybdenum	ICPMSW	mg/kg	0.1
Antimony	ICPMSW	mg/kg	<0.01
DOC	WSLM13	mg/kg	73
TDS	WSLM27	mg/kg	1861

Statistical Analysis

Inert	Non-hazardous	Hazardous	No. samples	Min	Max	Mean	Std dev.	CV	t	UCL 95%	t	UCL 99%	No. Occurrences greater than UCL95	No. Occurrences greater than Inert Limit	No. Occurrences greater than Non-hazardous Limit	No. Occurrences greater than Hazardous Limit
800	15000	2500	16	29.00	184.12	69.83	41.14	0.59	1.753	87.865	2.602	96.60	4	0	0	0
1000	20000	50000	16	56.00	1335.27	501.57	347.04	0.69	1.753	653.665	2.602	727.36	4	2	0	0
0.4	10	40	16	0.01	0.05	0.02	0.01	0.68	1.753	0.028	2.602	0.03	4	0	0	0
0.5	10	70	16	0.01	0.05	0.02	0.01	0.43	1.753	0.029	2.602	0.03	7	0	0	0
0.04	0.1	5	16	0.00	0.16	0.01	0.04	3.60	1.753	0.028	2.602	0.036	1	1	1	0
2	50	100	16	0.01	0.37	0.07	0.09	1.27	1.753	0.1	2.602	0.13	2	0	0	0
0.5	10	50	16	0.01	0.21	0.04	0.06	1.58	1.753	0.06	2.602	0.07	3	0	0	0
4	50	200	16	0.08	12.09	1.09	2.95	2.71	1.753	2.4	2.602	3.01	1	1	0	0
0.5	2	25	16	0.01	0.23	0.0370221	0.055524	1.499747	1.75305	0.061356	2.60248	0.073147	3	0	0	0
0.01	0.02	2	16	0.001	0.006371	0.0016482	0.001615	0.979923	1.75305	0.002356	2.60248	0.002699	2	0	0	0
0.1	0.5	7	16	0.01	0.068857	0.0175021	0.015843	0.90521	1.75305	0.024446	2.60248	0.02781	2	0	0	0
1			16	0.5	0.5	0.5	0	0	1.75305	0.5	2.60248	0.5	0	0	0	0
10	150	500	15	2	12	5.0666667	2.313521	0.456616	1.76131	6.118783	2.624494	6.634405	2	1	0	0
0.5	10	30	16	0.007	0.19	0.0704375	0.056134	0.796938	1.75305	0.095039	2.60248	0.10696	5	0	0	0
0.06	0.7	5	16	0.002	0.16	0.0244375	0.038257	1.565503	1.75305	0.041204	2.60248	0.049328	1	1	0	0
500	800	1000	16	10	296	65.125	67.68444	1.0393	1.75305	94.78856	2.60248	109.1619	2	0	0	0
4000	60000	100000	16	223	3063	1729	837.2503	0.48424	1.75305	2095.935	2.60248	2273.732	5	0	0	0

Date : 08/12/05 Operator: MG		Meteorological and Site Conditions					
		State of ground Wind Wind Direction Cloud Cover Precipitation Air Temperature (°C)	Wet Light SW 50% Dry 9				
Equipment Used:		Gas Data LMSxi (No.1436) & electronic dip meter.					
Borehole	Instrument Depth (m)	Water level (m)	O₂ (%v/v)	CH₄ (%v/v)	CO₂ (%v/v)	H₂S (ppm)	Barometric pressure (mb)
BH5/1	5.90	0.26	20.3	0.0	0.1	0	1008
BH5/2	6.80	Dry	8.2	0.0	0.2	0	1006
BH5/3	8.80	5.73	20.5	0.0	0.0	0	1008
BH5/4	3.00	Dry	20.8	0.0	0.0	0	1008
BH5/5A	13.20	9.01	3.7	26.0	2.5	0	1008
BH5/6	6.60	4.32	0.1	18.5	6.8	0	1007
BH5/7	3.70	Dry	0.4	12.0	3.8	0	1007
BH5/8	10.00	9.54	1.0	31.0	3.9	0	1007
BH5/9	14.30	7.11	0.8	54.0	4.2	0	1007
BH5/10	5.20	2.86	6.1	53.0	0.6	0	1006
BH5/11	5.20	4.23	3.7	13.5	5.1	0	1006
BH5/12	10.30	8.86	2.6	80.0	2.1	0	1006
BH5/14	11.70	8.25	3.0	15.0	1.7	0	1006
BH15	11.89	8.95	18.9	0.0	1.9	0	1007
BH17 (E)	10.40	7.84	20.5	0.0	0.0	0	1007
BH17 (W)	12.30	7.84	20.5	0.0	0.0	0	1007
BH17A (E)	11.14	8.15	20.6	0.0	0.0	0	1006
BH17A (W)	9.45	8.16	20.6	0.0	0.0	0	1006
BH20A	11.30	10.19	20.5	0.0	0.0	0	1007
BH21A	2.50	1.70	20.5	0.0	0.0	0	1007
BH22A	7.80	6.27	12.9	0.0	3.2	0	1006
BH23B (E)	10.52	7.96	18.9	1.2	0.1	0	1006
BH23B (W)	7.83	6.46	6.4	13.5	2.5	0	1006
Remarks: All above installations comprise 50mm nominal diameter gas monitoring standpipes.							
NB: The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If greater accuracies of gas concentration are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.							
Gas/ Groundwater Monitoring		Project: Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill)					Contract: H5141
Soil Mechanics		Client: Rhondda Cynon Taff County Borough Council					

Date : 06/02/06 Operator: NJ		Meteorological and Site Conditions							
		State of ground Wind Wind Direction Cloud Cover Precipitation Air Temperature (°C)	Dry Strong Easterly 100% None 7						
Equipment Used:		Gas Data LMSxi (No.1436) & electronic dip meter.							
Borehole	Instrument Depth (m)	Water level (m)	O₂ (%v/v)	CH₄ (%v/v)	CO₂ (%v/v)	H₂S (ppm)	Barometric pressure	Gas Flow (litres/hr)	
BH5/1	5.90	0.85	20.8	0.0	0.8	0	1017	0.07	
BH5/2	6.80	Dry	1.4	4.2	7.1	0	1019	-0.41	
BH5/3	8.80	5.84	0.8	35.0	1.2	0	1019	2.31	
BH5/4	3.00	Dry	20.4	0.2	0.1	0	1019	1.71	
BH5/5A	13.20	8.44	0.9	55.0	2.1	0	1018	9.41	
BH5/6	6.60	4.89	0.9	4.9	5.4	0	1019	1.11	
BH5/7	3.70	3.37	0.7	7.8	3.3	0	1019	1.21	
BH5/8	10.00	7.72	0.5	37.0	1.2	0	1019	7.31	
BH5/9	14.30	7.05	1.3	22.0	4.0	0	1018	0.61	
BH5/10	5.20	2.69	21.0	0.8	0.0	0	1019	-0.11	
BH5/11	5.20	4.00	21.0	0.2	0.0	0	1019	-1.07	
BH5/12	10.30	8.89	3.7	80.0	2.2	0	1019	1.21	
BH5/14	11.70	7.94	0.7	26.5	3.4	0	1019	4.57	
BH15	11.89	8.83	21.2	0.1	0.2	0	1019	0.07	
BH17 (E)	10.40	7.79	20.6	0.0	0.2	0	1019	0.11	
BH17 (W)	12.30	7.71	21.0	0.0	0.0	0	1018	0.07	
BH17A (E)	11.14	8.13	19.8	1.3	0.2	0	1019	-0.11	
BH17A (W)	9.45	8.18	19.6	1.6	0.3	0	1018	0.01	
BH20A	11.30	9.34	21.1	0.0	0.0	0	1018	0.07	
BH21A	2.50	1.78	21.1	0.0	0.0	0	1018	0.11	
BH22A	7.80	6.28	20.1	0.0	1.0	0	1018	0.01	
BH23B (E)	10.52	7.77	21.0	0.1	0.0	0	1018	-1.01	
BH23B (W)	7.83	6.66	4.7	14.5	2.5	0	1018	-0.21	
Remarks: All above installations comprise 50mm nominal diameter gas monitoring standpipes.									
NB: The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If greater accuracies of gas concentration are required, it is recommended that gas samples are recovered and laboratory tests carried out.									
Gas/ Groundwater Monitoring		Project: Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill)					Contract: H5141		
Soil Mechanics		Client: Rhondda Cynon Taff County Borough Council							

R
C¹⁴ RadioCarbon Dating
D

The Old Stables
East Lockinge
Wantage
Oxon, OX12 8QY

Measurement Report for Tritium and Carbon-14 Measurements on Gas Sample

for

S Miller
Soil Mechanics
Unit 15
Crosby Yard
Wildmill
Bridgend
CF31 1JZ

1st August 2005

1.0 Sample

Sample of gas from BH21A Ty Gairreg Landfill provided for measurement of the ^{14}C and ^3H content 23rd May 2005

2.0 Measurement Procedure

2.1 Chemical Processing

The gas was passed through an NaOH bubbler to strip out possible CO_2 , then through a silica gel column, to remove water vapour, and finally combusted over a Palladium based catalyst at 450°C . The combustion products from the methane were passed first through a dry ice trap cooled to -78°C to collect the H_2O then through an NaOH bubblers to absorb the CO_2 . At the conclusion of the process this CO_2 was released from the bubbler solution through acidification with HCl and was converted to C_6H_6 through the stages of lithium carbide and acetylene.

2.2 Counting

The produced C_6H_6 sample was made up for counting using butyl-pbd as scintillant and counted in a Wallac Quantulus liquid scintillation counter, optimised for low level counting, in association with both background and modern standards, the modern standard being NBS Oxalic acid, which is the primary international standard supplied to all Radiocarbon measurement laboratories. The sample was counted to accumulate $> 10,000$ counts (1.0% counting statistics).

A 4ml aliquot of the water sample was made up for counting of the tritium with a proprietary scintillant and similarly counted in a Wallac Quantulus in association with background and standard samples. The samples was counted for either 500 minutes the time to accumulate approximately 10,000 counts (1% counting statistics).

For both the tritium and the carbon-14 sample the error term given represents the full estimated replicate sample reproducibility and not counting statistics alone.

3.0 Results

The results are given in the table below as percent modern carbon for the ^{14}C measurement (corrected for $\delta^{13}\text{C}$), per mil (‰) for the $\delta^{13}\text{C}$ and Bq/litre + Tritium Units (TU) for the ^3H activity.

RCD Ref	Sample Ref	^{14}C Activity (Percent Modern)	$\delta^{13}\text{C}$ (‰)	^3H of the CH_4	
				Bq/litre H_2O	(TU)
RCD-6109	BH21a	115 ± 0.9	-62.3	6 ± 1	50 ± 9

4.0 Comments

The ^{14}C level in the methane indicates that it is from modern, ie post-1950, organic material (see Figure 1) with the $\delta^{13}\text{C}$ value consistent with that from a biogenic source.

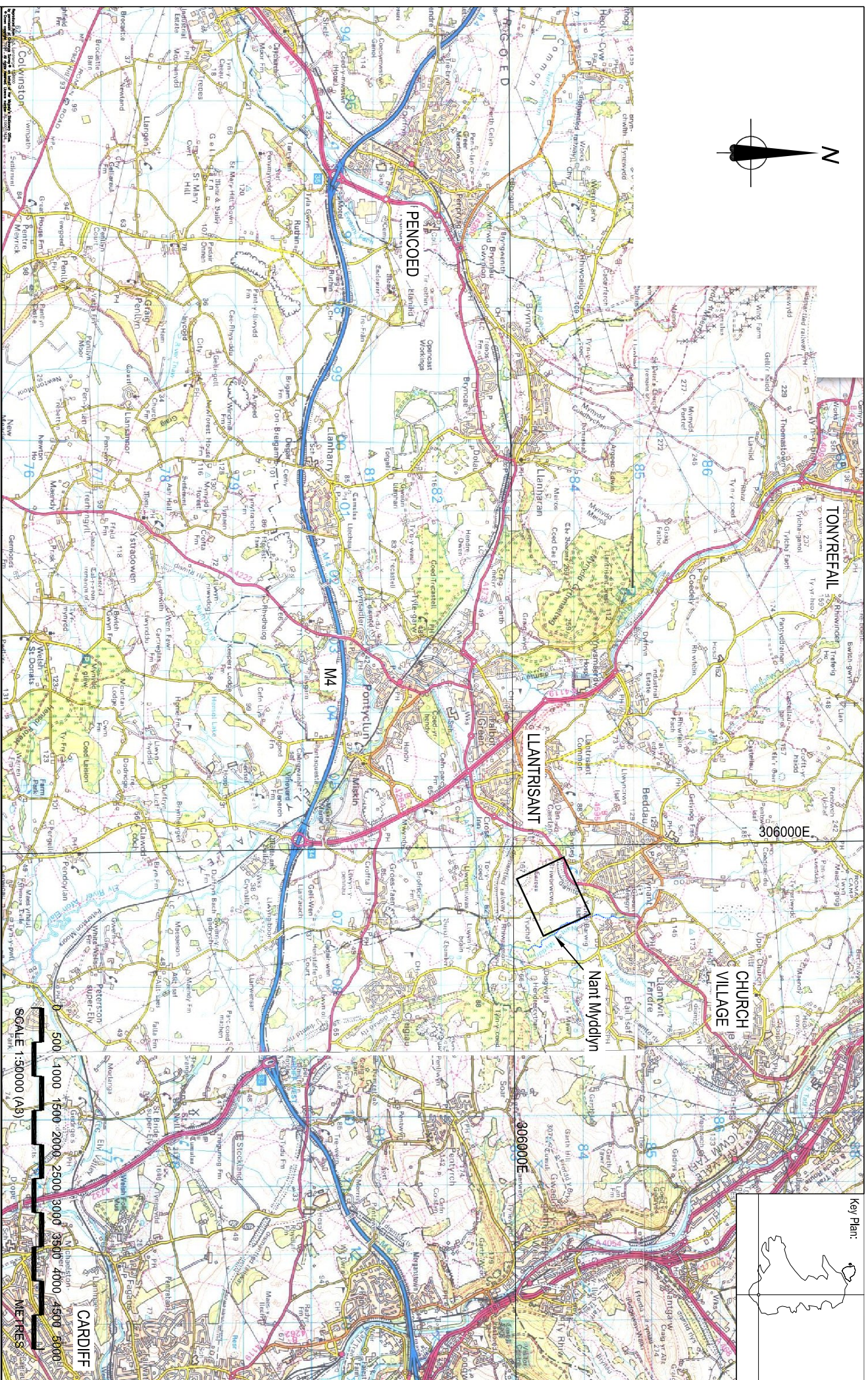
The ^3H level in the water collected from the combustion of the methane, although higher than present rainfall (current precipitation levels are only of the order of 1 to 3 Bq/l, ie ~30 TU maximum) is not really high enough to confirm possible contamination from tritiated landfill rubbish (eg luminous dials).

R L Otlet/A J Walker
Radiocarbon Dating
The Old Stables
East Lockinge
Wantage, Oxon OX12 8QY

1st August 2005

FIGURE 1

SITE LOCATION PLAN



Key Plan:



CARDIFF

Phase 5 Ground Investigation (Ty Garreg Landfill) Site Location Plan

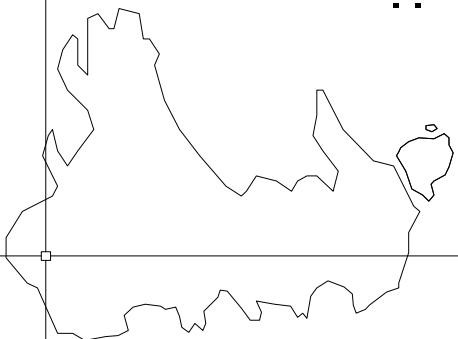
FIGURE

Drawing file path & name :

FIGURE 3

CONCEPTUAL MODEL

Key Plan:



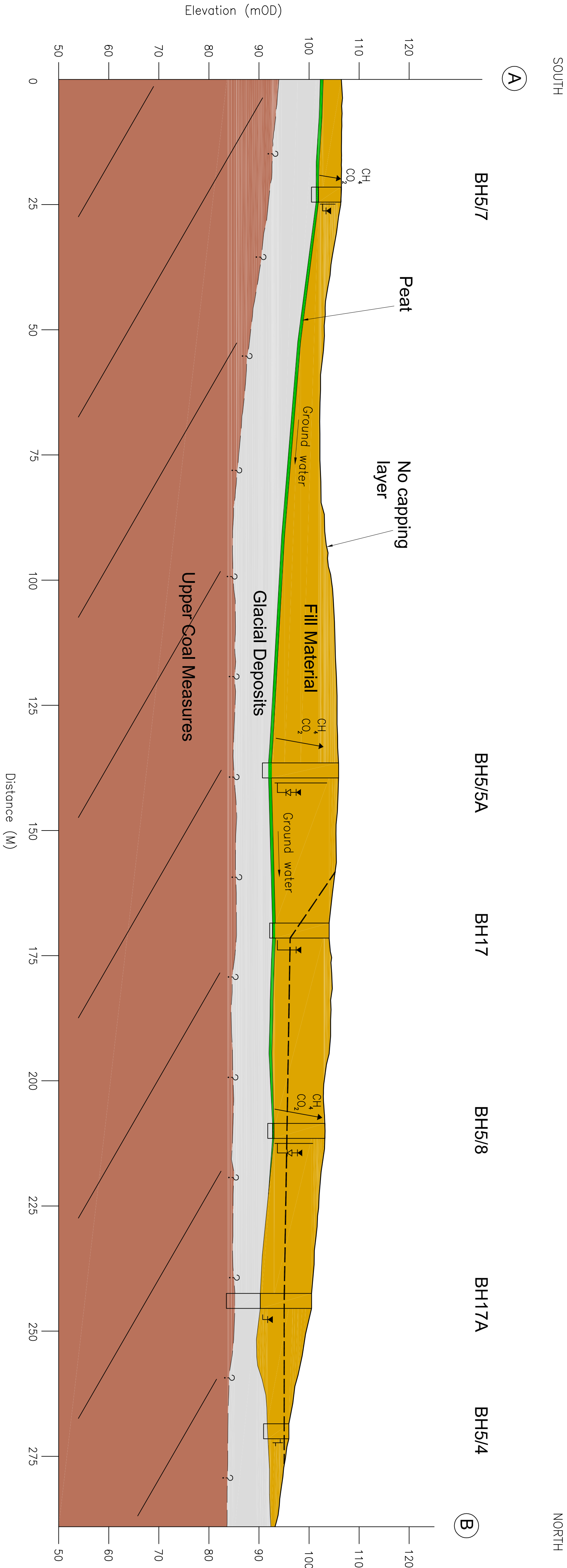
Notes:

- BH5/7 – Projected 22.5m West of Section
- BH5/5A – Projected 30m West of Section
- BH17 – Projected 15m East of Section
- BH5/8 – Projected 7.5m East of Section
- BH17A – Projected 35m East of Section
- BH5/4 – Projected 12.5m West of Section

--- Proposed cutting
- - - - - Denotes inferred boundary

Max. recorded water level
Min. recorded water level
Piezometer tip and gravel filter

Gas emanating from borehole



	BH5/7	BH5/5A	BH17	BH5/8	BH17A	BH5/4
CH ₄ % vol	7.8 - 12	26 - 55	0	31 - 37	0 - 1.6	0 - 0.2
CO ₂ % vol	3.3 - 3.8	2.1 - 2.5	0 - 0.2	1.2 - 3.9	0 - 0.3	0 - 0.1
O ₂ % vol	0.4 - 0.7	0.9 - 3.7	20.5 - 21	0.5 - 1.0	19.6 - 20.6	20.4 - 20.8
H ₂ S ppm	0	0	0	0	0	0
FLOW L/hr	1.2	9.4	0.07 - 0.11	7.3	-0.11 - 0.01	1.71

YMOYGOBRYN PEBELANNIG MORANNIG
GLANORGAN ENGINEERING CONSULTANCY
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One Kingsway, Cardiff CF10 3AN
Tel: 0300 060 0600
Fax: 0300 060 0601
Email: info@halcrow.com



Church Village Bypass

Conceptual Model - Ty Garreg Landfill

Drawn by: JLE	Date: MAR 06
Checked by: SPH	Date: MAR 06
Approved by: ALC	Date: MAR 06
Drawing No.	Revision

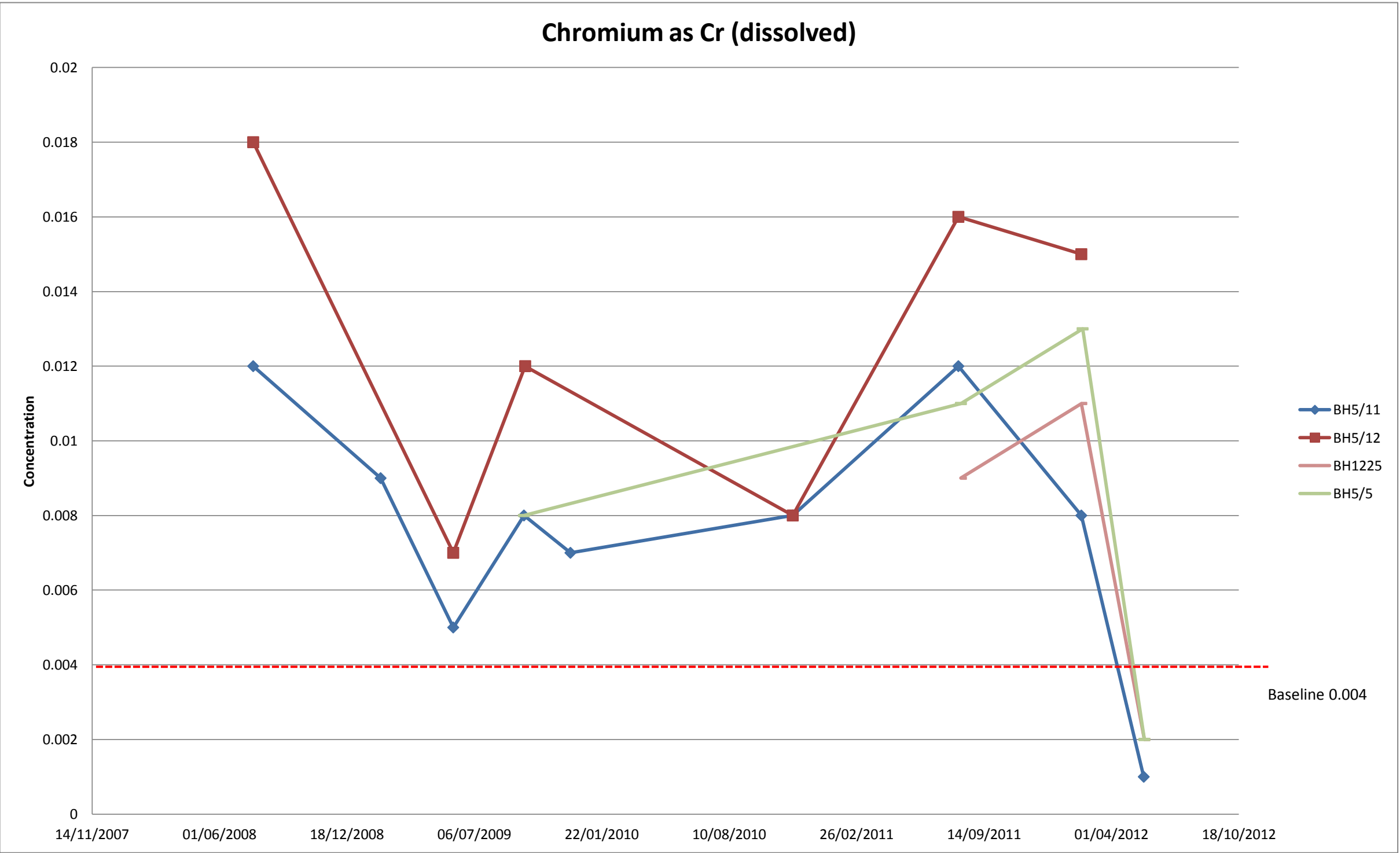
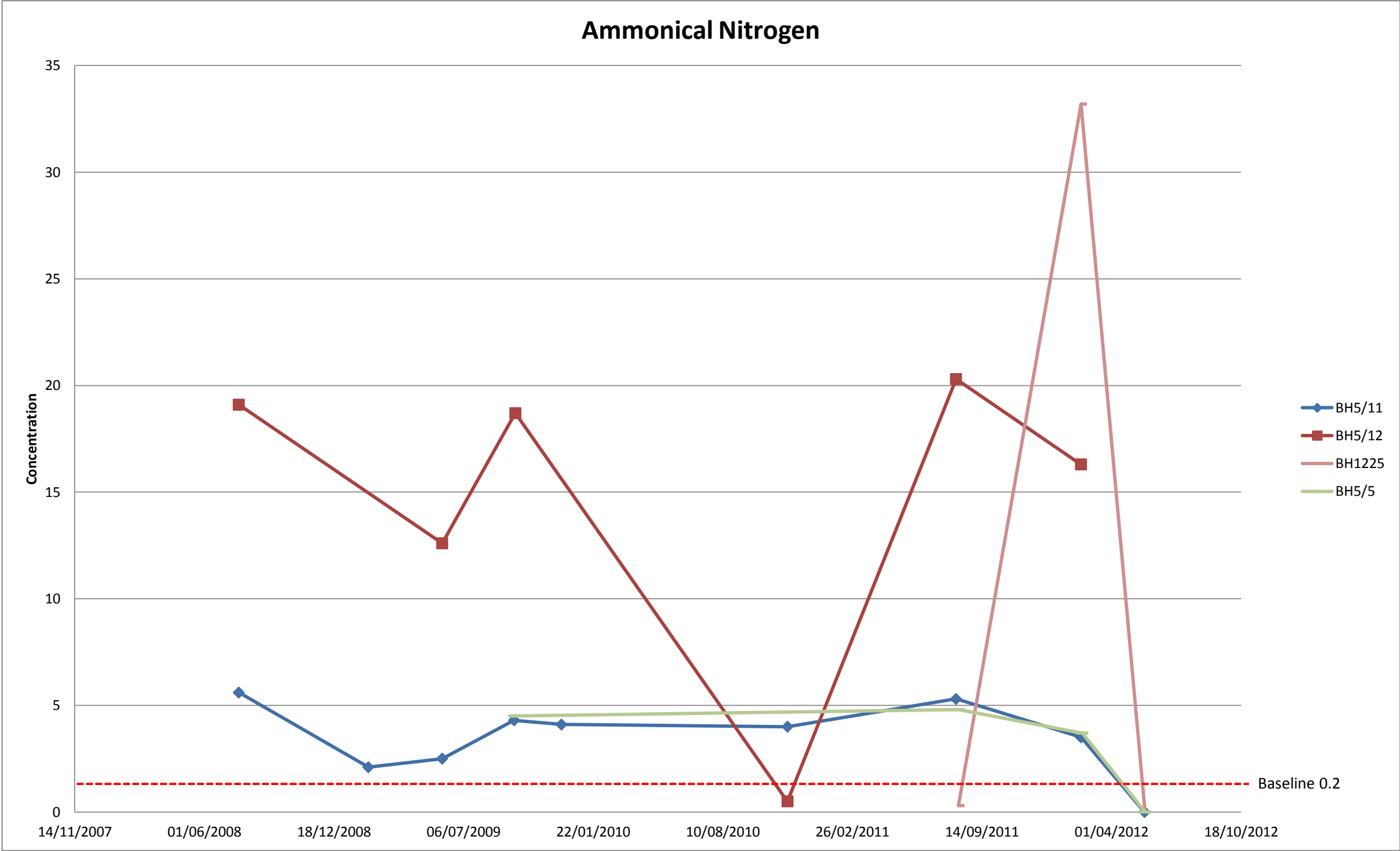
FIGURE 3

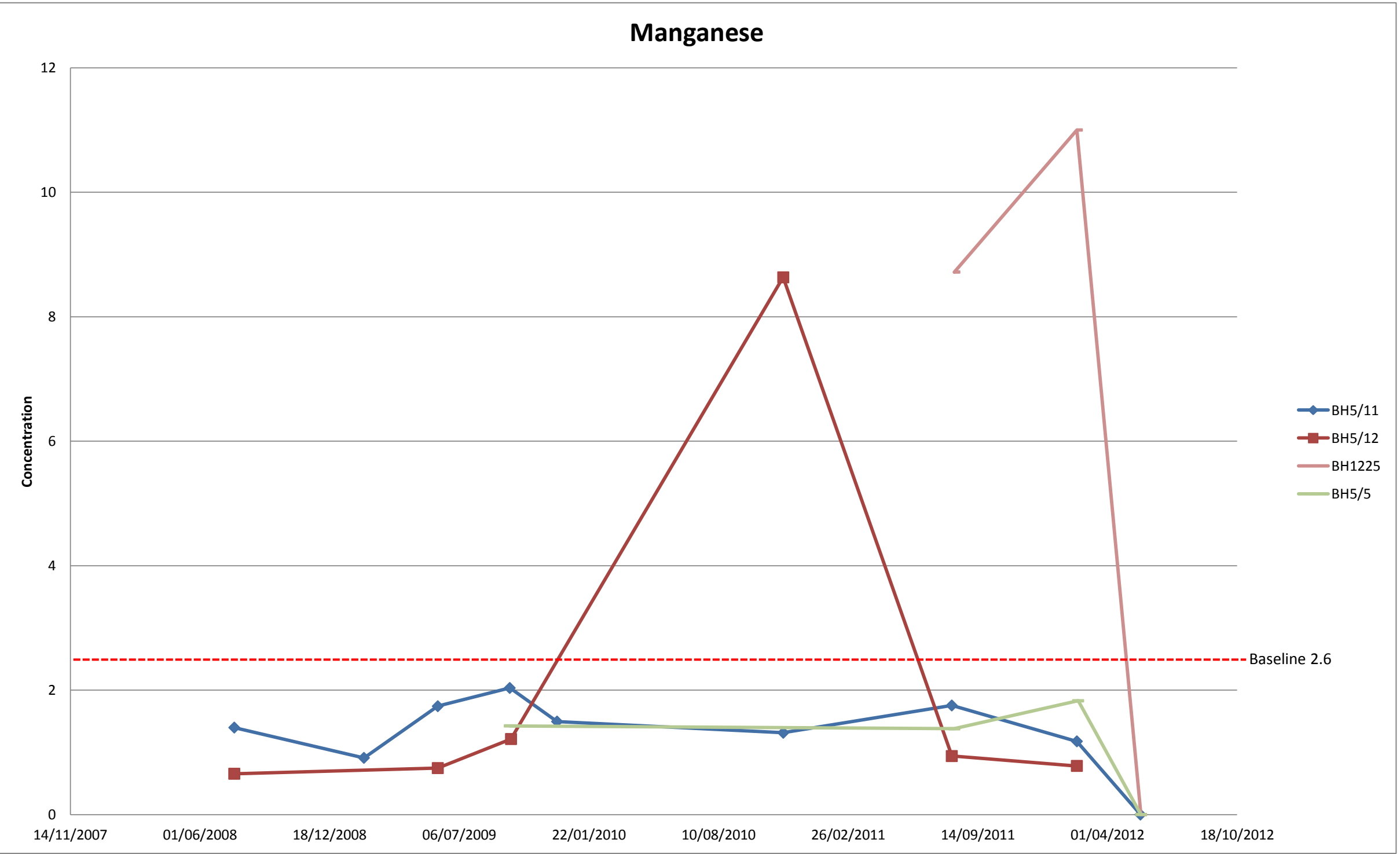
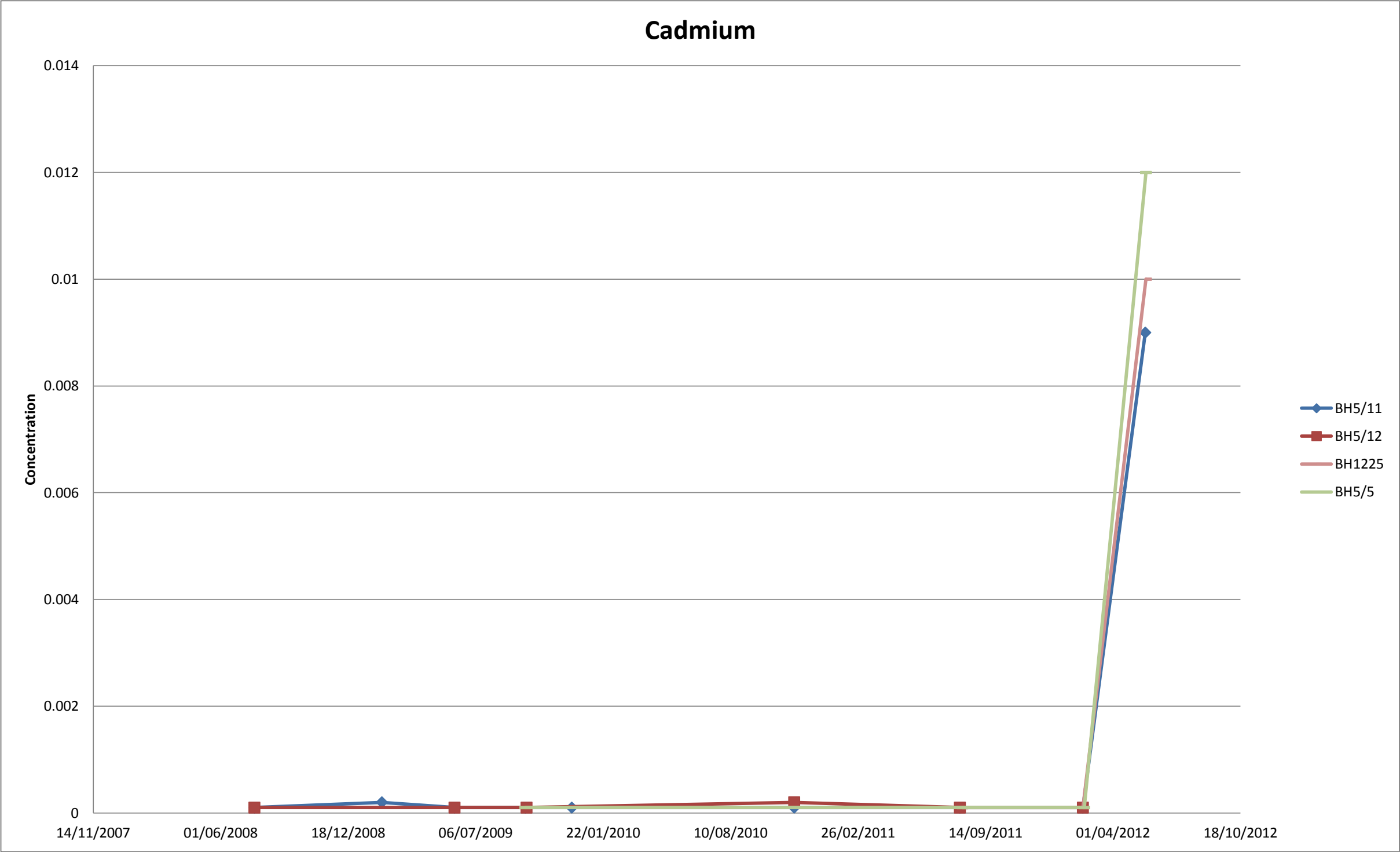
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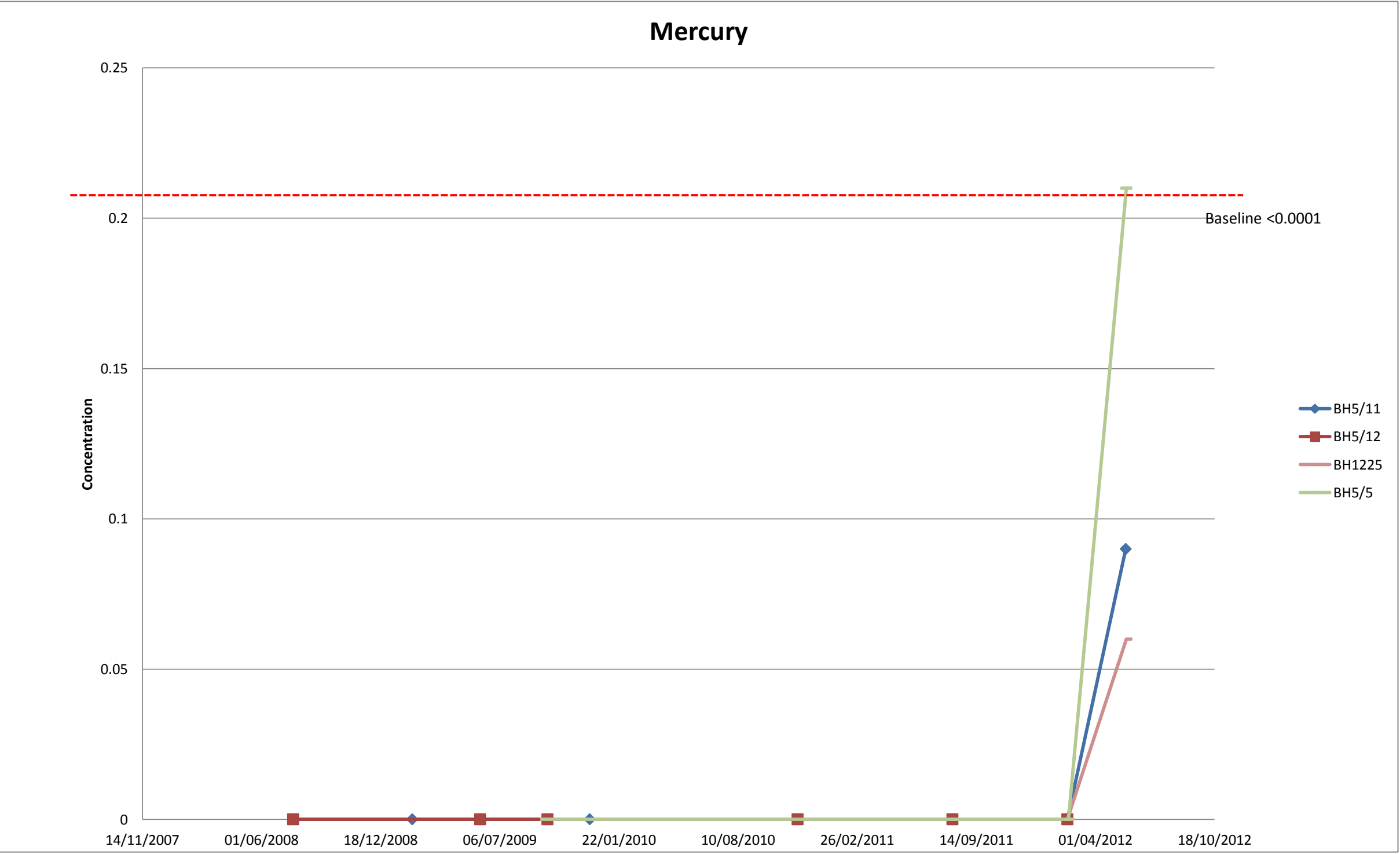
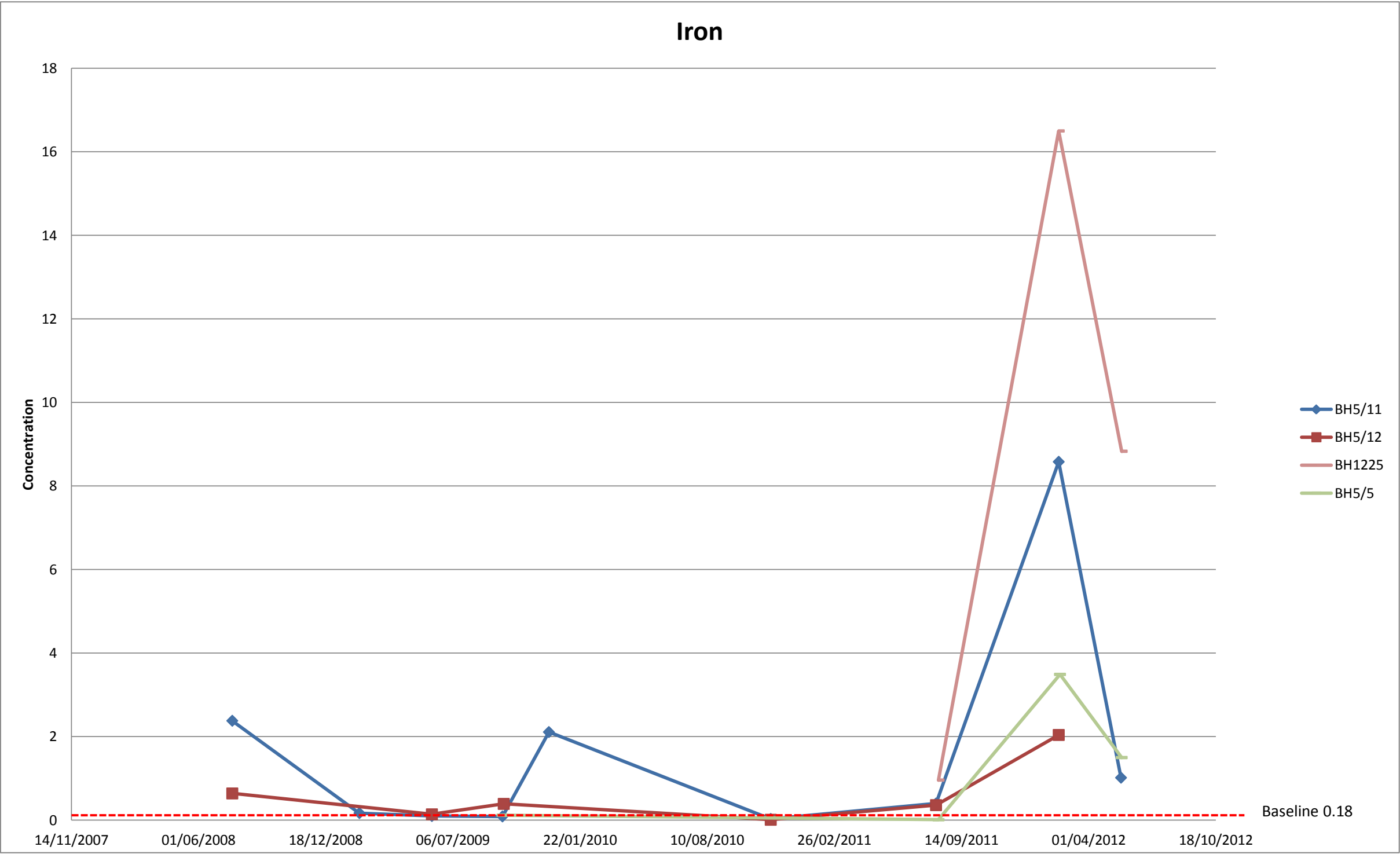
FIGURE 2
GROUND INVESTIGATION SUMMARY
PLAN

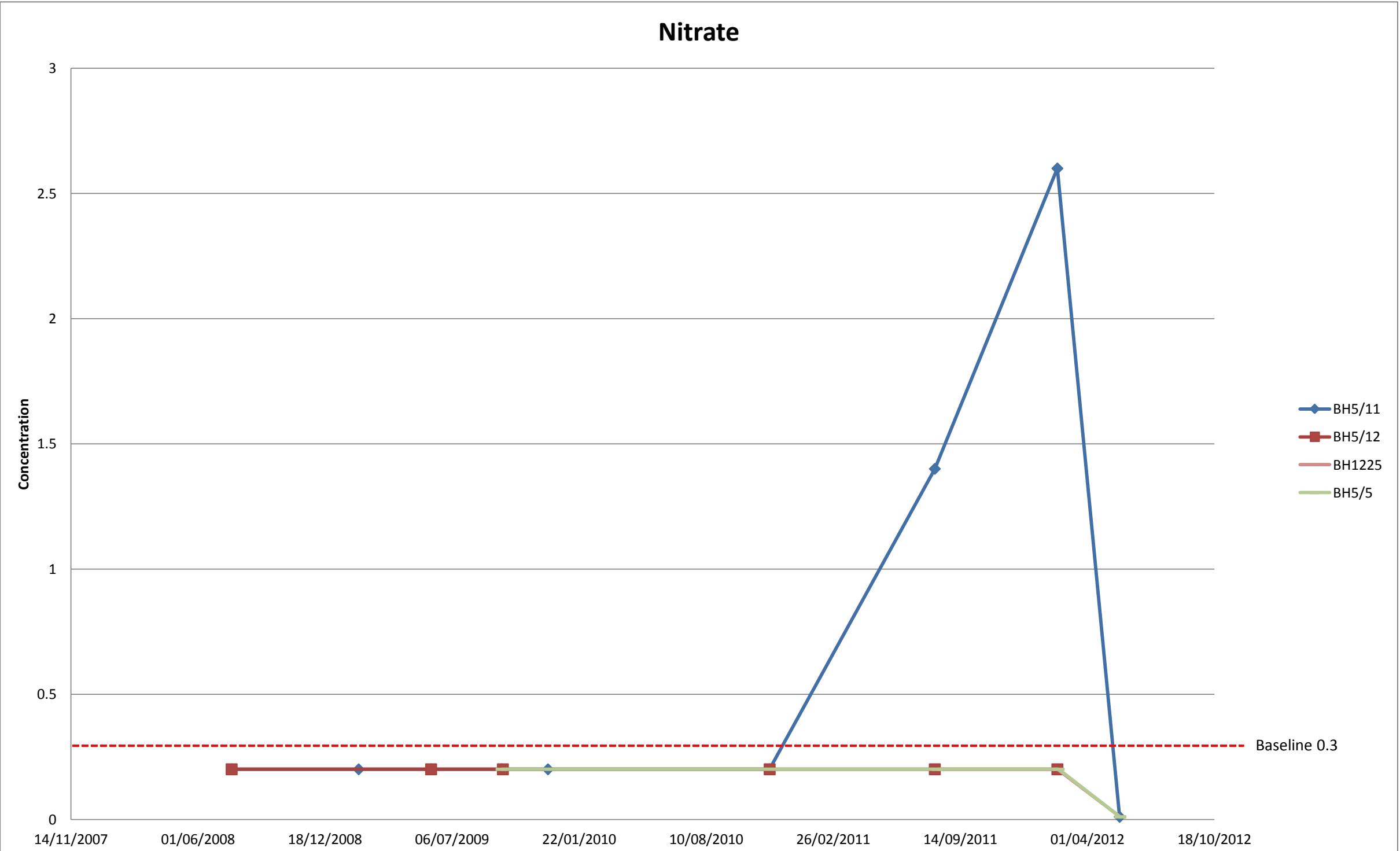
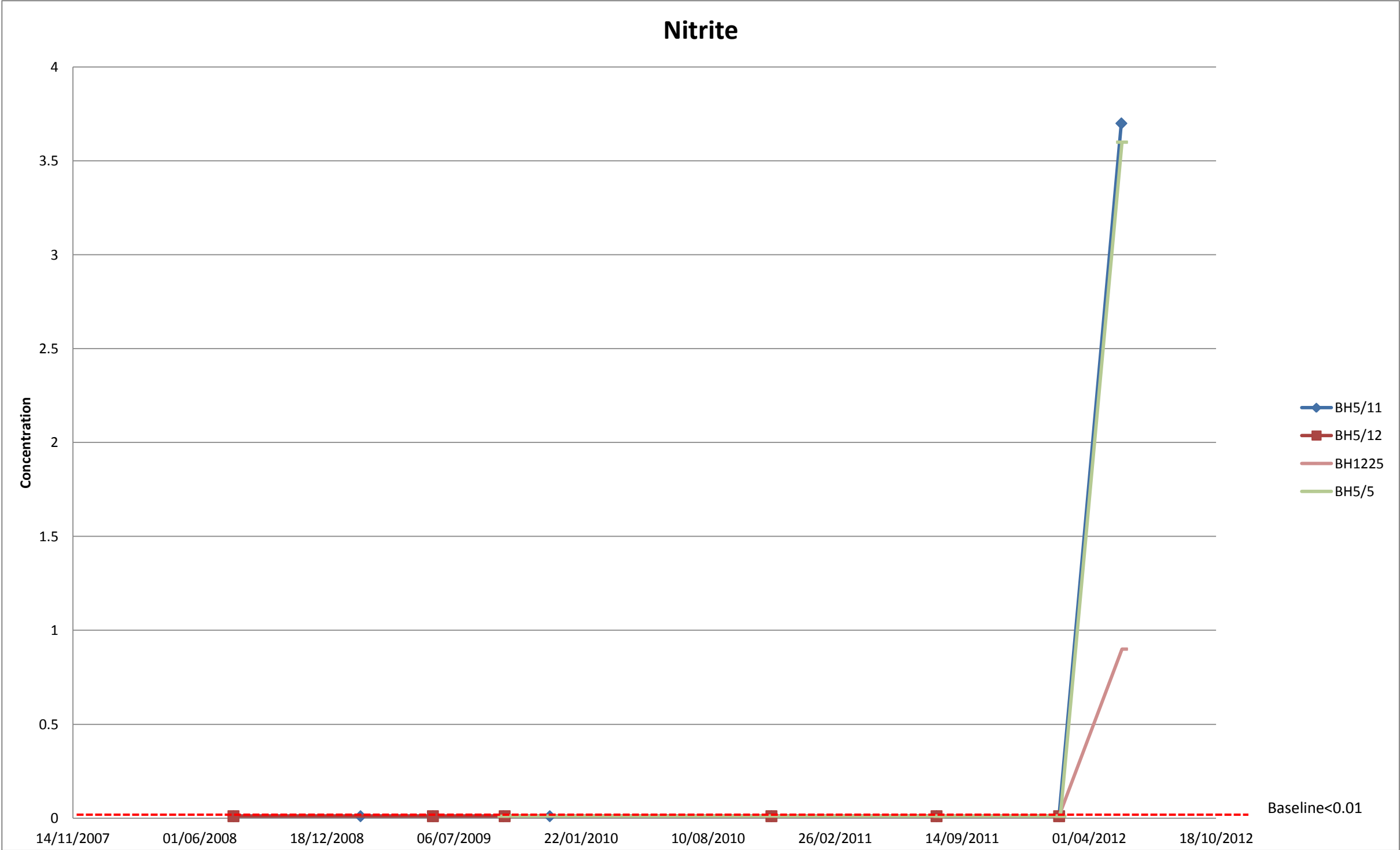
APPENDIX D

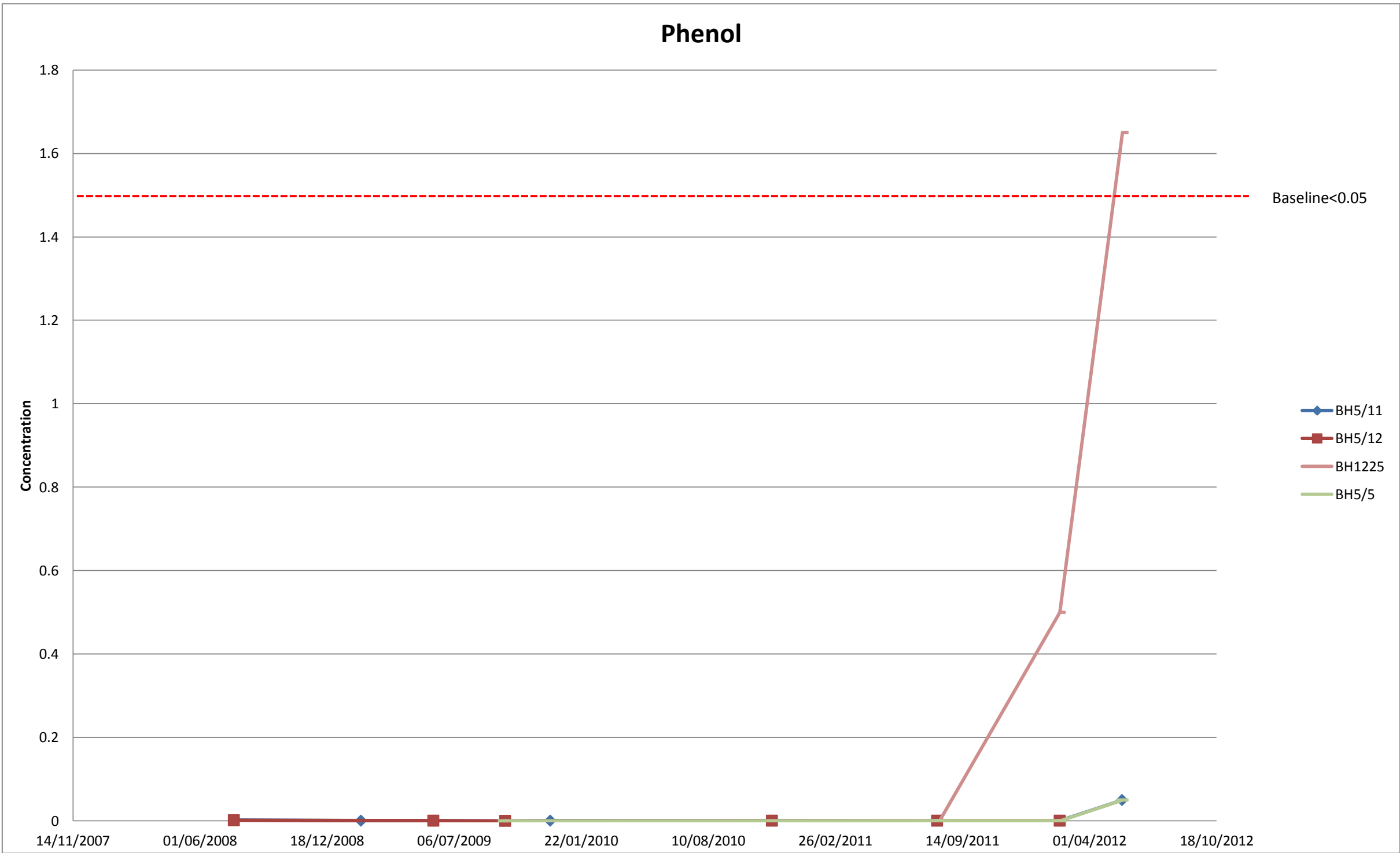
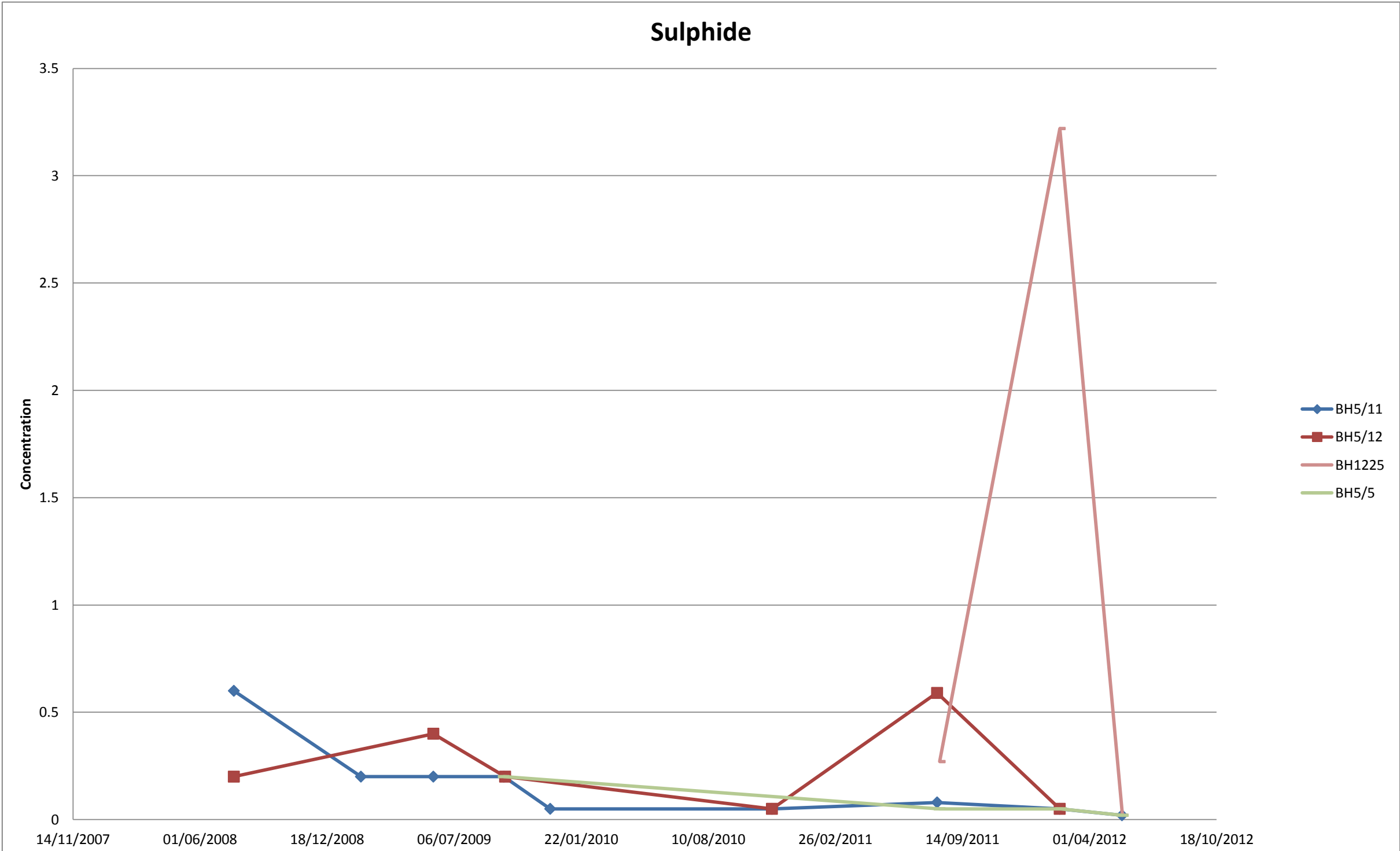
TES Bretby Scientific Results

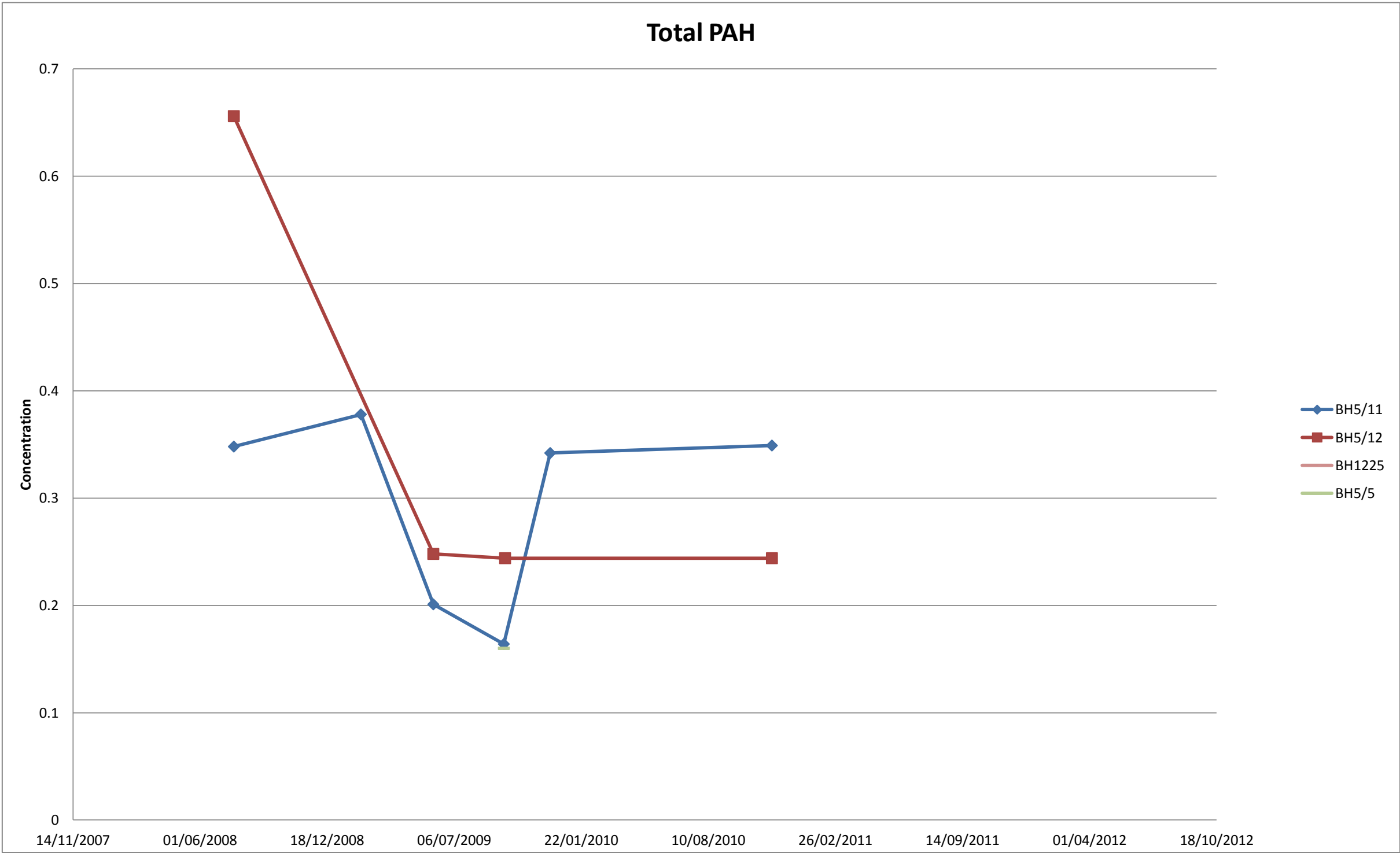


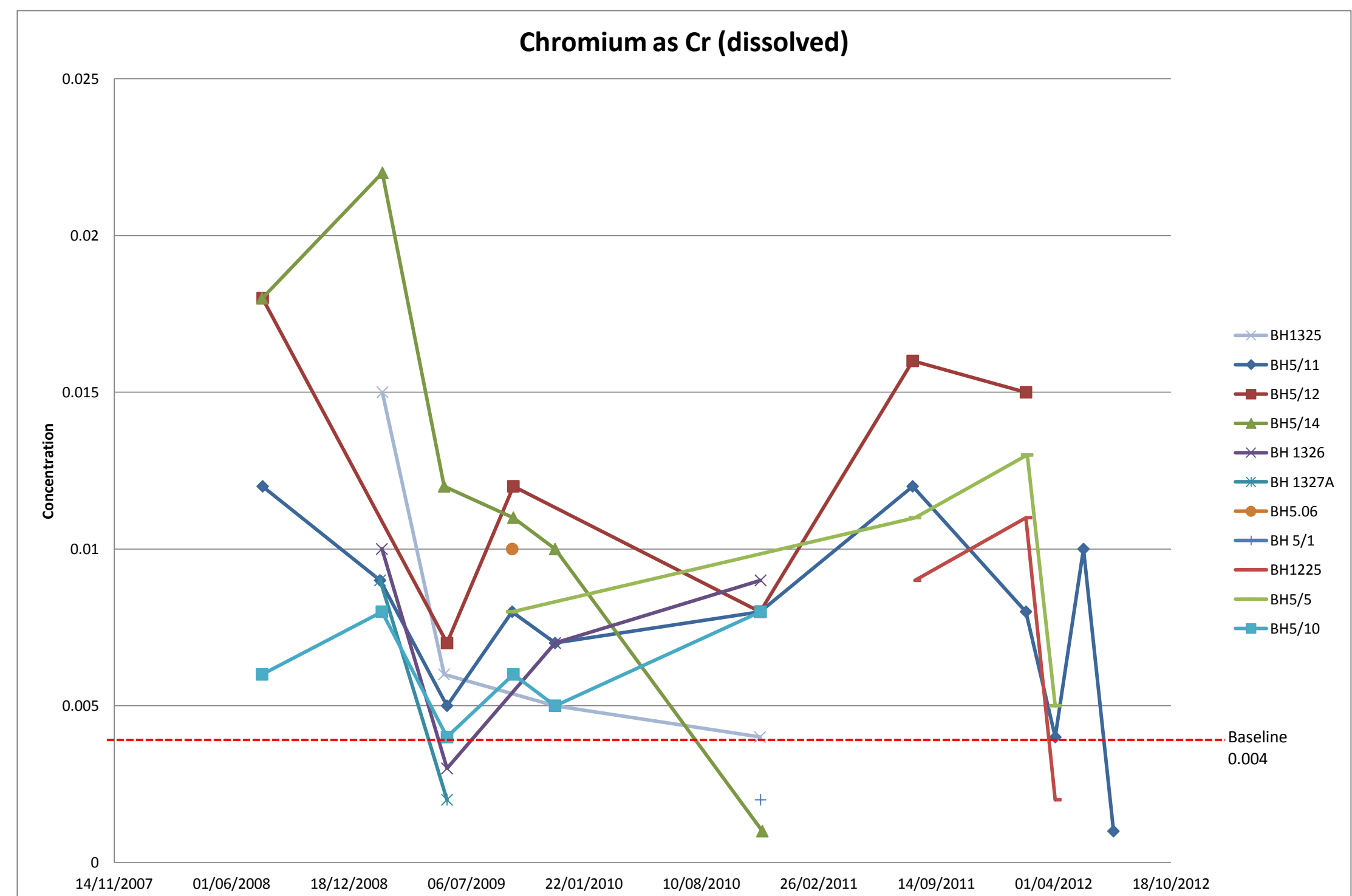


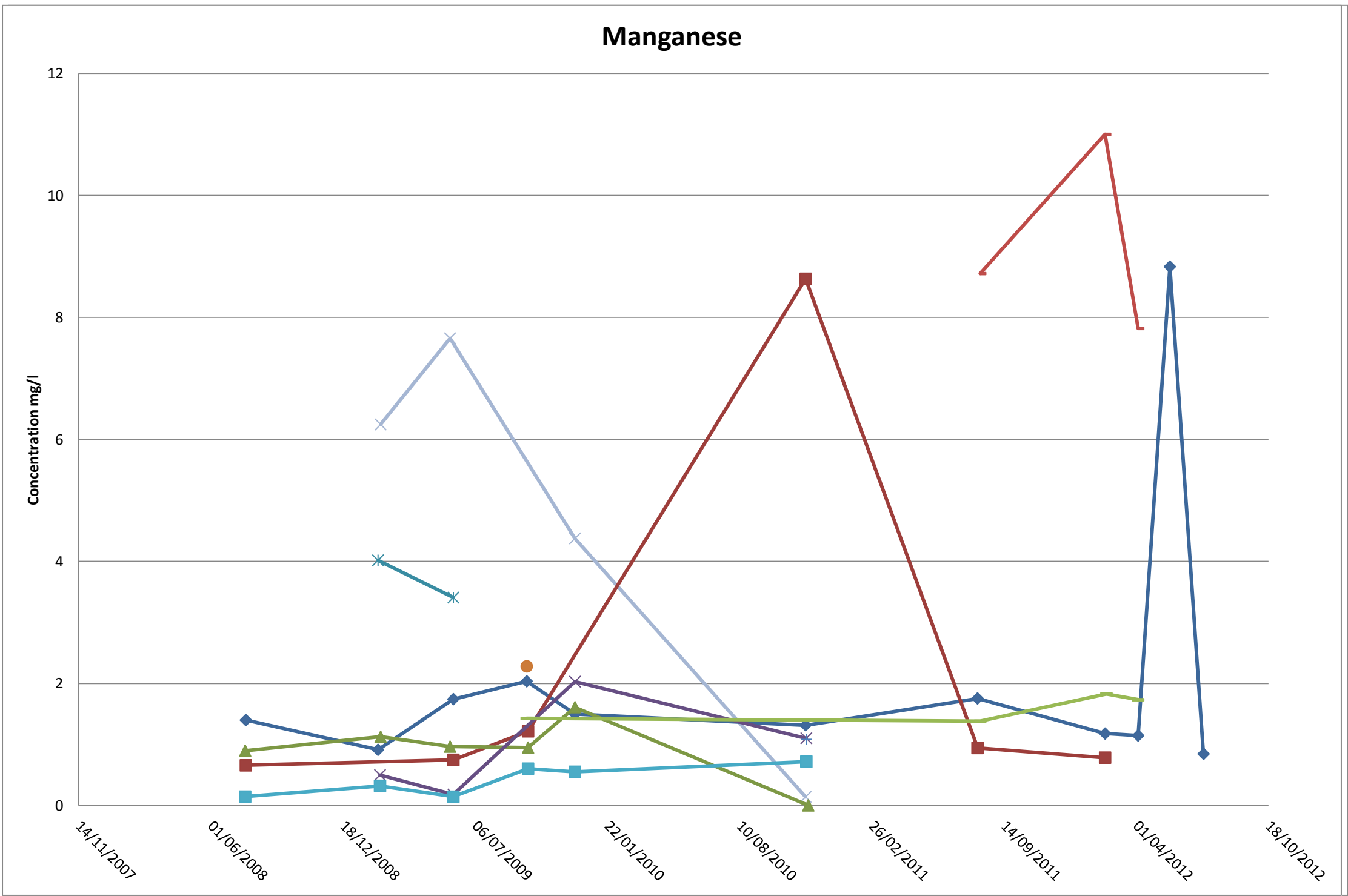
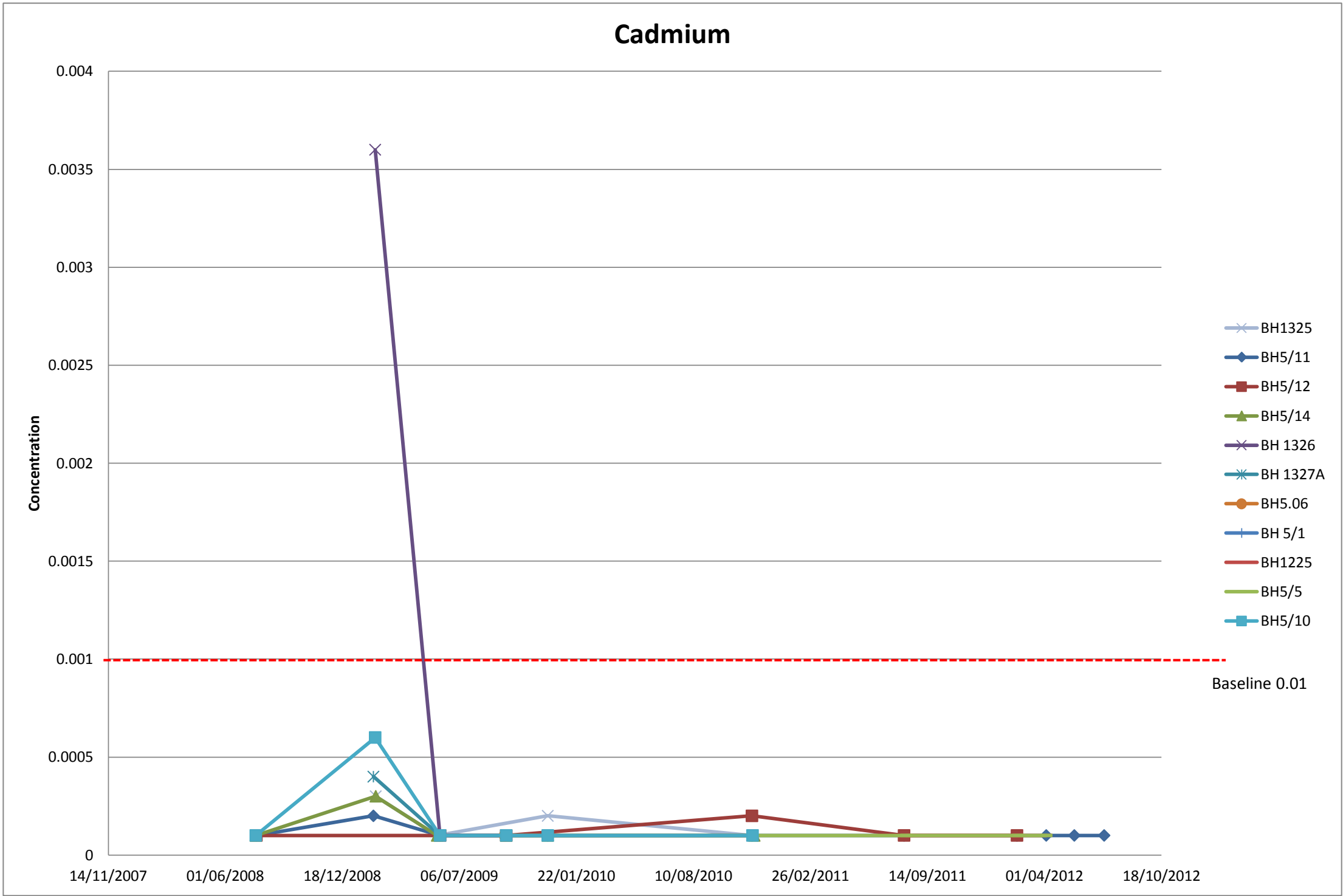


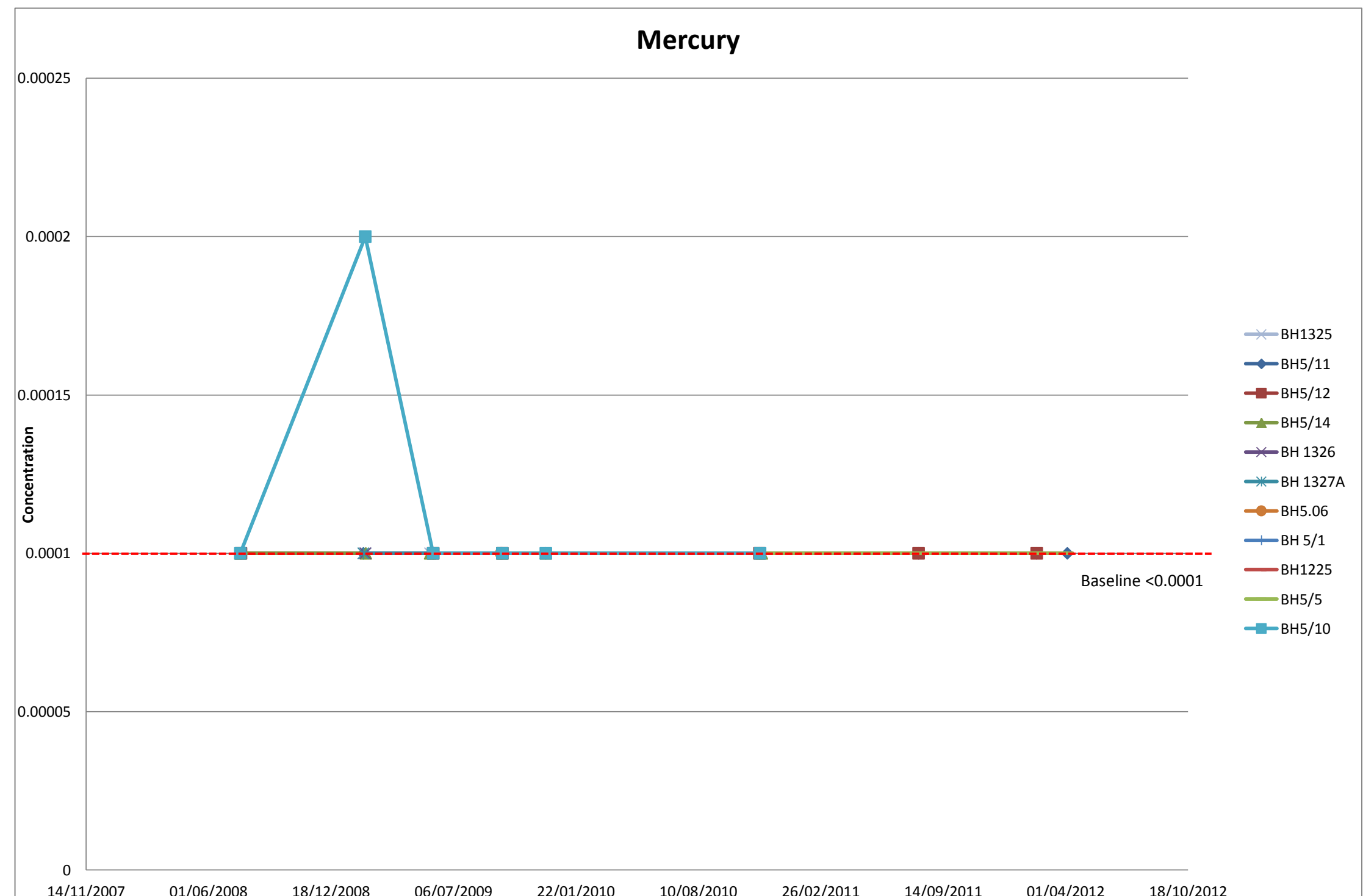
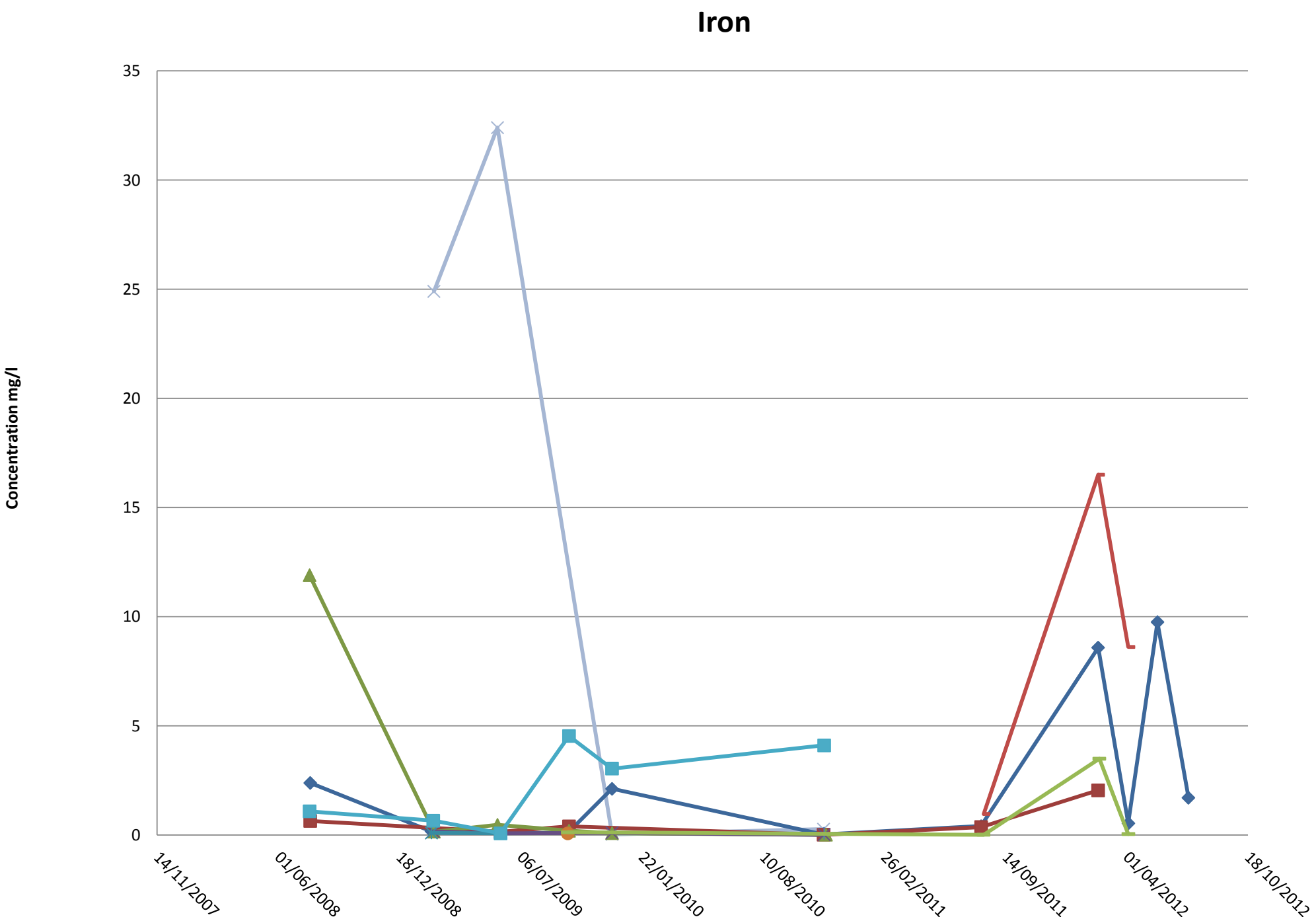


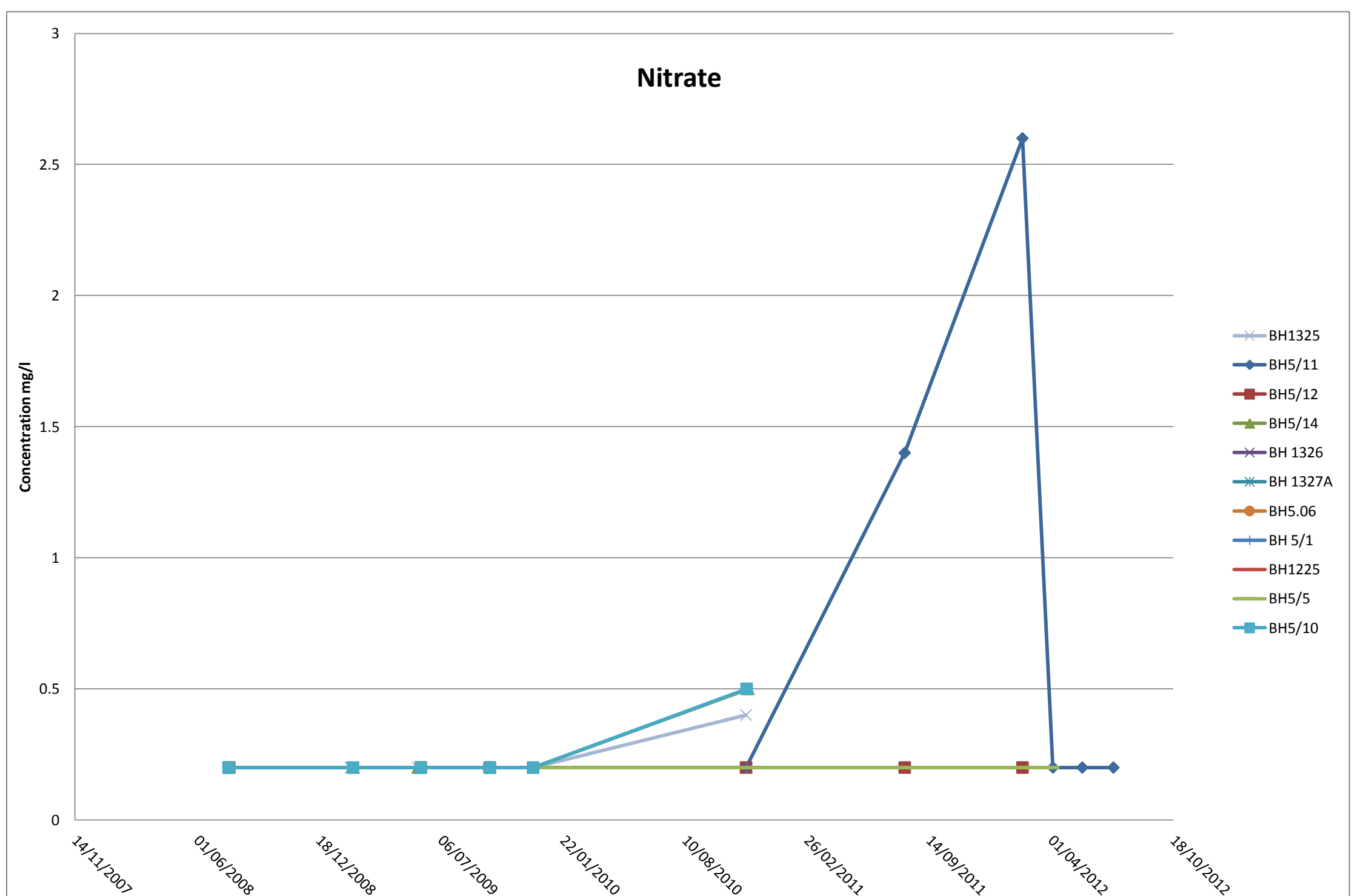


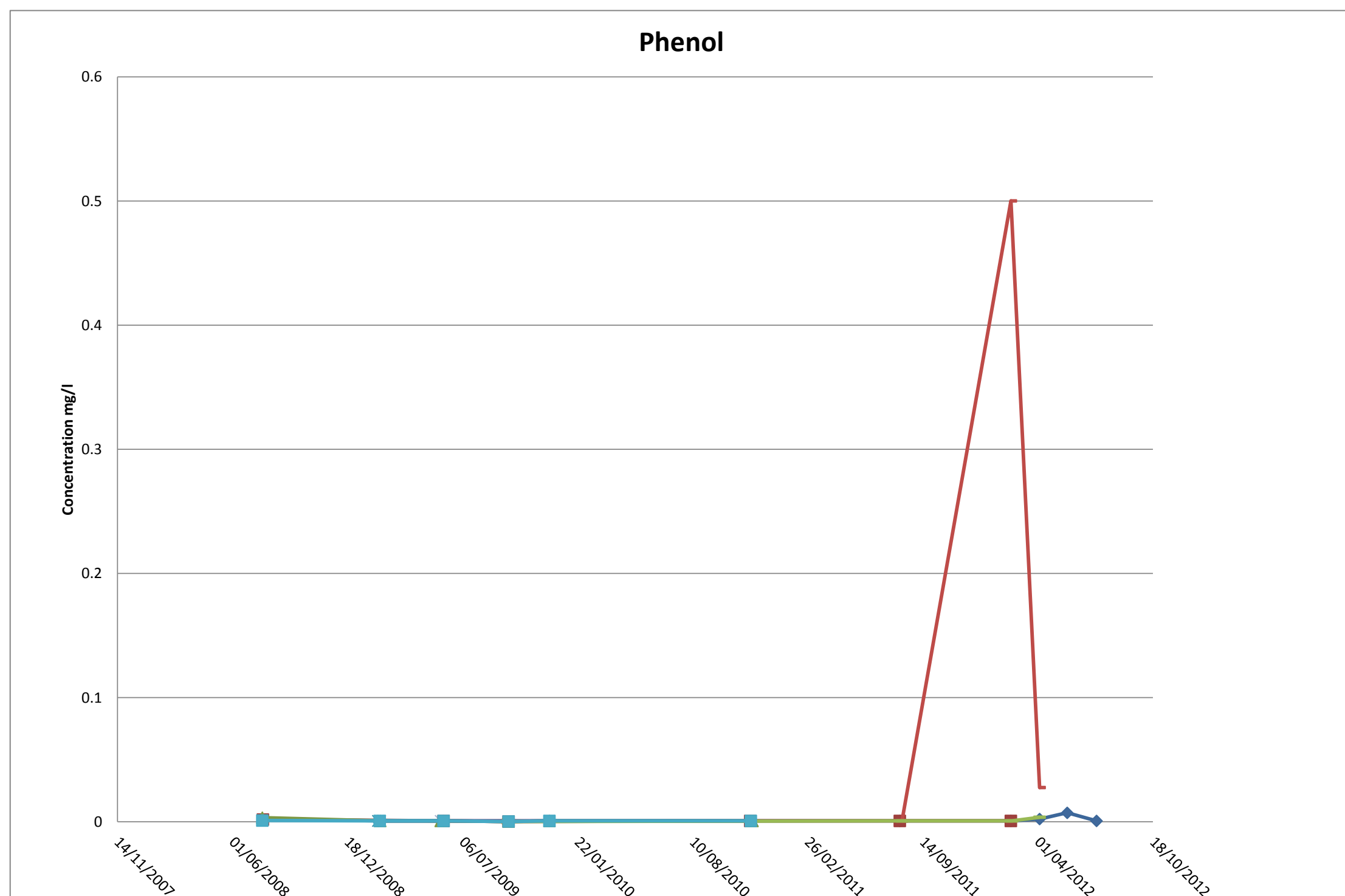


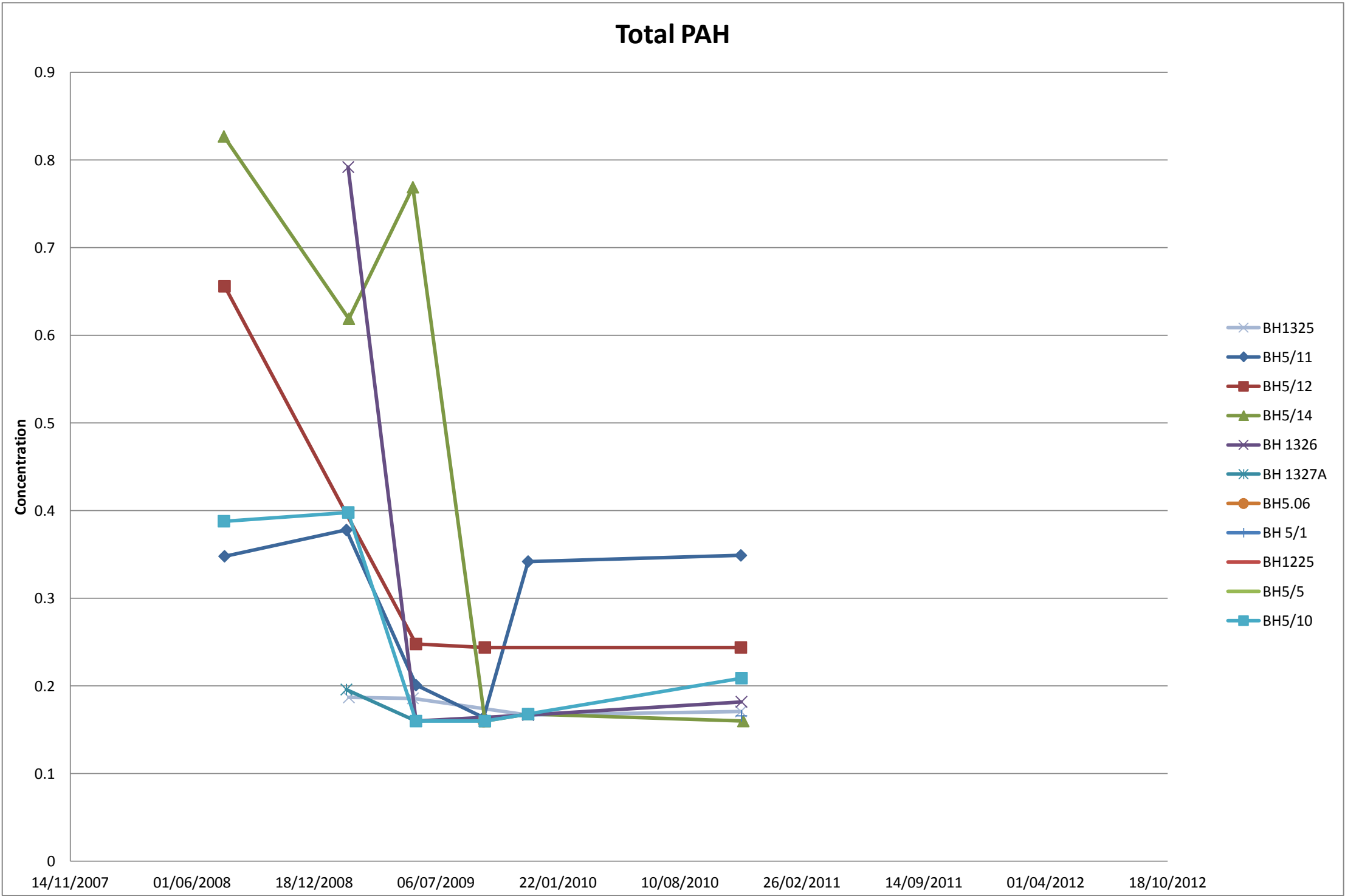












5	2	2	6	6	8	2	45	0	0	0	0	11	0	6	4	1	2	51	6	5	0	0	1	0	0	0	0
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[illegible]

APPENDIX E

Borehole Logs

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 24/11/2005 End 24/11/2005	Equipment, Methods and Remarks Pilcon 1500 Light cable percussion GL - 6.10m. Terminated on engineer's instruction.		Depth from 0.00m to 6.10m Diameter 250mm Casing Depth 6.10m	Ground Level Coordinates National Grid +102.32 mOD E 306340.61 N 183661.38	
Samples and Tests				Strata		
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)
0.10-0.50	B 1		24/11/2005	1000	TOPSOIL: Very soft brown slightly sandy organic CLAY/SILT with many rootlets.	0.10 +102.22 (0.40)
0.50-1.00	B 2				Soft to firm orange brown mottled grey slightly sandy slightly gravelly friable CLAY with occasional rootlets. Gravel is sub-angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	0.50 +101.82
3.00-3.20	B 3				Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional locally some sub-angular to sub-rounded cobbles of sandstone. [GLACIAL DEPOSIT]	(5.60)
4.50-4.70	B 4				4.50-6.10 m grey mottled orange brown.	
6.00-6.10	B 5		24/11/2005 6.10	1640 4.90	EXPLORATORY HOLE ENDS AT 6.10 m	6.10 +96.22
						SP1E SP
Depth	Type & No	Records	Date Casing	Time Water		
Groundwater Entries			Depth sealed (m)		Depth Related Remarks *	
No.	Struck (m)	Post strike behaviour			From to (m)	
1	6.10	Standing at 4.90m (end of shift)				
					Chiselling	
					Depth (m)	
					Time	
					Tools used	
					1.70-2.10 60 mins Chisel	
					2.80-3.10 60 mins Chisel	
					4.10-4.60 75 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taf County Borough Council	
Scale 1:50 (H) MERO 306 v1.20/09/12/2005 17:20:04					Borehole BH5/1 Sheet 1 of 1	

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 25/10/2005 End 25/10/2005	Equipment, Methods and Remarks Picon 1500 Machine excavation GL - 4.20m (TPBH5/4), then backfilled to GL. Light cable percussion GL - 4.20m Terminated on engineer's instruction.		Depth from 0.00m to 4.20m Diameter 250mm Casing Depth 4.20m	Ground Level +95.96 mOD Coordinates E 306479.32 National Grid N 183834.13 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-4.20 m Open holed	25/10/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/4 for details)	(4.20)		
			25/10/2005	1100		4.20	+91.76	
EXPLORATORY HOLE ENDS AT 4.20 m								
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m)		Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council		
Scale 1:50 (c) MESH 358 v1.20a39/12/2005 17:18:36 						Borehole BH5/4 Sheet 1 of 1		

Borehole Log



Soil Mechanics

Drilled MY Logged MY Checked AF	Start 17/11/2005 End 17/11/2005	Equipment Methods and Remarks Pitcon 1500 Machine excavation GL - 5.90m (TPBH5/5), then backfilled to GL. Light cable percussion GL - 3.20m. Large obstruction deflecting casing at 3.20m, terminated on engineer's instruction. Move 1m to BH5/5A		Depth from 0.00m	to 3.20m	Diameter 250mm	Casing Depth 3.20m	Ground Level +105.91 mOD Coordinates E 306481.25 National Grid N 183702.38 Chainage
Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description			Depth, Level (Thickness)
		0.00-3.20 m Open holed	17/11/2005	1445 0.00	Backfilled trial pit arisings (Refer to TPBH5/5 for details)			(3.20)
			17/11/2005	1600 3.20 dry	EXPLORATORY HOLE ENDS AT 3.20 m			3.20 +102.71
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks *			Chiselling Depths (m)
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)		From to (m)			Time Tools used
None observed (see Key Sheet)								2.10 -2.30 105 mins Chisel
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council				Borehole BH5/5 Sheet 1 of 1

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 23/11/2005 End 23/11/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.30m. Light cable percussion GL - 9.00m Terminated on engineer's instruction.		Depth from 0.00m to 9.00m Diameter 250mm Casing Depth 9.00m	Ground Level +102.75 mOD Coordinates E 306512.71 National Grid N 183654.08 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-5.30 m Open holed	23/11/2005	0800	Backfilled trial pit arisings. (Refer to TPBH5/6 for details)	(5.30)		
5.30-6.80 5.30-6.80	B 1 ES 2				MADE GROUND: Firm grey brown slightly sandy gravelly CLAY with occasional angular cobbles of sandstone & concrete. Gravel is angular to sub-angular fine to coarse of concrete sandstone & brick	5.30 +97.45 (1.50)		
6.80-7.60	B 3				Firm grey brown mottled orange brown sandy slightly gravelly CLAY with occasional locally some sub-angular to sub-rounded cobbles of sandstone. Gravel is angular to sub-rounded fine to coarse of sandstone [GLACIAL DEPOSIT]	6.80 +95.95		SPIE SP
7.60-9.00	B 4					(2.20)		
			23/11/2005 9.00	1700 5.90	EXPLORATORY HOLE ENDS AT 9.00 m	9.00 +93.75		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour 1 6.80 Rose to 5.90 m after 20 minutes.					Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used 2.60 -3.00 60 mins Chisel 4.80 -4.80 45 mins Chisel 5.80 -6.00 30 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/6 Sheet 1 of 1	

Φ

Drilled MY Logged AF Checked AF	Start 25/10/2005 End 26/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 5.00m (TPBH5/10), then backfilled to GL. Light cable percussion GL - 6.40m. Terminated on engineer's instruction.		Depth from 0.00m to 6.40m Diameter 250mm Casing Depth 6.40m	Ground Level Coordinates National Grid Chainage +95.11 mOD E 306578.27 N 183909.65			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill Instrument
		0.00-5.00 m Open hole			Backfilled trial pit arisings. (Refer to TPBH5/10 for details)			
5.00	B 1							
5.40	KRH	k=4.2-10 m/s				5.40 +89.71		
5.40	B 2				Firm grey mottled brown slightly sandy locally sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	(1.00)		
					EXPLORATORY HOLE ENDS AT 6.40 m	6.40 +88.71		
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks *	Chiselling Depth (m)	Time	Tools used
Groundwater Entries					From to (m)	4.30 - 4.50	30 mins	Chisel
No. Struck Post strike behaviour						5.10 - 5.30	30 mins	Chisel
None observed (see Key Sheet)								
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council	Borehole BH5/10 Sheet 1 of 1		
Scale 1:50 (N) M200 308 v1.20x09/12/2005 17:18:41								

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 26/10/2005 End 27/10/2005	Equipment, Methods and Remarks Picon 1500 Machine excavation GL - 4.20m (TPBH5/11), then backfilled to GL. Light cable percussion GL - 8.40m. Terminated on engineer's instruction.	Depth from 0.00m to 8.40m Diameter 250mm Casing Depth 8.40m	Ground Level Coordinates National Grid Chainage	+93.36 mOD E 306880.33 N 184024.89			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
			26/10/2005	1230	Backfilled trial pit arisings. (Refer to TPBH5/11 for details)			
4.20	B 1				MADE GROUND: Dark grey clayey sandy angular to sub-rounded fine to coarse GRAVEL of brick, sandstone & concrete with some sub-angular cobbles of sandstone, brick & concrete. Occasional timber fragments.	4.20 +89.16 (1.20)		
5.40 5.40	KRH B 2	k=3.5E-9 m/s			Firm grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	5.40 +87.96 (1.10)		SPIE SP
7.50	B 3		26/10/2005 7.70	1730 dry	Firm brown grey slightly sandy locally sandy gravelly CLAY with occasional sub-angular cobbles of sandstone. Gravel is angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	6.50 +86.86 (1.90)		
			27/10/2005 7.70	0800 8.40				
			27/10/2005 8.40	1100 8.40				
					EXPLORATORY HOLE ENDS AT 8.40 m	8.40 +84.96		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour None observed (see Key Sheet)			Depth sealed (m)		Depth Related Remarks * From to (m) 7.70 8.40 Water added to assist drilling.		Chiselling Depths (m) Time Tools used 4.50 - 4.70 30 mins Chisel 5.00 - 5.20 30 mins Chisel 8.10 - 8.40 45 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/11 Sheet 1 of 1			

Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 27/10/2005 End 28/10/2005	Equipment, Methods and Remarks Pilon 1500 Machine excavation GL - 4.50m (TPBH5/12), then backfilled to GL. Light cable percussion GL - 13.50m. Terminated on engineer's instruction.		Depth from 0.00m to 13.50m Diameter 250mm Casing Depth 13.50m	Ground Level +100.05 mOD Coordinates E 306697.82 National Grid N 183963.76 Chainage			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		0.00-4.50 m Open holed	27/10/2005	1200	Backfilled trial pit arisings. (Refer to TPBH5/12) for details)			
4.50 4.50	ES 1 B 2					(4.50)		
7.50 7.50	ES 3 B 4		27/10/2005 7.60	1800	MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, concrete & brick with occasional locally some sub-angular cobbles of concrete and sandstone.	4.50 +95.55		
			27/10/2005 7.60	0800 6.20	7.60-10.50 m Driller notes large proportion of building rubble.	(6.00)		
			Stratum continues to 10.50 m					
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)		Depth sealed (m)	Depth Related Remarks * From to (m) 3.00 7.60 Water added to assist drilling			Chiselling Depths (m) Time Tools used 5.40-5.60 30 mins Chisel 6.70-6.90 30 mins Chisel 6.90-7.40 60 mins Chisel 8.10-8.40 45 mins Chisel 9.60-9.90 45 mins Chisel		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garmeg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council			Borehole BH5/12 Sheet 1 of 2		

Scale 1:50

(c) MESG 328 v1.20/02/12/2005 17:18:30



Borehole Log



Soil Mechanics

Drilled MY Logged AF Checked AF	Start 27/10/2005 End 28/10/2005	Equipment, Methods and Remarks Pilcon 1500 Machine excavation GL - 4.50m (TPBH5/12), then backfilled to GL. Light cable percussion GL - 13.50m. Terminated on engineer's instruction.		Depth from 0.00m to 13.50m Diameter 250mm Casing Depth 13.50m	Ground Level Coordinates National Grid Chainage +100.05 mOD E 306697.82 N 183963.76			
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness)	Legend	Backfill/ Instruments
10.50 10.50 10.50	KRH ES 5 B 6	k=1.1E-9 m/s			MADE GROUND: Dark brown grey clayey locally very clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone, concrete & brick with occasional locally some sub-angular cobbles of concrete and sandstone. Firm to stiff grey mottled brown slightly sandy slightly gravelly CLAY with occasional locally some sub-angular cobbles of sandstone. Gravel is sub-angular to sub-rounded fine to coarse of sandstone. [GLACIAL DEPOSIT]	10.50 +89.55		
13.50 13.50	ES 7 B 8		27/10/2005 13.50	1700	EXPLORATORY HOLE ENDS AT 13.50 m	13.50 +86.55		
Depth	Type & No	Records	Date Casing	Time Water				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)			Depth sealed (m)		Depth Related Remarks * From to (m) 10.50 13.50 Water added to assist drilling.		Chiselling Depths (m) Time Tools used 12.50 -13.10 75 mins Chisel 13.10 -13.50 60 mins Chisel	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Church Village Bypass - Phase 5 Ground Investigation (Ty Garreg Landfill) Project No. H5141 Carried out for Rhondda Cynon Taff County Borough Council		Borehole BH5/12 Sheet 2 of 2	

RECORD OF BOREHOLE 14

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 101.91 Co-ordinates: 6321.5E, 13735.3N

Intégral Géotechnique

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Project Engineer: A Sirati

Project Number: 8352

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
04.07.02						0.0		Ground Surface
			0.5	D		0.9		MADE GROUND : Orange/brown sandy slightly gravelly CLAY.
			1.0 - 1.45 1.0 - 1.5 1.7	C B D	11	1.6		MADE GROUND : Firm grey/brown gravelly CLAY with occasional broken concrete.
		2.3	2.0 - 2.45 2.0 - 2.5 2.7	C B D	15	2.4		MADE GROUND : Coarse gravel, broken brick and concrete with occasional wood.
04.07.02 05.07.02	3.0		3.0 - 3.45 3.0 - 3.5 3.7	S B D	8	3.6		Loose orange/grey clayey, silty, sandy GRAVEL.
			4.0 - 4.45 4.0 - 4.3	S B	35	4.7		Stiff grey/brown slightly gravelly CLAY.
05.07.02			5.0 - 5.15	C	>50	5.1		Very dense COBBLES and BOULDERS of sandstone.
								END OF BOREHOLE AT 5.1m

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: n/a

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Fax: 029 2034 0789

Co-ordinates: 6321.5, 13735.3

GROUNDWATER OBSERVATIONS

- 1- Ground water strike at 2.30m and rising to 2.30m after 20 minutes (04/07/02)
- 2- Borehole Dry (05/07/02)

1. Equipment:	Pilcon Wayfarer drilling rig
2. Borehole Depth (m):	5.10m

TYPE OF BORING	Shell and Auger
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DIAMETER OF BORING
200mm

DIAMETER OF CASING
200mm

RECORD OF BOREHOLE 15

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 102.95 Co-ordinates: 6433.5E, 13750.4N

Project Engineer: A Sirati

Project Number: 8352

Intégral Géotechnique

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Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
2.7.02			0.00 - 1.00	D		0.0		Ground Surface
			1.00 - 1.45	C	13			
			1.00 - 1.50	B				
			1.50 - 2.00	D				
			2.00 - 2.45	C	8			
			2.00 - 2.50	B				
			2.50 - 3.00	D				
			3.00 - 3.45	C	25			
			3.00 - 3.50	B				
			3.50 - 4.00	D				
			4.00 - 4.45	C	31			
			4.00 - 4.50	B				
			4.50 - 5.00	D				
			5.00 - 5.45	C	19			
			5.00 - 5.50	B				
			5.50 - 6.50	D				
			6.50 - 6.95	C	24			
			6.50 - 7.00	B				
			7.00 - 8.00	D				
		7.90	8.00 - 8.45	C	28			
			8.00 - 8.50	B				
			8.50 - 9.50	D				
2.7.02 3.7.02			9.50 - 9.95	C	32	9.10		MADE GROUND : Soft to firm/loose to medium dense, grey/brown, CLAY/GRAVEL with cobbles and boulders, brick, concrete and tarmac.
			9.50 - 10.20	B				
			10.20 - 10.60	D		10.20		MADE GROUND : Medium dense, grey/brown, clayey GRAVELS/COBBLES of sandstone/limestone.
3.7.02	10.60					10.60		Stiff to very stiff, yellow/grey, gravelly CLAY.
								END OF BOREHOLE AT 10.6m

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment:

Type of boring: Cable percussion
Diameter of boring: 200mm
Diameter of casing: 200mm
Depth of gas/water standpipe: 10.3m

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50 Cathedral Road

Site name: Church Village By Pass

Project Engineer: A. Sirati

Co-ordinates: 6433.5, 13750.4

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GROUNDWATER OBSERVATIONS									
--------------------------	--	--	--	--	--	--	--	--	--

- 1- Ground water strike at 8.4m and rising to 7.9m after 20 minutes (02/07/02)
- 2- Depth to ground water level at 8.20m (03/07/02)

1.	Equipment:	Pilcon Wayfarer drilling rig
2.	Borehole Depth (m):	10.60m

TYPE OF BORING	Shell and Auger
----------------	-----------------

DIAMETER OF BORING
200mm

DIAMETER OF CASING
200mm

RECORD OF BOREHOLE 17

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 102.58 Co-ordinates: 6516.9E, 13734.2N

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Project Engineer: A Sirati

Project Number: 8352

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
27/06/02						0.0		Ground Surface
			0.50	D				
			1.00 - 1.45	C	1			
			1.00 - 1.50	B				MADE GROUND: Very soft, grey/brown, CLAY.
			1.80	D				
			2.00 - 2.45	C	35			
			2.00 - 2.30	B		2.30		MADE GROUND: Obstruction probably concrete block.
			2.80	D		2.70		
			3.00 - 3.45	C	1			MADE GROUND: Very soft, grey, slightly gravelly, slightly sandy, slightly silty CLAY.
			3.00 - 3.50	B				
			3.80	D		3.60		
			4.00 - 4.45	C	9			
			4.00 - 4.50	B				
			4.80	D				
			5.00 - 5.45	C	25			MADE GROUND: Firm becoming stiff to very stiff, grey/brown, gravelly CLAY.
			5.00 - 5.50	B				
			5.80	D				
			6.00 - 6.45	C	41			
			6.00 - 6.50	B				
			6.80	D		6.70		MADE GROUND: Medium dense, red/brown, clayey GRAVEL of mudstone.
			7.00 - 7.45	C	17			
			7.00 - 7.50	B		7.30		MADE GROUND: Medium dense, grey/brown, sandy clayey GRAVEL.
						7.70		
			8.00 - 8.45	C	25			
			8.10 - 8.50	B				
			8.70	W				
			8.80	D				
			9.00 - 9.45	C	5			MADE GROUND: Medium dense but in places loose, clayey, silty, very sandy GRAVEL with tarmac and cobbles.
			9.00 - 9.50	B				
			9.80	D				
			10.00 - 10.45	C	13			

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: 9.1m & 11.3m

RECORD OF BOREHOLE 17

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 102.58 Co-ordinates: 6516.9E,13734.2N

Intégral Géotechnique

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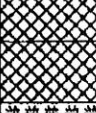
Tel: 029 2022 0462

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Project Engineer: A Sirati

Project Number: 8352

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
27/06/02 28/06/02 28/06/02	11.50		10.00 - 10.50	B	7	10.30		MADE GROUND: Medium dense, tarmac GRAVELS/COBBLES of tarmac with some peat.
			10.80	D		10.70		Soft, very compressible, brown/black, PEAT.
			11.00 - 11.45	S				
			11.00 - 11.50	B		11.30		Soft, grey/brown, slightly sandy, slightly silty, slightly gravelly CLAY.
			11.50	D		11.50		Stiff, grey/ brown, silty CLAY.
	12.0					12.00		END OF BOREHOLE AT 12.00m

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: 9.1m & 11.3m

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**50 Cathedral Road
Cardiff CF11 9LL
Tel: 029 2022 0462
Fax: 029 2034 0789**

Co-ordinates: 6516.9, 13734.2

CHISELLING

GROUNDWATER OBSERVATIONS

1	Groundwater struck at 7.2m. Remaining at 7.2m after 20 mins (27.06.02)
2	Groundwater struck at 9.1m. Rising to 8.7m after 20 mins (27.06.03)

DIAMETER OF CASING
200mm

RECORD OF BOREHOLE 20A

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 100.38 Co-ordinates: 6594.6E, 13869.8N

Project Engineer: A Sirati

Project Number: 8352

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Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
25.6.02						0.0		Ground Surface
			0.0 - 0.5	D				MADE GROUND: Firm to stiff, grey/ brown, CLAY with occasional cobbles.
			1.0 - 1.45 1.0 - 1.5	C B	19	1.8		
			2.0 - 2.45 2.0 - 2.4	C B	47	2.8		MADE GROUND: Firm, grey/ brown, CLAY with some to much brick and tarmac.
		3.0	2.9	D				
			3.0 - 3.45 3.0 - 3.5 3.8	C B D	16	4.1		MADE GROUND: Firm , grey/ brown, CLAY.
			4.0 - 4.45	C	63	4.7		MADE GROUND: Very dense GRAVELS, COBBLES and BOULDERS of concrete.
			4.8	D				
			5.0 - 5.45 5.0 - 5.5	C B	6	5.9		MADE GROUND: Soft, grey, gravelly CLAY.
		6.0	5.8 6.0	D W				
			6.0 - 6.45 6.0 - 6.5 6.8	C B D	3			MADE GROUND: Very soft/ soft to firm in places, grey, gravelly CLAY with layer of dense gravel and tarmac (c.6.9-7.3m).
			7.0 - 7.45 7.3 - 7.5 7.8	C B D	34	8.0		
			8.0 - 8.45 8.0 - 8.5 8.8	C B D	7			MADE GROUND: Soft ,orange/ grey/ brown, gravelly CLAY with bricks, wood and steel.
25.6.02	9.5	9.2	9.0 - 9.45	C	5	9.5		
26.6.02		8.6	9.0 - 9.5 9.7	B D		9.7		MADE GROUND: Soft ,grey/ brown, CLAY.

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: n/a

RECORD OF BOREHOLE 20A

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 100.38 Co-ordinates: 6594.6E, 13869.8N

Intégral Géotechnique

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Cardiff CF11 9LL

Tel: 029 2022 0462

Fax: 029 2034 0789

e mail: mail@integralgeotec.com

Project Engineer: A Sirati

Project Number: 8352

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
26.6.02	12.0		10.0 - 10.45	C	44	10.3		MADE GROUND: Very dense GRAVEL/COBBLES of Concrete, bricks and tarmac.
			10.3 - 10.5	B		10.6		
			10.6	D				
			11.0 - 11.45	S	6	11.1		MADE GROUND: Soft, gey/ brown, gravelly CLAY.
			11.0 - 11.5	B		11.6		
			11.5 - 11.95	S		11		
			11.5 - 12.0	B	12.1			
			12.3	D				
			12.5 - 12.95	C	50	12.9		Soft, dark brown, slightly clayey, slightly gravelly, sandy SILT.
			12.5 - 12.9	B		13.1		
			13.0 - 13.1	C				
					>50			Firm, orange/grey, CLAY.
								Stiff, grey/green, slightly sandy, silty CLAY.
			END OF BOREHOLE 13.1m					

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: n/a

20A

Intégral Géotechnique

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Tel: 029 2022 0462

Fax: 029 2034 0789

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GROUNDWATER OBSERVATIONS

- 1 Groundwater struck at 3.0m. Remaining at 3.0m after 20 mins.
- 2 Groundwater struck at 6.2m. Rising to 6.00m after 20 mins.
- 3 Groundwater level at 9.20m at 17.00 on 25.6.02
- 4 Groundwater level at 8.60m at 08.00 on 26.6.02

REMARKS

- | | |
|------------------------|------------------------------|
| 1. Equipment: | Pilcon Wayfarer drilling rig |
| 2. Borehole Depth (m): | 13.1m |

TYPE OF BORING	Shell and Auger
----------------	-----------------

DIAMETER OF BORING
200mm

DIAMETER OF CASING
200mm

RECORD OF BOREHOLE 21A

Client: Rhondda Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 103.41

Co-ordinates: 6593.72E, 13770.25N

Project Engineer: A Sirati

Project Number: 8352

Intégral Géotechnique

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Cardiff CF11 9LL

Tel: 029 2022 0462

Fax: 029 2034 0789

e mail: mail@integralgeotec.com

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
24/06/02			0.00			0.00		Ground Surface
			0.5	D				
			1.00-1.45	C	6			
			1.00-1.50	B				MADE GROUND: Loose to medium dense, brownish grey, sandy, clayey, silty GRAVEL.
			2.00-2.45	C	11			
		2.50	2.00-2.50	B				
			2.70	D		2.7		
24/06/02	3.00		3.00-3.35	C	>50	3.2		MADE GROUND: Very dense, grey, COBBLES of sandstone and concrete.
								END OF BOREHOLE AT 3.20m

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon Wayfarer

Type of boring: Cable percussion

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: n/a

21A

50 Cathedral Road

Site name: Church Village By Pass

Project Engineer: A. Sirati

Co-ordinates: Not used

Tel: 029 2022 0462

Fax: 029 2034 0789

CHISELLING

[illegible]

GROUNDWATER OBSERVATIONS

- 1 Water strike at 2.5m and remaining at 2.5m after 20 minutes.

REMARKS

- | | | |
|----|---------------------|-------------------------|
| 1. | Equipment: | Pilcon 150 drilling rig |
| 2. | Borehole Depth (m): | 3.20m |

TYPE OF BORING	Shell and Auger
----------------	-----------------

DIAMETER OF BORING
200mm

DIAMETER OF CASING
200mm

RECORD OF BOREHOLE 22A

Client: Rondra Cynon Taff

Site Name: Church Village Bypass

Ground Level mOD: 103.85 Co-ordinates: 6723.3E, 13903.9N

Project Engineer: A.S.

Project Number: 8352

Intégral Géotechnique

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e mail: mail@integralgeotec.com

Daily Progress	Casing Depth (m)	Water Depth (m)	Samples/Tests			Depth (m)	Legend	Description
			Depth (m)	Type/No.	SPT (N)			
17.06.02						0.0		Ground Surface
			0.50	D1				
			1.00 - 1.45	C2	7			
			1.00 - 1.50	B3				
			1.80	D4				
17.06.02	2.00		2.00 - 2.45	C5	5			MADE GROUND: Loose to medium dense in places, grey/brown, clayey, sandy GRAVEL with occasional brick.
18.06.02			2.00 - 2.50	B6				
			2.80	B7				
			3.00 - 3.45	C8	14			
			3.00 - 3.50	B9				
			3.8	D10		3.8		
			4.00 - 4.45	C11	43			MADE GROUND: Loose to medium dense/ dense in places, grey/brown, very clayey, sandy GRAVEL of bricks, concrete, stone and occasional wood.
			4.00 - 4.50	B12				
			4.90	D13				
			5.00 - 5.45	C14	9			
			5.10 - 5.50	B15				
			5.80	D16				
			6.00 - 6.45	C17	5			
			6.00 - 6.50	B18				
			6.80	D19		6.7		
			7.00 - 7.45	C20	20			
			7.00 - 7.50	B21				
			7.80	D22				
			8.00 - 8.45	C23	13			
			8.00 - 8.50	B24				
			8.80	D25				
			9.00 - 9.45	C26	17			
			9.00 - 9.50	B27				
			9.80	D28				
			10.00 - 10.45	C29	23			

REMARKS

1. See attached sheet for details of in situ tests, groundwater observations and chiselling, where appropriate.

Sample/Test Types

B = bulkdisturbed
W = water sample
D = small disturbed
SPT = standard penetration test
C = SPT using solid cone
S = SPT using split spoon
U = undisturbed

Equipment: Pilcon

Type of boring: Shell and Auger

Diameter of boring: 200mm

Diameter of casing: 200mm

Depth of gas/water standpipe: n/a

22A

Client: Rhondda Cynon Taff

Project Number: 8352

Ground level: Not used

50 Cathedral Road

Tel: 029 2022 0462

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GROUNDWATER OBSERVATIONS

1- Borehole Dry.

REMARKS

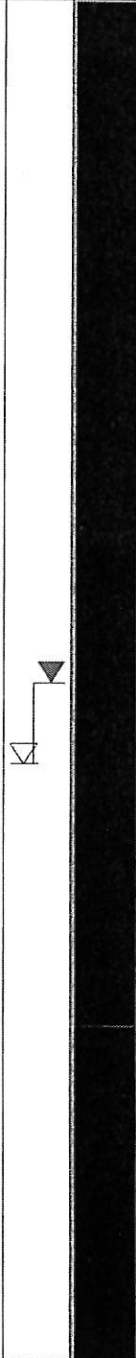
- | | | |
|----|---------------------|-------------------------|
| 1. | Equipment: | Pilcon 150 drilling rig |
| 2. | Borehole Depth (m): | 15.10m |

TYPE OF BORING
Shell and Auger

DIAMETER OF BORING
200mm

DIAMETER OF CASING
200mm

 Geotechnical Services	Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1225
	Contract Number: 5079	Date Started: 25/07/2008	Logged By: TDP	Checked By: JAF	
Cable Percussion Borehole Log	Easting: 6660.74	Northing: 13787.33	Ground Level: 105.133	Plant Used: Dando 2000	Sheet 1 of 2 Scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth (m)	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	Water Strike(s)	Backfill/Installation
0.50-1.20	B 001					MADE GROUND: Long grass over soft to firm brown/grey slightly sandy gravelly clay with occasional fragments of brick and concrete. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone.		
1.20-1.65	U 002	*35/0.45m						
1.70	D 003					At 1.70m Some pockets of dark grey sandy clay.		
2.00	D 004			(4.00)		At 2.00m Mottled orange/brown.		
2.20-2.65	D 005	S(6)				From 2.20m Rare brick and concrete fragments.		
2.20-2.70	B 006							
3.00	D 007					At 3.00m 1 Sandstone cobble (<75mm).		
3.20	U	*150/0.00m						
3.70	U							
4.00-4.45	D 008	S(36)	101.13	4.00		MADE GROUND: Stiff to very stiff brown locally grey/brown slightly gravelly sandy clay with some pockets of grey sandy clay with occasional subangular to subrounded cobbles of sandstone. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone and rare flint (Driller notes wood and metal fragments).		
4.00-4.50	B 009 010							
5.00-5.50	B 011	C(17)		(2.50)				
6.00	D 012					At 6.00m Gravelly.		
6.50-6.95	D 013	C(17)	98.63	6.50				
6.50-7.00	B 014			(1.50)		MADE GROUND: Stiff locally firm grey/brown slightly sandy gravelly clay with occasional fragments of brick, wood and concrete. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone and rare chert.		
7.50	D 015					Stiff laminated grey/brown slightly sandy CLAY with rare sand laminations and rare subangular fine to coarse gravel of sandstone. Sand is fine to medium with rare shell fragments.		
8.00-8.45	D 016	S(18)	97.13	8.00				
8.00-8.50	B 017							
9.00	D 018					At 9.00m Sandy.		
		C(22)		(2.80)				

Continued next sheet

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks: 1. Hand dug inspection pit to 1.20m. No services encountered. 2. Groundwater encountered at 5.60m, rose to 5.00m after 20 minutes. 3. Borehole terminated on hard strata. (10m) and moved to BH1225A. Release Status: Preliminary
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
					10.00	150	
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					10.80	150	

		Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1225	
		Contract Number: 5079	Date Started: 25/07/2008	Logged By: TDP	Checked By: JAF	Sheet 2 of 2	
Geotechnical Services		Easting: 6660.74	Northing: 13787.33	Ground Level: 105.133	Plant Used: Dando 2000	Scale: 1:50	
Cable Percussion Borehole Log							
Samples & In Situ Testing			Strata Details				Groundwater
Depth (m)	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	Water Strike(s) Backfill/Installation
10.20 10.30-10.75 10.30-10.80	D 001 D 002 B 003	S(21)	94.33	10.80		Stiff laminated grey/brown slightly sandy CLAY with rare sand laminations and rare subangular fine to coarse gravel of sandstone. Sand is fine to medium with rare shell fragments. From 10.20m Grey, sandy with slight creosote odour.	
						End of Borehole at 10.80 m	
							11
							12
							13
							14
							15
							16
							17
							18
							19
Boring Progress & Water Observations			Depth/Casing Diameter		Remarks:		
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	1. Hand dug inspection pit to 1.20m. No services encountered 2. Groundwater encountered at 5.60m, rose to 5.00m after 20 minutes. 3. Borehole terminated on hard strata. (10m) and moved to BH1225A.
					10.00	150	
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					10.80	150	
Release Status: Preliminary							

 Geotechnical Services Cable Percussion Borehole Log	Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1226	
	Contract Number: 5079		Date Started: 07/08/2008		Logged By: TDP	
	Easting: 6569.99		Northing: 13877.33		Checked By: JAF	
		Ground Level: 98.364		Plant Used: Dando 2000		Sheet 1 of 2 Scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater		
Depth (m)	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	Water Strike(s)	Backfill/Installation	
0.00-1.00	B 001		96.76	(1.60)		MADE GROUND: Soft to firm brown sandy gravelly clay with occasional cobbles and some fragments (<100mm) of concrete and brick sand. Sand is fine to medium. Gravel is fine to coarse. Gravel and cobbles are subangular to subrounded fine to coarse of sandstone.			
1.20-1.70	B 002	C(50)				From 1.20m Very gravelly with plastic and wood fragments (<80mm)	1		
2.00	D 003			1.60			MADE GROUND: (Stiff) grey/brown slightly sandy gravelly clay with frequent subangular to subrounded fragments of concrete (<110mm) brick (<60mm) and plastic (<60mm). Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone and rare flint. Slightly concrete odour.		2
2.20-2.70	B 004	C(20)							
3.00	D 005						From 3.00m Frequent subrounded gravel sized sandstone fragments.		3
3.20-3.70	B 006	C(26)							From 3.20m Very gravelly.
4.00	D 007						From 4.20m Some subangular to subrounded sandstone cobbles.		4
4.20-4.70	B 008	C(50)							
5.00	D 009						At 5.00m Some pockets (<40mm) of red brown sandy clay.		5
5.20-5.70	B 010	C(15)							From 5.20m to 5.70m Two wood fragments (<150mm)
6.00	D 011			(8.50)					6
6.70-7.20	B 012	C(39)							
8.00	D 013				From 8.20m to 8.70m One red brick fragment (<85mm).	8			
8.20-8.70	B 014	C(28)							
9.00	D 015					9			
9.70-10.20	B 016	C(50)							

Continued next sheet

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks:
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
07/08/2008	1800	6.00	6.00	-	10.50	200	
08/08/2008	1600	10.80	10.50	-			
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					10.80	210	

Release Status: Preliminary

		Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1226	
		Contract Number: 5079	Date Started: 07/08/2008	Logged By: TDP	Checked By: JAF	Sheet 2 of 2	
Geotechnical Services		Easting: 6569.99	Northing: 13877.33	Ground Level: 98.364	Plant Used: Dando 2000	Scale: 1:50	
Cable Percussion Borehole Log							

Samples & In Situ Testing			Strata Details				Groundwater	
Depth (m)	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	Water Strike(s)	Backfill/ Installation
10.50	D 017		88.26	10.10 (0.70)		MADE GROUND: (Stiff) grey/brown slightly sandy gravelly clay with frequent subangular to subrounded fragments of concrete (<110mm) brick (<60mm) and plastic (<60mm). Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone and rare flint. Slightly concrete odour.		
			87.56	10.80		Very dense grey/brown slightly sandy GRAVEL/COBBLES of strong fine to medium grained sandstone. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of sandstone. AL10.50m Recovered as sandy gravelly clay. End of Borehole at 10.80 m		
							11	
							12	
							13	
							14	
							15	
							16	
							17	
							18	
							19	

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks: 1. Hand dug inspection pit to 1.20m depth. No services encountered. 2. Bentonite seal of 2m for Rotary follow-on (8.80-10.80m). 3. Borehole terminated on client's instruction. 4. On completion 50mm plain pipe with piezo tip installed as shown.
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
07/08/2008	1800	6.00	6.00	-	10.50	200	
08/08/2008	1600	10.80	10.50	-			
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					10.80	210	
Release Status: Preliminary							

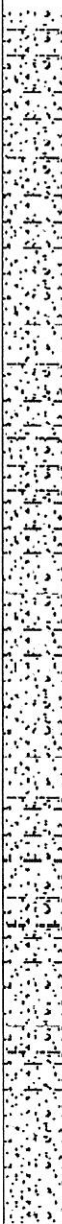
 Geotechnical Services	Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1227
	Contract Number: 5079	Date Started: 11/08/2008	Logged By: TDP	Checked By: JAF	Sheet 1 of 1
	Easting: 6661.24	Northing: 13950.99	Ground Level: 99.189	Plant Used: Dando 2000	Scale: 1:50

Samples & In Situ Testing			Strata Details				Groundwater	
Depth (m)	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	Water Strike(s)	Backfill/Installation
0.00-1.00	B 001		98.89	(0.30) 0.30		MADE GROUND: Brown clay/cobbles and sand (Drillers Description)		
1.20-1.70	B 002	C(11)						
2.00	D 003							
2.20-2.70	B 004	C(50)						
3.00	D 005			(5.20)				
3.20-3.70	B 006	C(40)						
4.00	D 007							
4.20-4.70	B 008	(50)						
5.00	D 009	C(50)						
			93.69	5.50			End of Borehole at 5.50 m	

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks: 1. Hand dug inspection pit to 1.20m. No services encountered. 2. Groundwater encountered at 4.50m, no rise after 20 minutes. 3. Chiselling from 4.80m to 5.00m (1.00hr) and 5.50m (1 hour). 4. Borehole terminated on hard strata and moved to BH1227A. 5. Borehole backfilled with bentonite.
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
11/08/2008	1800	5.00	-	-	5.50	200	
12/08/2008	1000	5.50	5.50	-			
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					5.50	200	

Release Status: Preliminary

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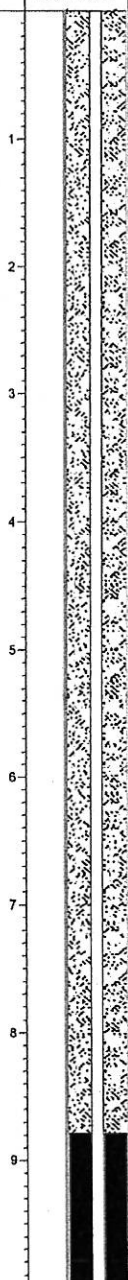
 Geotechnical Services				Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1325		
				Contract Number: 5079		Date Started: 14/08/2008		Logged By: TP		Checked By: JAF
Rotary Cored Borehole Log				Easting: 6660.89		Northing: 13787.51		Ground Level: 105.043		
						Plant Used: Klemm		Scale: 1:50		
Coring Information				Samples & In Situ Testing		Strata Details				
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	
						94.54	10.50	 (10.00)	Drilled by cable percussion (see log)	
									Clayey cobbly GRAVEL (Drillers description)	
									Continued next sheet	
Boring Progress & Water Observations						Depth/Casing Diameter		Remarks:		
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	1. CP Rig cased BH in 8" to 10.50m depth. 2. Gas monitored during drilling. 3. Borehole terminated on hard strata. 4. Rotary follow-on to bedrock. 5. On completion 50mm installation as shown.			
14/08/2008	1110	21.50	20.50	-	10.50 20.50	200 140				
Depth/Borehole Diameter										
Depth (m)						Borehole Diameter (mm)				
21.50						115		Release Status: Preliminary		

 Geotechnical Services		Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1325	
		Contract Number: 5079	Date Started: 14/08/2008	Logged By: TP	Checked By: JAF	Sheet 3 of 3	
Rotary Cored Borehole Log		Easting: 6660.89	Northing: 13787.51	Ground Level: 105.043	Plant Used: Klemm	Scale: 1:50	

Coring Information				Samples & In Situ Testing		Strata Details				Groundwater, Backfill & Installation
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	
						84.54	20.50		Clayey cobbly GRAVEL (Drillers description)	
							(1.00)		MUDSTONE (Drillers description)	21
						83.54	21.50		End of Borehole at 21.50 m	22
										23
										24
										25
										26
										27
										28
										29

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks: 1. CP Rig cased BH in 8" to 10.50m depth. 2. Gas monitored during drilling. 3. Borehole terminated on hard strata. 4. Rotary follow-on to bedrock. 5. On completion 50mm installation as shown.
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
14/08/2008	1110	21.50	20.50	-	10.50	200	
					20.50	140	
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					21.50	115	
Release Status: Preliminary							

 Geotechnical Services Rotary Cored Borehole Log	Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1326	
	Contract Number: 5079		Date Started: 12/08/2008		Logged By: TDP	
	Easting: 6569.94		Northing: 13877.55		Checked By: JAF	
		Ground Level: 98.363		Plant Used: Klemm		Sheet 1 of 2 Scale: 1:50

Coring Information				Samples & In Situ Testing			Strata Details			Groundwater, Backfill & Installation
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	
							(11.00)		Cable percussion cased 10.80m, Rotary follow-on.	
Continued next sheet										

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks:
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
13/08/2008	0800	0.00	-	-	10.80	203	
13/08/2008	1150	17.00	-	-	16.00	140	
13/08/2008	1215	17.00	-	-			
					Depth/Borehole Diameter		1. Cable Percussion cased BH in 8" to 10.80m depth. 2. Gas monitored during drilling. 3. Borehole terminated on hard strata. 4. Rotary follow-on to bedrock. 5. On completion 50mm installation as shown.
					Depth (m)	Borehole Diameter (mm)	
					17.00	115	
							Release Status: Preliminary

 Geotechnical Services		Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1326	
		Contract Number: 5079	Date Started: 12/08/2008	Logged By: TDP	Checked By: JAF	Sheet 2 of 2	
		Easting: 6569.94	Northing: 13877.55	Ground Level: 98.363	Plant Used: Klemm	Scale: 1:50	

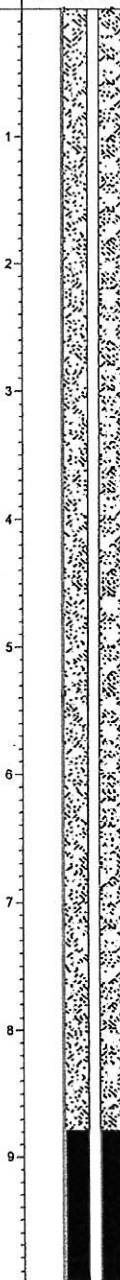
Coring Information				Samples & In Situ Testing		Strata Details				Groundwater, Backfill & Installation
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	
									Cable percussion cased 10.80m, Rotary follow-on.	
						87.36	11.00		Clayey cobbly GRAVEL (Drillers description)	
							(5.00)			
						82.36	16.00		MUDSTONE (Drillers description)	
							(1.00)			
						81.36	17.00		End of Borehole at 17.00 m	

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks:
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
13/08/2008	0800	0.00	-	-	10.80	203	
13/08/2008	1150	17.00	-	-	16.00	140	
13/08/2008	1215	17.00	-	-			

Depth/Borehole Diameter	
Depth (m)	Borehole Diameter (mm)
17.00	115

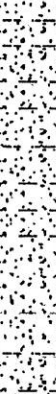
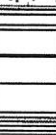
Release Status: Preliminary

 Geotechnical Services Rotary Cored Borehole Log		Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1327A	
		Contract Number: 5079	Date Started: 14/08/2008	Logged By: TDP	Checked By: JAF	Sheet 1 of 2	
		Easting: 6661.00	Northing: 13951.02	Ground Level: 99.149	Plant Used: Klemm	Scale: 1:50	

Coring Information				Samples & In Situ Testing		Strata Details				Groundwater, Backfill & Installation
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description	
							(10.50)		CP rig cased to 10.50m	
Continued next sheet										

Boring Progress & Water Observations					Depth/Casing Diameter		Remarks:
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
14/08/2008	1335	17.50	10.50	-	10.50	200	
14/08/2008	1355	17.50	10.50	-	17.50	140	
14/08/2008	1435	17.50	10.50	-			
					Depth/Borehole Diameter		1. CP Rig cased BH in 8" to 10.50m depth. 2. Gas monitored during drilling. 3. Borehole terminated on hard strata. 4. Rotary follow-on to bedrock. 5. On completion 50mm installation as shown.
					Depth (m)	Borehole Diameter (mm)	
					10.50 17.50	200 140	
Release Status: Preliminary							

 Geotechnical Services Rotary Cored Borehole Log	Contract Name: Church village bypass		Client: Costain Limited		Borehole ID: BH1327A Sheet 2 of 2 Scale: 1:50		
	Contract Number: 5079		Date Started: 14/08/2008			Logged By: TDP	Checked By: JAF
	Easting: 6661.00		Northing: 13951.02			Ground Level: 99.149	Plant Used: Klemm

Coring Information				Samples & In Situ Testing		Strata Details				Groundwater, Backfill & Installation	
TCR	SCR	RQD	FI	Depth (m) / Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)	Legend	Strata Description		
						88.65	10.50		CP rig cased to 10.50m		
											Clayey cobbly GRAVEL
							(6.00)				
						82.65	16.50		MUDSTONE (Drillers description)		
							(1.00)				
						81.65	17.50		End of Borehole at 17.50 m		

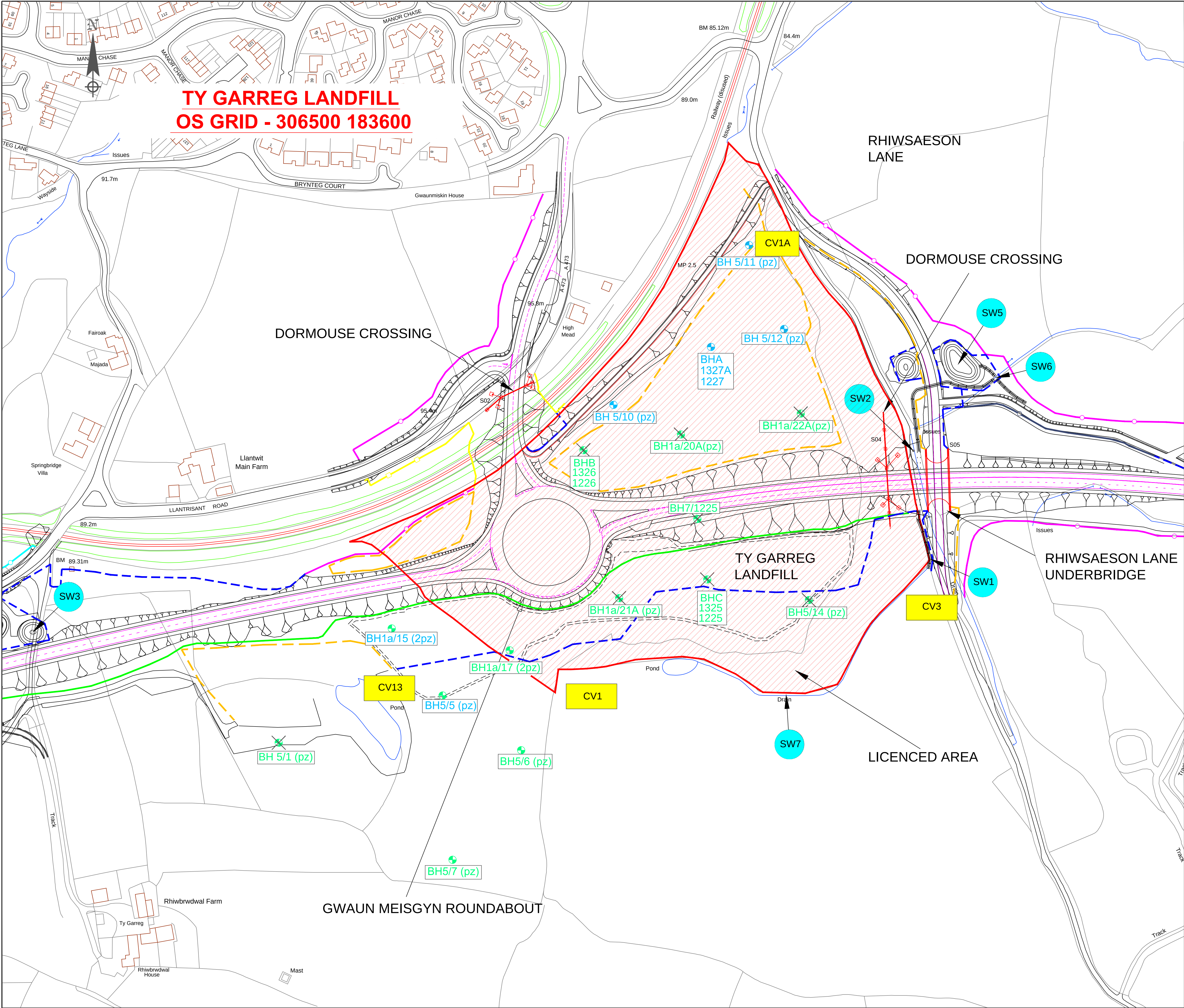
Boring Progress & Water Observations					Depth/Casing Diameter		Remarks:
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	
14/08/2008	1335	17.50	10.50	-	10.50	200	
14/08/2008	1355	17.50	10.50	-	17.50	140	
14/08/2008	1435	17.50	10.50	-			
					Depth/Borehole Diameter		
					Depth (m)	Borehole Diameter (mm)	
					10.50	200	
					17.50	140	

Release Status: Preliminary

Geotechnical Services							Contract Name: Church Village Peizos		Client: Costain		Borehole ID: BH 7/1225	
Rotary Cored Borehole Log							Contract Number: 4073	Date Started: 09/07/2010	Logged By:	Checked By:	Sheet 1 of 1	
							Easting: -	Northing: -	Ground Level (mOD): -	Plant Used: Griffin Rotary	Scale: 1:50	
Coring Information						Samples & In Situ Testing		Strata Details			Groundwater Backfill & Installation	
TOR	SCR	RCD	Fracture Spacing Ave Min Max			Run	Sample ID	Test Result	Level (m AOD)	Depth (m) (thickness)		Legend
												MADE GROUND: Clay and gravel. (Drillers Description)
										(6.70)		
										6.70		Clay and boulders. (Drillers Description)
										(3.30)		
End of Borehole at 10.00 m												
Boring Progress & Water Observations						Depth/Casing Diameter		Remarks:				
Date	Time	Borehole Depth (m)	Depth of Casing (m)	Water Depth (m)	Depth (m)	Casing Diameter (mm)	Position CAT scanned before drilling. No services encountered. Borehole open holed from ground level. Borehole 50mm pipe installed with response zone between 5.2m and 7.7m depth. All geology descriptions are drillers descriptions and not engineers descriptions.					
09/07/2010	0800	0.00	-	-								
09/07/2010	1730	10.00	-	-								
						Depth/Borehole Diameter						
						Depth (m)	Borehole Diameter (mm)					
						10.00	125					
Release Status: Preliminary												

APPENDIX F

Fig 5 Rev A



TY GARREG LANDFILL
OS GRID - 306500 183600

AMENDMENTS				
Rev. Ref.	DETAILS	Date	Made By	Chkd By
A	Boreholes amended	10/15	PG	MGR

Key

- Boreholes currently monitored
- Boreholes not currently monitored
- Abandoned Boreholes
- Licence Boundary
- Close Boarded Fence HCD Detail H14
- Newt Fence
- Post and 4 Rail Fence
- Stock Proof Post and 4 Rail Fence
- Stock Proof Post and Wire Fence
- Stock Proof Post and 4 Rail Fence with Barbed Wire
- Surface Water Sampling Location
- Previous Surface Water Sampling Location

Notes

SW2 is in reference to sampling chamber.

SW7 access permitting

DO NOT SCALE FROM THIS DRAWING

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Client :
Project :
Title :
Church Village Bypass

Drawn SID W:\acsoft\Signatures\Drawers_Sign_P01		Approved WP 	
Checked MS M.S. has.	Date Feb '12	Scale 1:1250	Original drawing A1
Job No. GC/000041	Orig No. SW01	Rev. A	

APPENDIX G

Table 6.3 rev A

Table 6.3: Exceedances of EQS Values in micro grams/litre (Rev A)

Determinand	EQS	Max recorded Concentration	Monitoring Location	Dates
Selenium	10	11	BH5/14 (within landfill)	23/07/2008 24/09/2009
Manganese	400	11000	BH5/1* (up gradient) BH5/5 (up gradient) BH5/6 (up gradient) BH5/14 (within landfill) BH5/10 (within landfill) BH5/12 (within landfill) BH1225 (within landfill) BH5/11 (within landfill)	Frequent exceedances between: 09/2009 & 07/2012
Iron	1000	16500	BH5/5 (up gradient) BH5/14 (within landfill) BH5/10 (within landfill) BH5/12 (within landfill) BH1225 (within landfill) BH5/11 (within landfill)	Frequent exceedances between: 09/2009 & 07/2012
Sodium	133000	225000	BH5/12 (within landfill)	24/07/2008 03/06/2009 24/09/2009 04/12/2009
Chloride	187500	341000	BH5/12 (within landfill)	24/07/2008 03/06/2009 24/09/2009 04/12/2009
Aluminium	150	180	BH5/10 (within landfill)	23/07/2008 12/02/2009

Appendix H

Paragraph 6.1 Rev A

6 Groundwater Monitoring (rev A)

6.1.1 Locations

The site has been subjected to intensive investigation for the bypass development. The majority of groundwater monitoring installations were installed by Halcrow and Soil Mechanics during a fifth stage of investigation in 2005.

During the construction of the bypass, a number of boreholes were lost or damaged during the earthworks; resulting in only four locations being available in 2012. The boreholes that were lost between July 2008 and July 2012, together with those unable to be monitored and those remaining are shown in Table 6.1.

Table 6.1: Groundwater Monitoring Boreholes

Boreholes Monitored up to July 2012	BH5/5, BH5/11, BH5/12, BHA(1225)
Boreholes Not monitored	BH5/6, BH5/7, BH1a/17, BH1a/15
Boreholes Lost (construction / abandoned)	BH5/10, BH1a/22A, BH5/14, BH5/4, BH1225, BH5/1, BH2/X03, BH5/2

In order to determine the influence of the landfill on the groundwater the data The boreholes used to collect groundwater information have been grouped as those up gradient of the landfill and those within the land fill material. The location of the boreholes is provided on Figure 4.and summarised in the Table 6.2.

Table 6.2: Location of Groundwater Monitoring Boreholes

Boreholes installed up gradient of the site	Boreholes installed within the site
BH5/1*	BH5/14
BH5/5	BH5/10
BH5/6	BH5/12
	BH1225
	BH5/11

With the exception of BH5/1, the response zones of the monitoring wells were installed within superficial deposits of the Ty Garreg landfill or in the neighbouring historical landfill to the south west.

Borehole BH5/1 was installed outside the extent of the landfill material with a response zone in the bedrock aquifer.

All the boreholes remain on the site in-situ, none have been removed.

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