GROUNDWATER MONITORING REPORT 2019

EnerSys, Newport.
Stephenson Street, Newport.
NP19 4XJ

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GROUNDWATER MONITORING REPORT AT ENERSYS, NEWPORT

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ACRONYMS / TERMS USED IN THIS REPORT

AOD	Above Ordnance Datum
BH	Borehole
EA	Environment Agency
ECL	Environmental Compliance Limited
EQS	Environmental Quality Standard
NRW	Natural Resources Wales
Pb	Lead
TPH	Total Petroleum Hydrocarbons

1. SUMMARY

1.1. The Study

1.1.1. EnerSys Newport is required by Natural Resources Wales ("NRW") to undertake routine groundwater sampling at its Newport site. The results outlined in this report represent the current groundwater conditions within the installation boundary.

1.1.2. The site groundwater sampling was undertaken on the 30th April 2019. The sampling was undertaken by Environmental Compliance Ltd ("ECL").

1.1.3. The locations of the current groundwater installations/boreholes ("BH") are identified in the Borehole Location Diagram found in Appendix A of this report. Of the eight boreholes on-site, samples were extracted from seven as unfortunately BH09 was blocked on the day the survey was conducted.

1.1.4. A second phase of monitoring was undertaken on the 7th August 2019 targeting BH09. A sample was obtained and scheduled for laboratory analysis. The results are presented in Appendix C.

1.1.5. BH01 exceeds the lead Environmental Quality Standard ("EQS") guideline level (of 25µg/l) with a result of 440µg/l. The concentration has increased from April 2018. BH09 was also found to exceed this EQS with a concentration of 97µg/l.

1.1.6. The exceedance of the Lead EQS in BH01 and BH09 could potentially be explained by contaminative historic processes. It is understood a high volume of lead processing has occurred within the general site area since the 1950's, potentially resulting in a legacy of lead related issues. The Terra-Firma report (2007) [Appendix H, section 2.5.3] reports a generally high background concentration of lead within the subsurface materials on site.

1.1.7. Similarly, the exceedance of the sulphate EQS of 250,000µg/l in BH08 (with a concentration of 310,000µg/l) appears to be an isolated exceedance which could potentially be related to neighbouring off-site activities involving the handling of hazardous chemicals. However, this would need to be investigated further in order to establish the origin of the source and/ or whether the result is an anomaly.

1.1.8. There is no clear trend in either the depth of groundwater, temperature or pH.

1.1.9. A full table of results may be found in Appendix C and a trend analysis of selected contaminants can be found in Chapter 5 of this report.

2. INTRODUCTION

2.1. Site Location

2.1.1. The site is located at:
EnerSys Newport.
Stephenson Street,
Newport,
Gwent
NP19 4XJ.

2.2. Details of Installation

2.2.1. The installation is designed for the manufacturing of specialised lead acid batteries.

2.3. Groundwater Monitoring Approach

2.3.1. Previous groundwater monitoring has been undertaken by Terrafirma in October 2007, July 2008, November 2010 and by Environmental Compliance ("ECL") in 2013, 2014, 2015, 2016, 2017 and 2018.

2.3.2. This report is updated following each round of groundwater monitoring and contains the following:

- results of on-going monitoring;
- graphs to identify any trends; and
- laboratory testing results.

3. INVESTIGATION AND SAMPLING STRATEGY

3.1. General

3.1.1. The groundwater monitoring was undertaken on the 30th April 2019 with a second phase of monitoring undertaken on the 7th August 2019 in order to obtain a sample from BH09 which was obstructed during the April visit.

3.1.2. The sampling was undertaken by ECL. The locations of the groundwater installations/boreholes ("BH") are identified in the Borehole Location Diagram found in Appendix A of this report.

3.1.3. In addition, the Terra Firma report (07th November 2007) has been provided as Appendix H. This report includes a Conceptual Site Model illustrating the anticipated groundwater flow direction as well as detailing the encountered geological composition of the Site (refer to Section 2.4.1 of Appendix H for details). This is supported by a hydrological review undertaken by Swan Environmental Services in May of 2018 (refer to Appendix I for details).

3.2. Sampling History

3.2.1. Results for aliphatic/aromatics may deviate for BH06 in April 2013 due to inappropriate sample containment. This was due to the limited availability of groundwater, only 1 litre was obtained without purging from BH06.

3.2.2. Sample data for BH01 and BH08 is unavailable for October 2007 due to insufficient samples retrieved at the time of the survey.

3.2.3. Sample data for BH06 and BH07 is unavailable for July 2008 due to insufficient samples retrieved at the time of the survey.

3.2.4. From November 2010 onwards, there is no sample data for BH02, BH05 and BH07 as they were accidentally destroyed. These were replaced by BH9, BH10 and BH11 which are located in the vicinity of the original boreholes.

3.2.5. Groundwater temperature is unavailable for the October 2007 survey.

3.2.6. Data for groundwater temperature and depth to groundwater is unavailable for the April 2008 and November 2010 surveys.

3.2.7. During the April 2015 survey, BH3 was being relocated due to safety issues. Groundwater samples were taken from the original BH3 before it was infilled and relocated 1.5m away from the path. This is now known as BH12, however, due to the close proximity to BH3 the results will be grouped with BH3 in order to continue trend analysis.

3.3. Groundwater Sampling Techniques and Protocols

3.3.1. Groundwater Sampling, Collection and Analysis Protocol

The Groundwater Sampling, Collection and Analysis Protocol consists of the following:

- Depth to groundwater was recorded using a dip meter;
- Boreholes were purged, where possible, using a bailer prior to sample extraction (due to the low levels of the groundwater and the slow recharge rates, boreholes 4 and 6 were not purged to ensure enough groundwater was available for extraction);
- Groundwater was extracted using a bailer and stored in a one litre plastic bottle, a one litre amber glass bottle and one 40ml amber glass septum-capped vial;
- Sample temperature, turbidity, colour, odour and any discernible sheens were recorded on a borehole record form;
- Samples were immediately placed in cool boxes to minimise the potential for deterioration;
- Samples were labelled prior to dispatch to the accredited laboratory for analysis; and
- All samples were accompanied by a chain of custody form (as provided in Appendix J).

3.3.2. Determination of Groundwater Level Above Ordnance Datum

Determination of groundwater level Above Ordnance Datum ("AOD") for each borehole was calculated using the nearest known AOD manhole height, minus the measured depth below ground level of the groundwater. The drainage plan for the site used to determine the nearest manhole can be found in Appendix G. Table 1 lists the borehole IDs, nearest manhole IDs and manhole heights AOD taken from the drainage plan.

Table 1: Borehole IDs, Nearest Manhole IDs and Manhole Heights

Borehole ID	Manhole ID	Manhole Height (AOD)
BH01	S17	7.025m
BH03/BH12	S8	7.050m
BH04	F43	7.115m
BH06	F33	6.895m
BH08	S27	7.075m
BH09	F46	7.070m
BH10	S13	7.150m
BH11	F35	6.660m

3.3.3. Analytical Suites

The analytical suite used for the groundwater samples is as follows:

- lead, dissolved;
- sulphate;
- pH;
- total petroleum hydrocarbons ("TPH");
- TPH aliphatic C_5-C_{44} (total and split); and
- TPH aromatic C_6-C_{44} (total and split).

3.3.4. Methodology for Data Analysis

Results of the groundwater chemical analysis have been compared with Environmental Quality Standards ("EQSs"), or in their absence, information obtained via NRW and the Environment Agency ("EA")[1].

[1] Information available online via https://www.gov.uk/government/collections/groundwater-protection

4. RESULTS OF THE GROUNDWATER MONITORING

4.1. Summary of the Groundwater Monitoring Sample Conditions

4.1.1. A summary of the groundwater monitoring conditions can be found in Appendix B.

4.2. Laboratory Results

4.2.1. The results for the groundwater samples extracted on 30th April 2019 are provided in Appendix C. Determinants that have exceeded their EQS are highlighted in bold.

4.2.2. The laboratory certificate of analysis is provided in Appendix F.

5. TREND ANALYSIS

5.1. Tables containing results for each determinant, and each individual borehole, from October 2007 to April 2019 (using results from ECL and Terra-firma's previous monitoring campaigns) can be found in Appendix D, Trend Tables.

5.2. Graphs for temperature, the depth to groundwater, lead, sulphate and TPH from October 2007 to April 2019 are shown in Appendix E, Trend Charts.

5.3. Results obtained in April 2019 show a decreasing trend for sulphate concentrations in boreholes 1 and 4 and an increase in boreholes 6, 8, 10, 11 and 03/12. BH08, (One of the seven boreholes monitored) exceeded the EQS for sulphate (250,000µg/l) with a result of 310,000µg/l. However, there still remains considerable variance in the results compared to earlier data.

5.4. A result of 440µg/l of Pb was obtained for BH01, exceeding the 25µg/l EQS for lead. This result was an increase compared to 64µg/l recorded in April 2018. There has also been an increase in the lead concentration observed in BH08, with a result of 2.4µg/l compared to 0.3µg/l recorded in April 2018. BH09 also exceeded the EQS for lead with a result of 97µg/l, an increase compared to the previous result of 61µg/l.

5.5. A result of 19µg/l of Pb was obtained for BH04. This is below the EQS for lead indicating a potentially decreasing trend compared to April 2018 in which a Pb concentration of 24µg/l was recorded. Similarly, a reduction in the lead concentration compared to the April 2018 survey results can be observed for boreholes 10, 11 and 12.

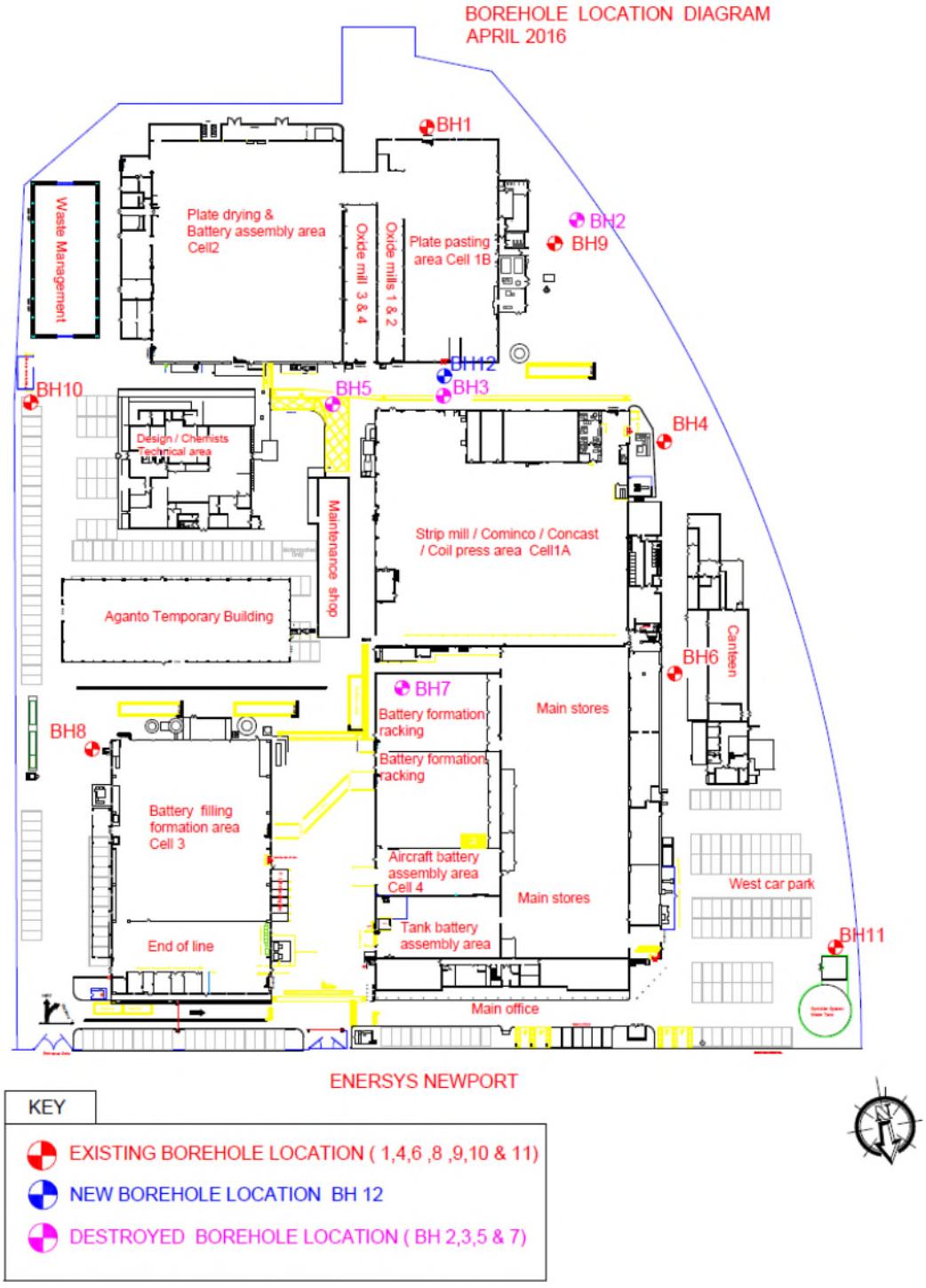
5.6. The lead result of 0.8µg/l for BH06 remains consistent with the 2018 results.

5.7. Following previous discussions with the operator, the exceedance of the lead EQS in borehole BH01 could potentially be explained by historical use of lead within the vicinity of the borehole. Anecdotal evidence suggests BH01 is located within an area of the site where large amounts of lead have historically (since the 1950s) been used in oxide manufacture and pasting. Therefore, there it is considered likely background concentrations of lead would be elevated within this area. However, further investigation would be necessary to determine the origin of the elevated trend for lead within BH01.

5.8. Similarly, the exceedance of the sulphate EQS (250,000µg/l) in BH08 could potentially be explained by an off-site source, with adjacent neighbouring activities involving the handling of hazardous chemicals. This would need to be investigated further in order to help establish the origin of the source and / or if the result is an anomaly.

5.9. There is no clear trend in either the depth of groundwater, temperature or pH.

APPENDIX A
BOREHOLE LOCATION DIAGRAM


BOREHOLE LOCATION DIAGRAM
APRIL 2016
BH1
BH2
BH9
BH12
BH3
BH5
BH10
BH4
BH6
BH7
BH8
BH11
Waste Management
Plate drying & Battery assembly area Cell2
Oxide mill 3 & 4
Oxide mills 1 & 2
Plate pasting area Cell 1B
Design / Chemists Technical area
Maintenance shop
Strip mill / Cominco / Concast / Coil press area Cell1A
Aganto Temporary Building
Canteen
Battery formation racking
Battery formation racking
Main stores
Battery filling formation area Cell 3
Aircraft battery assembly area Cell 4
Main stores
West car park
Tank battery assembly area
End of line
Main office
ENERSYS NEWPORT
KEY
EXISTING BOREHOLE LOCATION (1,4,6 ,8 ,9,10 & 11)
NEW BOREHOLE LOCATION BH 12
DESTROYED BOREHOLE LOCATION (BH 2,3,5 & 7)

APPENDIX B
SUMMARY OF THE GROUNDWATER MONITORING CONDITIONS – 30TH APRIL 2019

Summary of the Groundwater Monitoring Sample Conditions 30th April 2019

Sample ID	BH01	BH03 / BH12	BH04	BH06	BH08	BH10	BH11
Sampling Date	30th April 2019						
Depth (AOD) in Metres	6.17	5.23	5.83	6.28	6.37	6.02	5.94
Temperature (°C)	12.7	14.2	14.4	15.3	13.7	13.6	13.9
Sampling Time(s)	09:27, 13:18	13:48	11:30, 14:12	10:57, 14:42	16:15	12:43	12:05, 15:07
Monitored by	Tim Heard						
Sheens	None	None	None	None	Yes	Yes	None
Odours	None	None	None	Faint smell of hydrocarbons	Faint smell of hydrocarbons	None	Faint smell of hydrocarbons
Turbidity	Medium	Medium	Medium	Medium	High	Low-Medium	Medium-High
Colour	Light Brown	Yellow / Light Brown	Light Brown	Light Brown	Dark Brown	Light Brown	Dark Brown
Sampling Method	Bailer						
Sample Containers	1x1 litre plastic bottle | 1x 1 litre amber glass bottle | 1 x 40ml amber glass vial						
Weather	Sunny with blues skies (minimal cloud cover). Gentle breeze at times						
Approximate Tide Times[2]:							
High Tide:	04:43 17:11			**Low Tide:**	10:48 23:25		

Please note that no samples were obtained from BH09 as it was blocked during the time of this survey.
In addition, due to the low levels of the groundwater and the slow recharge rates, boreholes 4 and 6 were not purged to ensure enough groundwater was available for extraction.
The boreholes with two sampling times account for returning to the borehole after allowing it time to recharge. This was performed in order to obtain closer to the desired sample volume.

[2] Information obtained online via: https://www.tidetimes.org.uk/newport-tide-times

APPENDIX C
ANALYSIS RESULTS - 30TH APRIL 2019;
including 7th August 2019 retest of BH09

Summary of Chemical Analysis - Water Samples 30th April 2019, (BH09 7th August 2019)

Test	Units	EQS	BH01	BH03/12	BH04	BH06	BH08	BH10	BH11	BH09
Lead, Dissolved	µg/l	25	**440**	16	19	0.8	2.4	1.6	7.7	**97**
pH	-	n/a	7.09	6.93	7.22	9.49	6.85	6.91	7.78	7.07
Sulphate	µg/l	250,000	7,300	45,000	15,000	72,000	**310,000**	39,000	24,000	52,000
Aliphatic C5-C6	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C12-C16	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C16-C21	µg/l	n/a	10	10	10	10	10	240	10	10
Aliphatic C21-C35	µg/l	n/a	10	10	20	10	10	220	10	50
Aliphatic C35-C44	µg/l	n/a	10	10	10	10	10	10	10	10
Aromatic C6-C7	µg/l	30	10	10	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40	10	10	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a	10	10	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	10	10	10	10	10	10	10	10
Aromatic C12-C16	µg/l	n/a	10	10	10	10	40	20	10	40
Aromatic C16-C21	µg/l	n/a	10	20	10	20	50	200	20	40
Aromatic C21-C35	µg/l	n/a	10	10	10	20	30	90	50	10
Aromatic C35-C44	µg/l	n/a	10	10	10	10	10	10	10	10
Aliphatic C5-C44	µg/l	n/a	N.D.*	N.D.*	20	N.D.*	N.D.*	460	N.D.*	50
Aromatic C6-C44	µg/l	n/a	10	40	N.D.*	40	120	310	70	90
TPH Ali/Aro	µg/l	n/a	10	40	20	40	120	770	70	140

***N.D. – 'Not detected'**
Please note that no samples were obtained from BH09 as it was blocked during the time of the survey

APPENDIX D
TREND TABLES

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 - Borehole 1

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16	Dec-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a	n/d	n/d	10.0	12.0	12.0	10.0	10.0	12.0	11.5	12.7
Depth (AOD)	m	n/a	n/d	n/d	6.10	6.39	6.03	5.93	6.33	5.85	6.21	6.17
Lead, Dissolved	µg/l	25	**50**	**55**	**130**	**72**	**100**	**39**	**37**	**44**	**64**	**440**
pH	-	n/a	7.4	7.2	7.5	7.2	6.9	6.9	7.7	7.1	7.06	7.09
Sulphate	µg/l	250,000	46,000	67,200	35,000	32,000	19,000	24,000	17,000	13,000	16,000	7,300
Aliphatic C5-C6	µg/l	n/a	n/d	n/d	0.1	10	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	5	10	19	10	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	5	10	1.8	10	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	5	10	1.3	10	10	100($)	10	10	10	10
Aliphatic C12-C16	µg/l	n/a	8.7	10	1	10	10	100($)	10	10	10	10
Aliphatic C16-C21	µg/l	n/a	33	10	2.6	10	10	100($)	10	10	10	10
Aliphatic C21-C35	µg/l	n/a	n/d	n/d	1	10	10	100($)	20	10	10	10
Aliphatic C35-C44	µg/l	n/a	n/d	n/d	n/d	10	10	100($)	10	10	10	10
Aromatic C6-C7	µg/l	30	n/d	n/d	n/d	10	10	100($)	10	10	10	10
Aromatic C7-C8	µg/l	40	2.5	10	0.1	10	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a	5	10	0.1	10	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	5	10	7.2	10	10	10	10	10	10	10
Aromatic C12-C16	µg/l	n/a	5	10	12	10	10	100($)	10	10	10	10
Aromatic C16-C21	µg/l	n/a	14	10	67	10	20	100($)	20	10	40	10
Aromatic C21-C35	µg/l	n/a	n/d	n/d	78	10	10	100($)	10	10	70	10
Aromatic C35-C44	µg/l	n/a	n/d	n/d	n/d	10	10	100($)	10	10	10	10
Aliphatic C5-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	N.D.	100($)	20	10	10	N.D.
Aromatic C6-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	20	100($)	20	10	120	10
TPH Ali/Aro	µg/l	n/a	270	10	190	N.D.	10	10	40	10	120	10
Aromatic C5-C7(1)	µg/l	30	2.5	10	0.1	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a	n/d	n/d	25	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a	n/d	n/d	160	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a	140	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a	75	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a	180	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a	89	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to Table

(1) - Old banding

$ - Limit of Detection ("LOD") determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 - Borehole 03/12

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	May-13	Apr-15	May/June-16	Dec-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a	n/d	n/d	11.0	13.0	13.0	14.0	8.0	14.0	11.6	14.2
Depth (AOD)	m	n/a	n/d	n/d	6.35	6.39	6.25	5.15	5.25	5.19	5.75	5.23
Lead, Dissolved	µg/l	25	**50**	5	**25**	1.2	2.1	**280/89**	21	9.6	**59**	16
pH	-	n/a	6.9	6.8	7.1	7	7	6.9	7.6	7.7	7.11	6.93
Sulphate	µg/l	250,000	20,000	34,600	33,000	97,000	19,000	18,000	11,000	12,000	13,000	45,000
Aliphatic C5-C6	µg/l	n/a	n/d	n/d	0.1	10	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	5	10	0.1	10	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	78	10	0.1	10	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	450	10	1	10	10	10	10	10	140	10
Aliphatic C12-C16	µg/l	n/a	350	10	1	20	10	10	10	10	280	10
Aliphatic C16-C21	µg/l	n/a	68	10	1	10	10	10	10	10	40	10
Aliphatic C21-C35	µg/l	n/a	n/d	n/d	1	10	10	10	10	10	100	10
Aliphatic C35-C44	µg/l	n/a	n/d	n/d	n/d	10	10	10	10	10	30	10
Aromatic C6-C7	µg/l	n/a	n/d	n/d	n/d	10	10	10	10	10	10	10
Aromatic C7-C8	µg/l	30	n/d	n/d	n/d	10	10	10	10	10	10	10
Aromatic C8-C10	µg/l	40	2.5	5	0.1	10	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	5	10	0.1	10	10	10	10	10	20	10
Aromatic C12-C16	µg/l	n/a	44	10	1	10	40	30	20	30	40	10
Aromatic C16-C21	µg/l	n/a	47	10	1	10	40	30	40	10	80	20
Aromatic C21-C35	µg/l	n/a	13.0	10.0	1	10	10	10	10	10	90	10
Aromatic C35-C44	µg/l	n/a	n/d	n/d	1.0	10	10	10	10	10	10	10
Aliphatic C5-C44	µg/l	n/a	n/d	n/d	n/d	40	N.D.	N.D.	10	10	570	N.D.
Aromatic C6-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	90	60	50	30	230	40
TPH Ali/Aro	µg/l	n/a	1300	10	10	40	90	10	50	10	790	40
Aromatic C5-C7[(1)]	µg/l	30	2.5	5	0.1	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35[(1)]	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35[(1)]	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40[(1)]	µg/l	n/a	190	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40[(1)]	µg/l	n/a	42	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40[(1)]	µg/l	n/a	1100	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40[(1)]	µg/l	n/a	150	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 - Borehole 4

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	May-13	Apr-15	May-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a	n/d	n/d	10.0	12.0	12.0	14.0	12.0	11.6	14.4
Depth (AOD)	m	n/a	n/d	n/d	6.72	6.52	5.71	6.12	5.94	5.86	5.83
Lead, Dissolved	µg/l	25	**240**	5	16	11	24	15	**30**	24	19
pH	-	n/a	7.6	7.3	7.2	7.7	7.5	7.1	7.3	7.11	7.22
Sulphate	µg/l	250,000	20,000	6,800	11,000	12,000	8,700	7,800	6,400	19,000	15,000
Aliphatic C5-C6	µg/l	n/a	n/d	n/d	0.1	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	5	10	1	10	10	10	10	10	10
Aliphatic C12-C16	µg/l	n/a	5	10	1	10	10	10	10	10	10
Aliphatic C16-C21	µg/l	n/a	8	10	1	10	10	10	10	10	10
Aliphatic C21-C35	µg/l	n/a	n/d	n/d	1	10	10	10	10	40	20
Aliphatic C35-C44	µg/l	n/a	n/d	n/d	n/d	10	10	10	10	10	10
Aromatic C6-C7	µg/l	30	n/d	n/d	n/d	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40	2.5	10	0.1	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	5	10	1	10	10	10	10	10	10
Aromatic C12-C16	µg/l	n/a	5	10	1	10	10	10	10	40	10
Aromatic C16-C21	µg/l	n/a	8	10	1	10	20	10	10	90	10
Aromatic C21-C35	µg/l	n/a	n/d	n/d	1	10	10	10	10	160	10
Aromatic C35-C44	µg/l	n/a	n/d	n/d	n/d	10	10	10	10	10	10
Aliphatic C5-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	N.D.	N.D.	n/a	40	20
Aromatic C6-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	20	N.D.	n/a	280	N.D.
TPH Ali/Aro	µg/l	n/a	100	10	10	N.D.	20	10	10	320	20
Aromatic C5-C7(1)	µg/l	30	2.5	10	0.1	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a	98	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a	22	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a	98	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a	50	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 - Borehole 6

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a	n/d	n/d	10.0	12.0	12.0	16.0	14.0	14.2	15.3
Depth (AOD)	m	n/a	n/d	n/d	6.23	6.25	5.9	6.20	6.25	6.27	6.28
Lead, Dissolved	µg/l	25	I/S	5	1.8	1.5	4.7	0.9	2.1	0.8	0.8
pH	-	n/a	I/S	8.2	8	8.1	8.7	7.9	7.4	8.49	9.49
Sulphate	µg/l	250,000	I/S	41,700	37,000	41,000	31,000	60,000	49,000	58,000	72,000
Aliphatic C5-C6	µg/l	n/a	n/d	n/d	0.1	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	I/S	10	0.1	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	I/S	10	0.1	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	I/S	10	10	200($)	10	100($)	20	10	10
Aliphatic C12-C16	µg/l	n/a	I/S	10	10	200($)	10	100($)	20	10	10
Aliphatic C16-C21	µg/l	n/a	I/S	10	10	300	10	100($)	20	10	10
Aliphatic C21-C35	µg/l	n/a	n/d	n/d	10	350	10	100($)	40	10	10
Aliphatic C35-C44	µg/l	n/a	n/d	n/d	n/d	200($)	10	100($)	20	10	10
Aromatic C6-C7	µg/l	30	n/d	n/d	n/d	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40	I/S	5	0.1	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a	I/S	10	0.1	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	I/S	10	10	200($)	10	100($)	20	10	10
Aromatic C12-C16	µg/l	n/a	I/S	10	10	200($)	10	100($)	20	10	10
Aromatic C16-C21	µg/l	n/a	I/S	10	10	200($)	10	100($)	60	40	20
Aromatic C21-C35	µg/l	n/a	n/d	n/d	10	200($)	10	100($)	270	160	20
Aromatic C35-C44	µg/l	n/a	n/d	n/d	n/d	200($)	10	100($)	20	10	10
Aliphatic C5-C44	µg/l	n/a	n/d	n/d	n/d	650	n/d	100($)	40	10	N.D.
Aromatic C6-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	n/d	100($)	330	200	40
TPH Ali/Aro	µg/l	n/a	I/S	10	80	650	n/d	10	370	200	40
Aromatic C5-C7(1)	µg/l	30	I/S	5	0.1	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a	n/d	n/d	40	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a	n/d	n/d	40	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a	I/S	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a	I/S	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a	I/S	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a	I/S	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 – Borehole 8

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a	n/d	n/d	11.0	12.0	12.0	12.0	14.0	12.1	13.7
Depth (AOD)	m	n/a	n/d	n/d	6.36	6.33	6.08	6.28	6.20	6.31	6.37
Lead, Dissolved	µg/l	25	**50**	5	0.52	0.5	9.6	0.3	0.6	0.3	2.4
pH	-	n/a	7.3	7.1	7.2	7.6	7.2	7	7.5	7.01	6.85
Sulphate	µg/l	250,000	20,000	5,000	69,000	110,000	89,000	99,000	140,000	900	**310,000**
Aliphatic C5-C6	µg/l	n/a	n/d	n/d	0.1	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a	5	10	1	100 ($)	20	10	10	10	10
Aliphatic C12-C16	µg/l	n/a	5	10	1	100 ($)	20	10	10	10	10
Aliphatic C16-C21	µg/l	n/a	8	10	1	100 ($)	30	10	10	10	10
Aliphatic C21-C35	µg/l	n/a	n/d	n/d	1	100 ($)	50	10	10	10	10
Aliphatic C35-C44	µg/l	n/a	n/d	n/d	n/d	100 ($)	10	10	10	10	10
Aromatic C6-C7	µg/l	30	n/d	n/d	n/d	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40	2.5	10	0.1	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a	5	10	0.1	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a	5	10	1	100 ($)	40	10	10	10	10
Aromatic C12-C16	µg/l	n/a	5	10	1	100 ($)	80	50	30	50	40
Aromatic C16-C21	µg/l	n/a	8	10	1	100 ($)	30	50	50	80	50
Aromatic C21-C35	µg/l	n/a	n/d	n/d	1	100 ($)	10	40	10	140	30
Aromatic C35-C44	µg/l	n/a	n/d	n/d	n/d	100 ($)	10	10	10	10	10
Aliphatic C5-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	120	N.D	10	10	N.D.
Aromatic C6-C44	µg/l	n/a	n/d	n/d	n/d	N.D.	150	150	90	260	120
TPH Ali/Aro	µg/l	n/a	100	10	10	N.D.	270	10	90	260	120
Aromatic C5-C7(1)	µg/l	30	2.5	10	0.1	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a	n/d	n/d	10	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a	60	1	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a	22	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a	60	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a	50	10	n/d	n/d	n/d	n/d	n/d	n/d	n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 – Borehole 9

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16 (and retest)	Dec-16	Apr-17	Apr-18	Apr-19	August-19
Temperature	°C	n/a	Borehole installed March 2013 - No data available before this date		10.0	12.0	12.0	14.0	10.0	12.0	10.9	Borehole inaccessible during time of survey due to a blockage – no samples obtained.	n/d
Depth (AOD)	m	n/a			5.82	5.65	5.57	5.57	5.97	5.61	5.97		n/d
Lead, Dissolved	µg/l	25			4.3	12	14	**35 (29)**	**44**	**40**	**61**		**97**
pH	-	n/a			7.2	7.3	7.5	7.5	7.9	8.1	7.42		7.07
Sulphate	µg/l	250,000			30,000	28,000	33,000	17,000	11,000	11,000	500		52,000
Aliphatic C5-C6	µg/l	n/a			0.1	10	10	10	10	10	10		10
Aliphatic C6-C8	µg/l	n/a			0.1	10	10	10	10	10	10		10
Aliphatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10		10
Aliphatic C10-C12	µg/l	n/a			1	10	10	100($)	10	10	10		10
Aliphatic C12-C16	µg/l	n/a			1	10	10	100($)	10	10	10		10
Aliphatic C16-C21	µg/l	n/a			1	10	10	100($)	10	10	10		10
Aliphatic C21-C35	µg/l	n/a			1	30	20	100($)	10	10	10		50
Aliphatic C35-C44	µg/l	n/a			n/d	10	10	100($)	10	10	10		10
Aromatic C6-C7	µg/l	30			n/d	10	10	10	10	10	10		10
Aromatic C7-C8	µg/l	40			0.1	10	10	10	10	10	10		10
Aromatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10		10
Aromatic C10-C12	µg/l	n/a			1	10	10	100($)	10	10	10		10
Aromatic C12-C16	µg/l	n/a			1	10	50	100($)	10	10	10		40
Aromatic C16-C21	µg/l	n/a			1.8	10	20	100($)	10	10	30		40
Aromatic C21-C35	µg/l	n/a			3.1	10	10	100($)	10	10	100		10
Aromatic C35-C44	µg/l	n/a			n/d	10	10	100($)	10	10	10		10
Aliphatic C5-C44	µg/l	n/a			n/d	40	20	100($)	20	10	10		50
Aromatic C6-C44	µg/l	n/a			n/d	N.D.	70	100($)	10	10	130		90
TPH Ali/Aro	µg/l	n/a			10	40	90	10	40	10	130		140
Aromatic C5-C7(1)	µg/l	30			0.1	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aliphatic C5-C35(1)	µg/l	n/a			10	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aromatic C5-C35(1)	µg/l	n/a			10	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aliphatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aromatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aliphatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d		n/d
Aromatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d		n/d

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 – Borehole 10

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a			10.0	12.0	12.0	12.0	12.0	11.1	13.6
Depth (AOD)	m	n/a			6.13	6.07	5.32	6.05	5.95	6.05	6.02
Lead, Dissolved	µg/l	25			1.3	4.3	2.8	0.8	4	17	1.6
pH	-	n/a			7.3	6.8	7.4	6.9	7.5	7.03	6.91
Sulphate	µg/l	250,000			16,000	59,000	54,000	58,000	51,000	600	39,000
Aliphatic C5-C6	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a			2.4	10	10	10	10	10	10
Aliphatic C12-C16	µg/l	n/a			370	130	10	20	10	30	10
Aliphatic C16-C21	µg/l	n/a			3500	1600	30	390	10	540	240
Aliphatic C21-C35	µg/l	n/a			3200	1200	150	280	10	540	220
Aliphatic C35-C44	µg/l	n/a			n/d	10	10	10	10	10	10
Aromatic C6-C7	µg/l	30			n/d	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40			0.1	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a			1	10	10	10	10	10	10
Aromatic C12-C16	µg/l	n/a			34	10	30	20	20	20	20
Aromatic C16-C21	µg/l	n/a			340	10	120	50	10	60	200
Aromatic C21-C35	µg/l	n/a			350	10	10	10	10	40	90
Aromatic C35-C44	µg/l	n/a			n/d	10	10	10	10	10	10
Aliphatic C5-C44	µg/l	n/a			n/d	2900	180	700	10	1100	460
Aromatic C6-C44	µg/l	n/a			n/d	N.D.	150	90	20	130	310
TPH Ali/Aro	µg/l	n/a			7700	2900	330	10	20	120	770
Aromatic C5-C7(1)	µg/l	30			0.1	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a			7000	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a			720	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d

Borehole installed March 2013 - No data available before this date

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

Summary of Chemical Analysis
Water Samples July 2008 to April 2019 – Borehole 11

Determinant	Units	EQS*	Jul-08	Nov-10	Apr-13	Apr-14	Apr-15	May-16	Apr-17	Apr-18	Apr-19
Temperature	°C	n/a			10.0	12.0	12.0	16.0	12.0	11.1	13.9
Depth (AOD)	m	n/a			5.47	4.99	4.82	4.96	4.91	5.03	5.94
Lead, Dissolved	µg/l	25			0.81	1.5	3.9	5.4	2.1	9.2	7.7
pH	-	n/a			8.2	7.8	7.6	7.9	7.7	8.03	7.78
Sulphate	µg/l	250,000			12,000	43,000	39,000	30,000	34,000	1,300	24,000
Aliphatic C5-C6	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C6-C8	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10
Aliphatic C10-C12	µg/l	n/a			1	200$	10	100($)	10	100	10
Aliphatic C12-C16	µg/l	n/a			11	200$	10	100($)	150	130	10
Aliphatic C16-C21	µg/l	n/a			110	360	10	100($)	100	330	10
Aliphatic C21-C35	µg/l	n/a			590	1100	50	100($)	560	1200	10
Aliphatic C35-C44	µg/l	n/a			n/d	300	10	100($)	260	530	10
Aromatic C6-C7	µg/l	30			n/d	10	10	10	10	10	10
Aromatic C7-C8	µg/l	40			0.1	10	10	10	10	10	10
Aromatic C8-C10	µg/l	n/a			0.1	10	10	10	10	10	10
Aromatic C10-C12	µg/l	n/a			1	200$	10	100($)	100	100	10
Aromatic C12-C16	µg/l	n/a			21	320	10	100($)	140	240	10
Aromatic C16-C21	µg/l	n/a			420	1900	30	100($)	890	1600	20
Aromatic C21-C35	µg/l	n/a			1300	5800	50	110	1800	5000	50
Aromatic C35-C44	µg/l	n/a			n/d	200$	10	100($)	100	130	10
Aliphatic C5-C44	µg/l	n/a			n/d	1500	70	100($)	810	1700	N.D.
Aromatic C6-C44	µg/l	n/a			n/d	8300	90	100($)	2900	6800	70
TPH Ali/Aro	µg/l	n/a			2500	9800	160	10	3700	8500	70
Aromatic C5-C7(1)	µg/l	30			0.1	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C5-C35(1)	µg/l	n/a			710	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C5-C35(1)	µg/l	n/a			1800	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C21-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aliphatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d
Aromatic C6-C40(1)	µg/l	n/a			n/d	n/d	n/d	n/d	n/d	n/d	n/d

Borehole installed March 2013 - No data available before this date

n/a = no guideline value available

I/S =insufficient sample

n/d = no data

Obs = obstructed

N.D. = Not Detected

Note to table

(1) - Old banding

$ - Limit of Detection (LOD) determined by sample aliquot used for analysis or raised due to dilution of sample.

*References

H1 Environmental Risk Assessment - Annex J v2.0 April 2010 (Saltwater)

APPENDIX E
TREND CHARTS

Figure 1: TPH Concentration

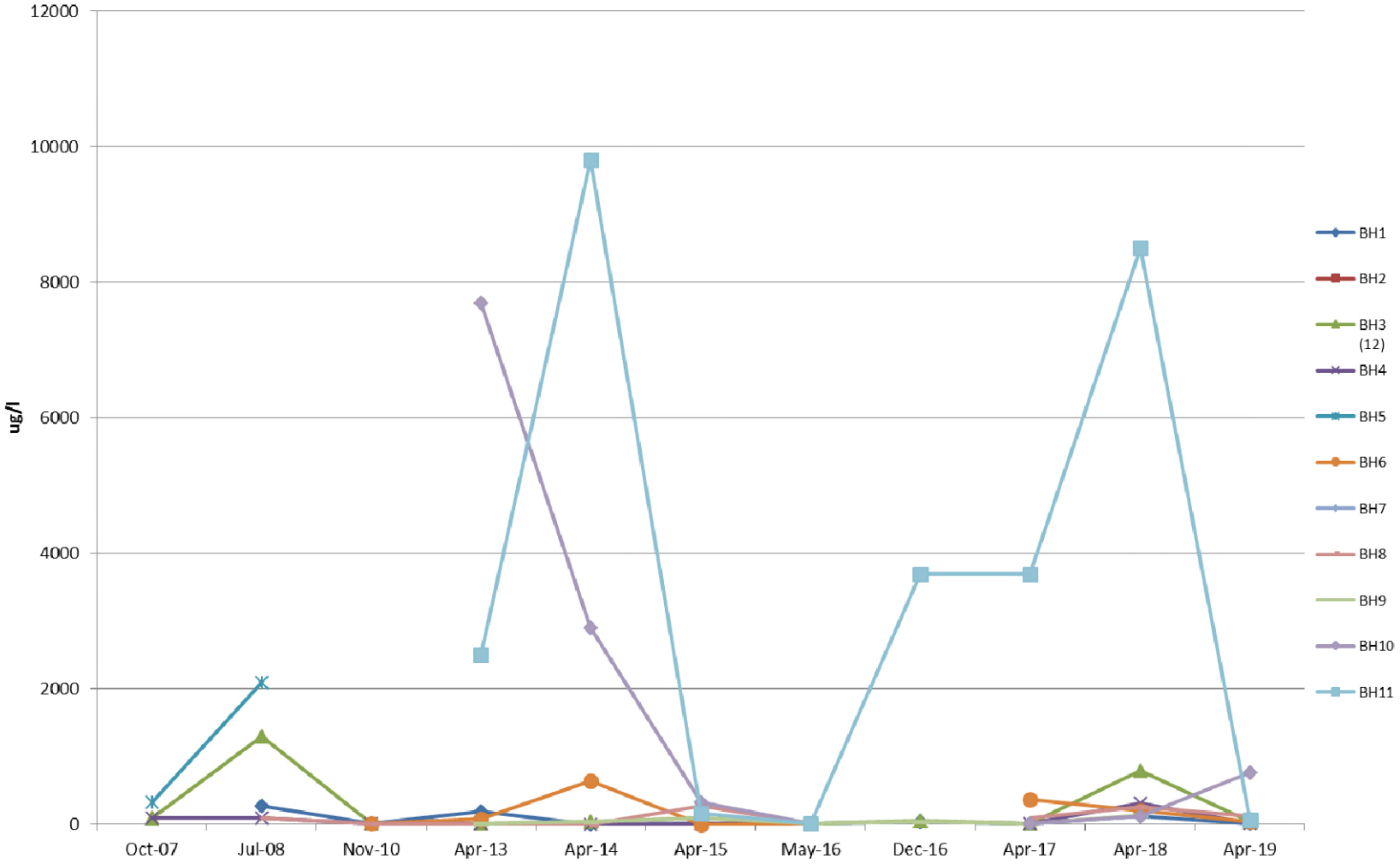


Figure 2: Sulphate Concentration

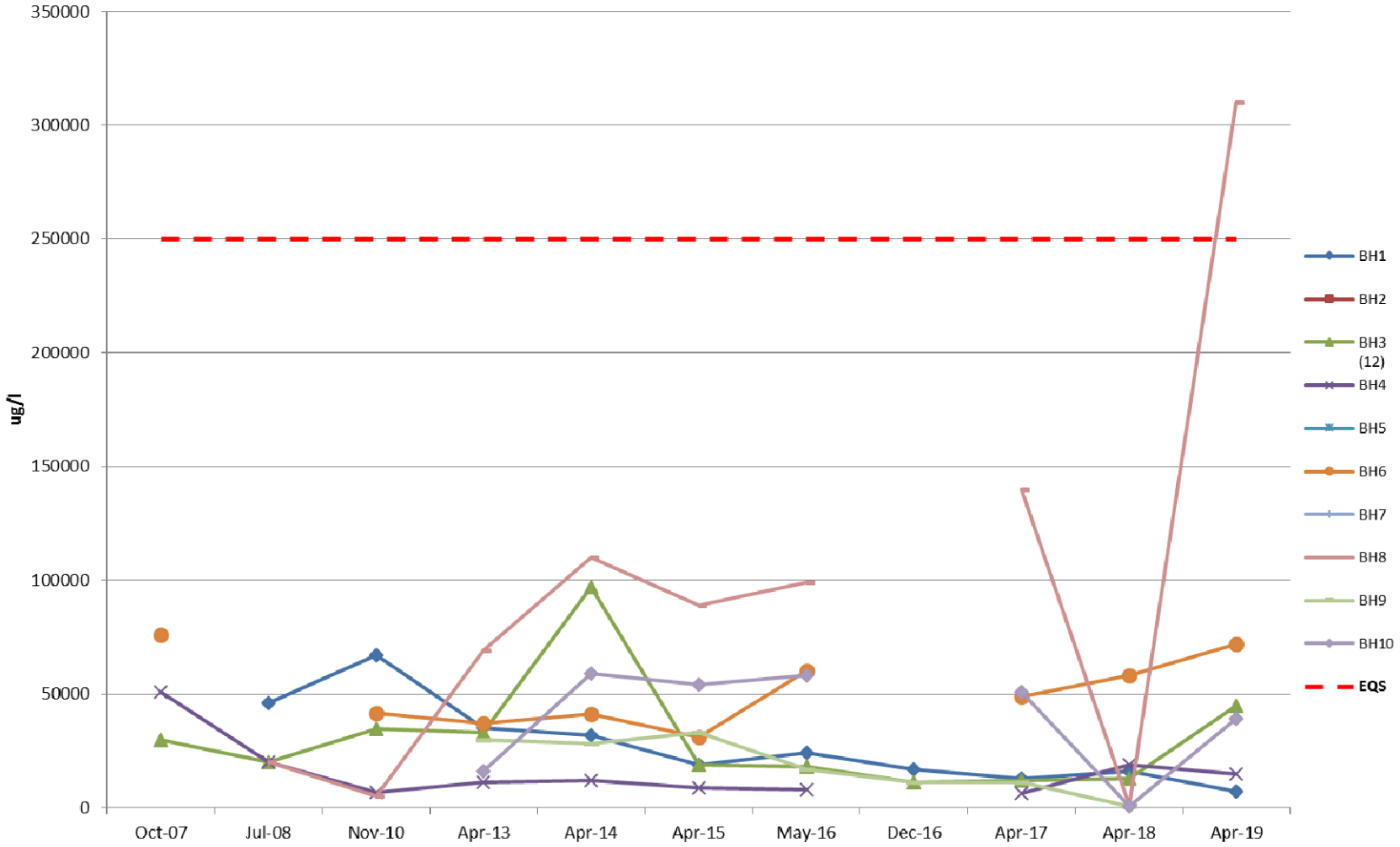


Figure 3: Lead Concentration

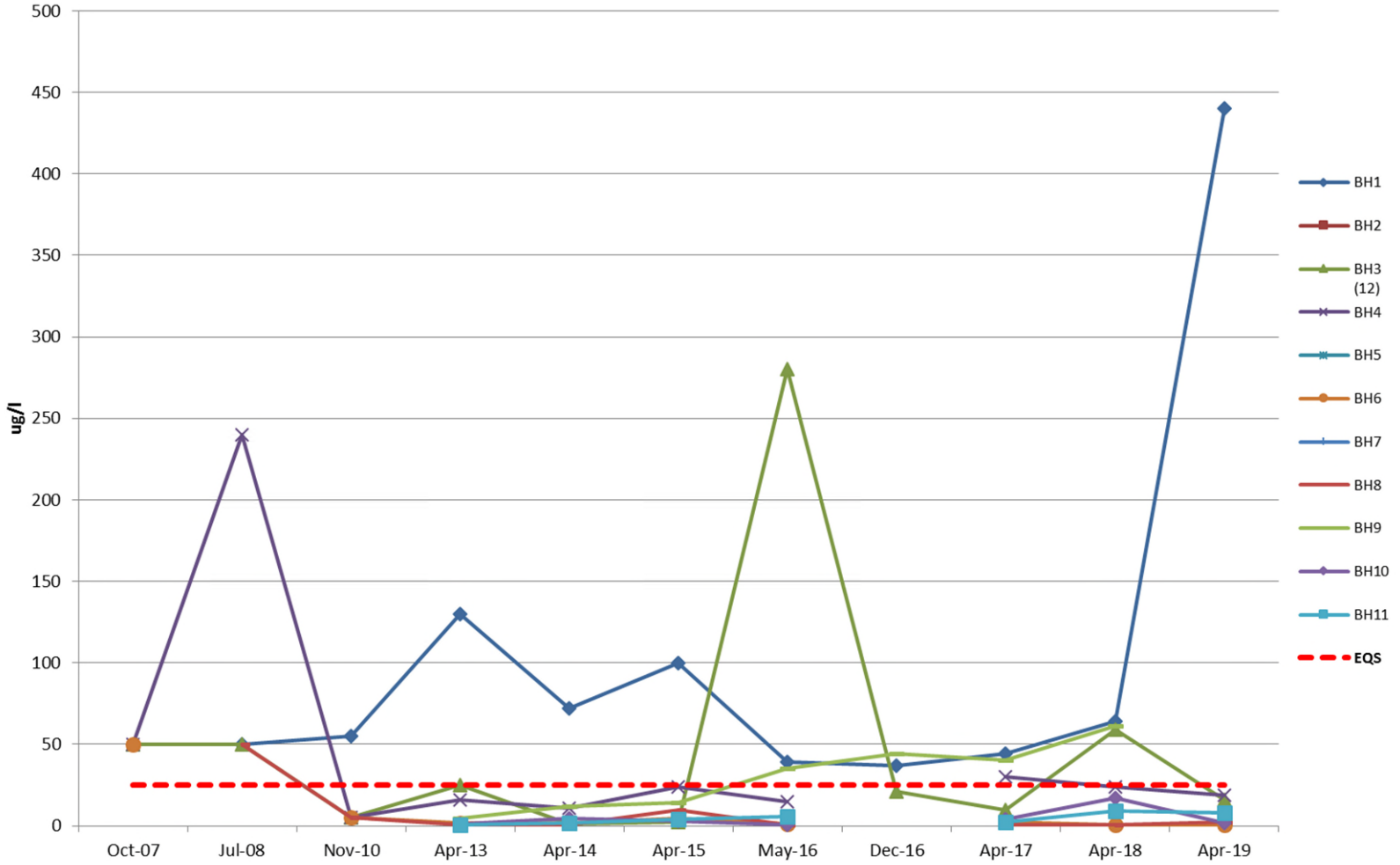


Figure 4: Depth of Groundwater (AOD)

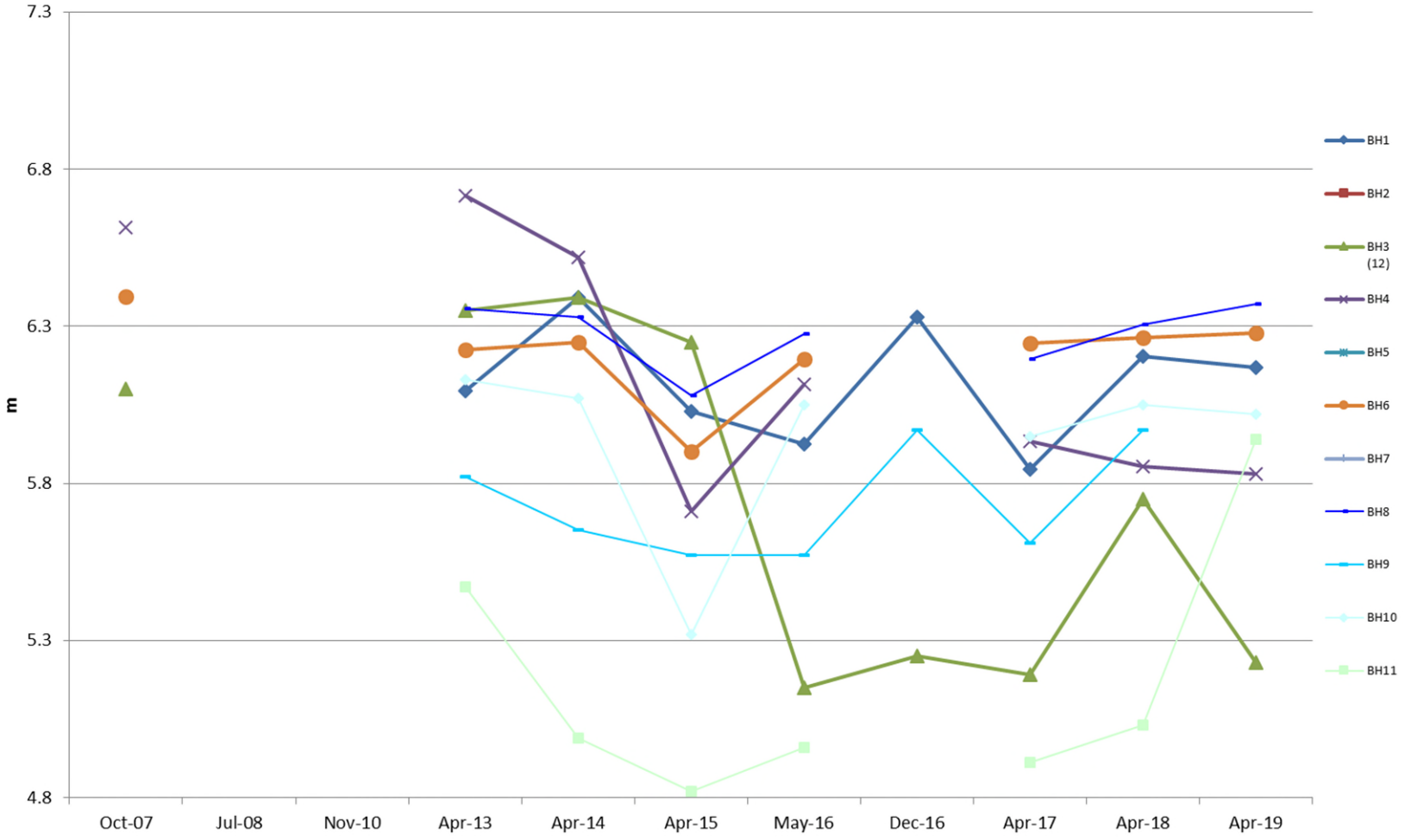
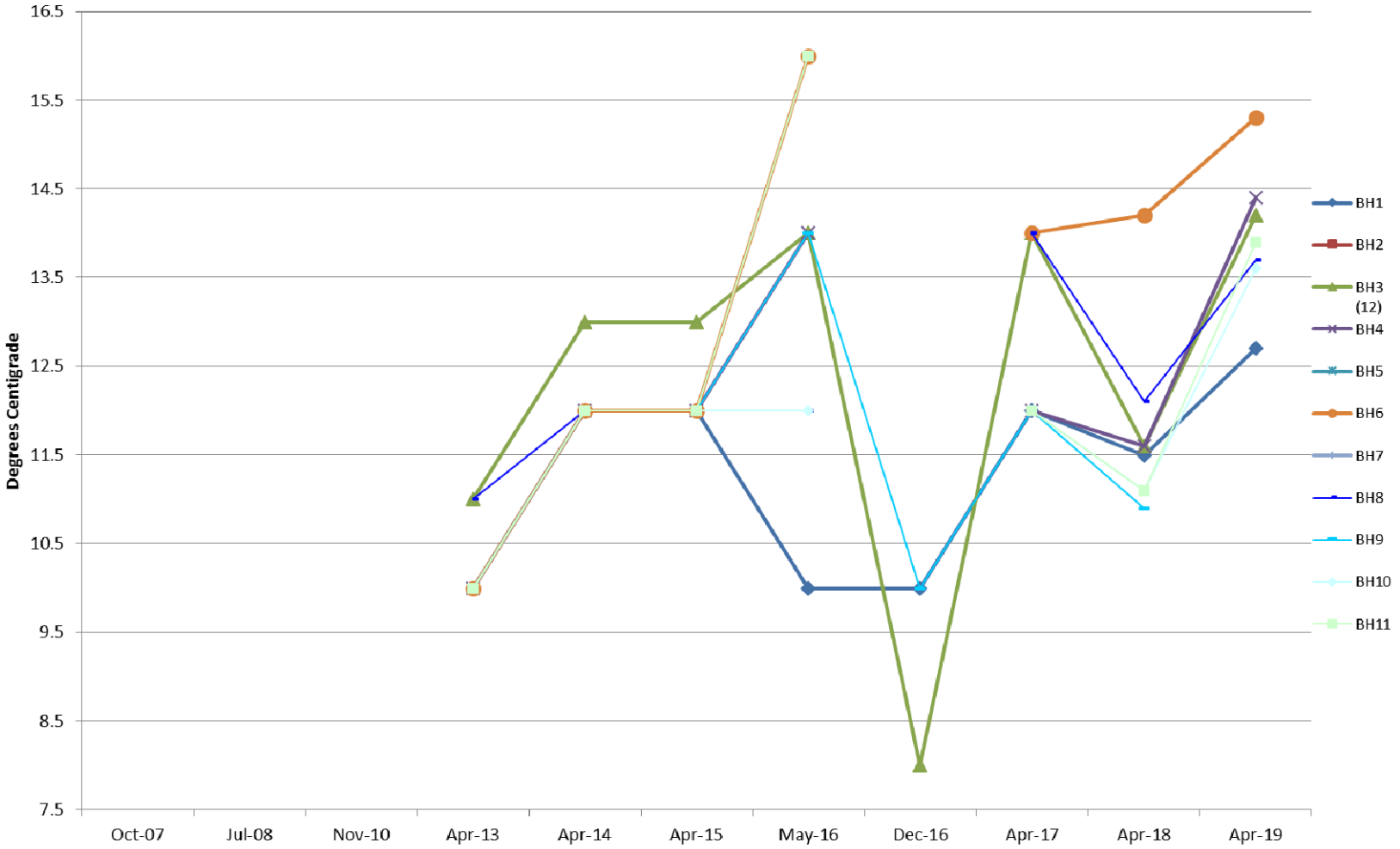


Figure 5: Temperature



APPENDIX F
LABORATORY CERTIFICATE OF ANALYSIS

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 819684-1

Date of Report: 14-May-2019

Customer: Environmental Compliance Ltd
Unit G1
Main Avenue
Treforest Industrial Estate
Pontypridd
CF37 5BF

Customer Contact: Mr Tim Heard

Customer Job Reference: 012.01.03
Customer Purchase Order: E9250
Customer Site Reference: GWM
Date Job Received at Concept: 03-May-2019
Date Analysis Started: 07-May-2019
Date Analysis Completed: 14-May-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

Report checked
and authorised by :
Toni Morris
Customer Service Advisor

Issued by :
Toni Morris
Customer Service Advisor

Concept Reference: 819684
Project Site: GWM
Customer Reference: 012.01.03

Water Analysed as Water
Miscellaneous

				Concept Reference	**819684 001**	**819684 002**	**819684 003**	**819684 004**	**819684 005**
				Customer Sample Reference	**BH1**	**BH4**	**BH6**	**BH8**	**BH10**
				Depth	**0.86**	**1.29**	**0.62**	**0.71**	**1.13**
				Date Sampled	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**
				Sample Received (ml)	**2040**	**2040**	**2040**	**2040**	**2040**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Pb (Dissolved)	T281	F	0.3	µg/l	**440**	**19**	**0.8**	**2.4**	**1.6**
pH	T7	AR			**7.09**	**7.22**	**9.49**	**6.85**	**6.91**
Sulphate	T686	F	0.5	mg/l	**7.3**	**15**	**72**	**310**	**39**

Concept Reference: 819684
Project Site: GWM
Customer Reference: 012.01.03

Water Analysed as Water
Miscellaneous

				Concept Reference	**819684 006**	**819684 007**
				Customer Sample Reference	**BH11**	**BH12**
				Depth	**0.72**	**1.82**
				Date Sampled	**30-APR-2019**	**30-APR-2019**
				Sample Received (ml)	**2040**	**2040**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Pb (Dissolved)	T281	F	0.3	µg/l	**7.7**	**16**
pH	T7	AR			**7.78**	**6.93**
Sulphate	T686	F	0.5	mg/l	**24**	**45**

Concept Reference: 819684
Project Site: GWM
Customer Reference: 012.01.03

Water Analysed as Water
TPH UKCWG

				Concept Reference	**819684 001**	**819684 002**	**819684 003**	**819684 004**	**819684 005**
				Customer Sample Reference	**BH1**	**BH4**	**BH6**	**BH8**	**BH10**
				Depth	**0.86**	**1.29**	**0.62**	**0.71**	**1.13**
				Date Sampled	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**	**30-APR-2019**
				Sample Received (ml)	**2040**	**2040**	**2040**	**2040**	**2040**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T54	AR	1	µg/l	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Toluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	**0.24[13]**
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	**0.02[13]**	<0.01[13]	<0.01[13]	**0.22[13]**
TPH (C35-C44 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
TPH (Aliphatic) total	T85	AR		mg/l	N.D.[13]	**0.02[13]**	N.D.[13]	N.D.[13]	**0.46[13]**
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	**0.04[13]**	**0.02[13]**
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	**0.01[13]**	<0.01[13]	**0.02[13]**	**0.05[13]**	**0.20[13]**
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	**0.02[13]**	**0.03[13]**	**0.09[13]**
TPH (C35-C44 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
TPH (Aromatic) total	T85	AR		mg/l	**0.01[13]**	N.D.[13]	**0.04[13]**	**0.12[13]**	**0.31[13]**
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/l	**0.01[13]**	**0.02[13]**	**0.04[13]**	**0.12[13]**	**0.77[13]**
Total Petroleum Hydrocarbons (C5 - C10 aliphatic/aromatic)	T85	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010

Concept Reference: 819684
Project Site: GWM
Customer Reference: 012.01.03

Water Analysed as Water
TPH UKCWG

Concept Reference	**819684 006**	**819684 007**
Customer Sample Reference	**BH11**	**BH12**
Depth	**0.72**	**1.82**
Date Sampled	**30-APR-2019**	**30-APR-2019**
Sample Received (ml)	**2040**	**2040**

Determinand	Method	Test Sample	LOD	Units		
Benzene	T54	AR	1	µg/l	<1[13]	<1[13]
EthylBenzene	T54	AR	1	µg/l	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1
Toluene	T54	AR	1	µg/l	<1	<1
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH (C35-C44 aliphatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH (Aliphatic) total	T85	AR		mg/l	N.D.[13]	N.D.[13]
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	**0.01[13]**
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	**0.02[13]**	**0.02[13]**
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	**0.05[13]**	**0.01[13]**
TPH (C35-C44 aromatic)	T81	AR	0.01	mg/l	<0.01[13]	<0.01[13]
TPH (Aromatic) total	T85	AR		mg/l	**0.07[13]**	**0.04[13]**
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/l	**0.07[13]**	**0.04[13]**
Total Petroleum Hydrocarbons (C5 - C10 aliphatic/aromatic)	T85	AR	0.010	mg/l	<0.010	<0.010

Index to symbols used in 819684-1

Value	Description
F	Filtered
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

These samples have been analysed exceeding recommended holding times for TPH. It is possible therefore that the results provided may be compromised.

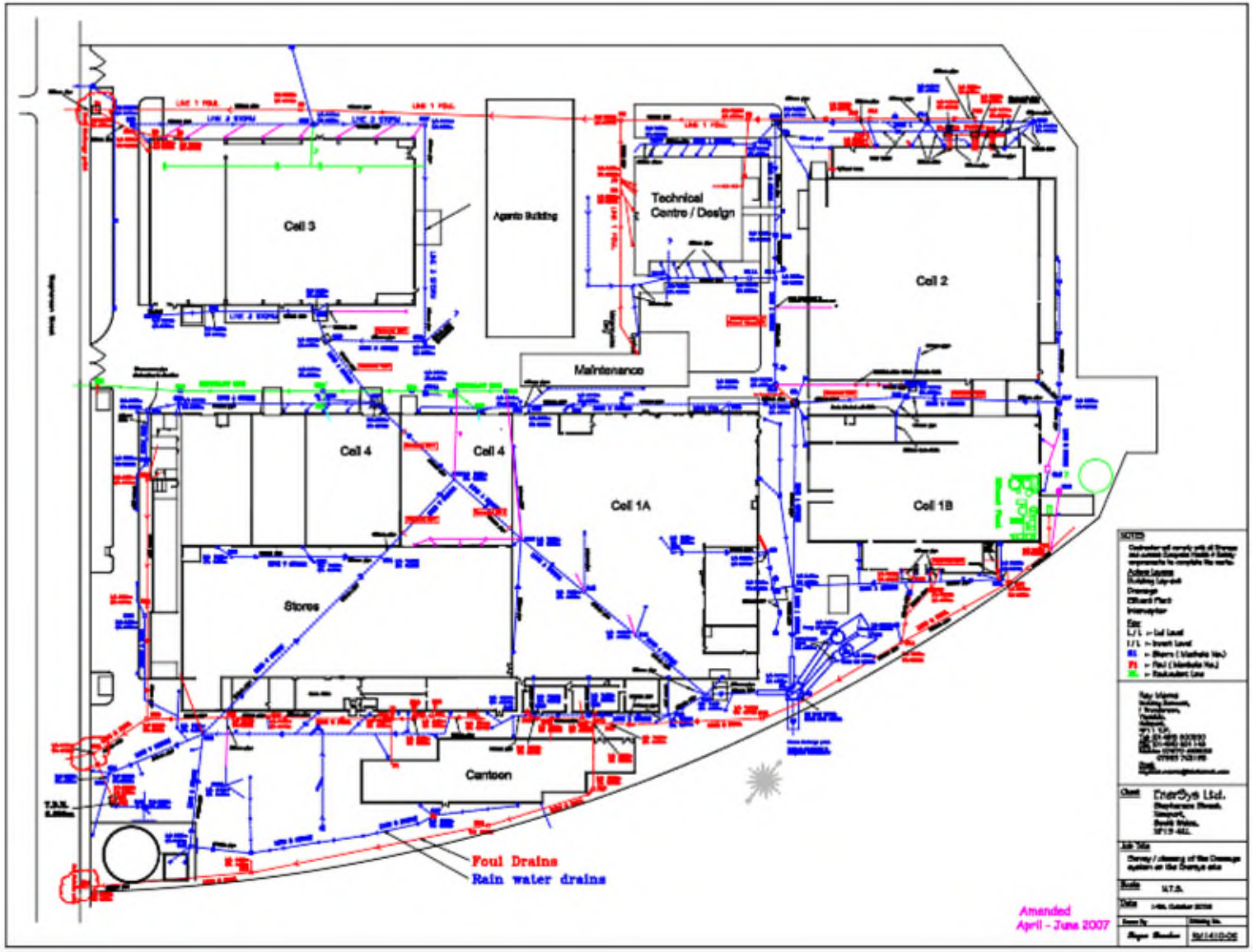
Method Index

Value	Description
T215	GC/MS (Headspace)(LV)
T686	Discrete Analyser
T54	GC/MS (Headspace)
T85	Calc
T281	ICP/MS (Filtered)
T7	Probe
T81	GC/FID (LV)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Pb (Dissolved)	T281	F	0.3	µg/l	U	001-007
pH	T7	AR			U	001-007
Sulphate	T686	F	0.5	mg/l	U	001-007
Benzene	T54	AR	1	µg/l	U	001-007
EthylBenzene	T54	AR	1	µg/l	U	001-007
M/P Xylene	T54	AR	1	µg/l	U	001-007
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-007
O Xylene	T54	AR	1	µg/l	U	001-007
Toluene	T54	AR	1	µg/l	U	001-007
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	N	001-007
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001-007
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001-007
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	N	001-007
TPH (C35-C44 aliphatic)	T81	AR	0.01	mg/l	N	001-007
TPH (Aliphatic) total	T85	AR		mg/l	N	001-007
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001-007
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001-007
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001-007
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	N	001-007
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	N	001-007
TPH (C35-C44 aromatic)	T81	AR	0.01	mg/l	N	001-007
TPH (Aromatic) total	T85	AR		mg/l	N	001-007
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/l	N	001-007
Total Petroleum Hydrocarbons (C5 - C10 aliphatic/aromatic)	T85	AR	0.010	mg/l	N	001-007

APPENDIX G
DRAINAGE PLAN


Cell 3
Agents Building
Technical Centre / Design
Cell 2
Maintenance
Cell 4
Cell 4
Cell 1A
Cell 1B
Stores
Canteen
Foul Drains
Rain water drains
Amended April - June 2007

APPENDIX H
TERRA FIRMA REPORT – MID/465403/2007
(7TH NOVEMBER 2007)

INTEGRATED POLLUTION PREVENTION AND CONTROL (IPPC): PHASE 1 REPORT FOR SITE PROTECTION AND MONITORING PROGRAMME

ENERSYS LIMITED
STEPHENSON ROAD
NEWPORT

Prepared for:
ENERSYS (UK) LIMITED

November 2007

TERRA FIRMA (WALES) LIMITED

5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HB

Tel: 029 2073 5354
Fax: 029 2073 5443
E-mail: gwyn@terrafirmawales.co.uk

Report No. 9565

REPORT TITLE	:	**IPPC: Phase 1 Reporting of SPMP**
REPORT STATUS	:	**Final**
JOB NUMBER	:	**9565**
DATE	:	**November 2007**
PREPARED BY	:	.....
		(Mr D. Emanuel)
REVIEWED BY	:	.....
		(Miss Louise Dow)
APPROVED BY	:	.....
		(Dr Gwyn C. Lake)

Executive Summary

This document represents the first report of the Site Protection and Monitoring Programme (SPMP) for the Enersys (UK) Ltd site on Stephenson Road, Newport, Gwent, Submitted to the Environment Agency in pursuance of Condition 2.10.10 of the Permit No. NP3030BJ. Authorising the operation of lead/acid battery manufacturing plant..

An intrusive investigation was undertaken to characterise substances identified as being present or potentially present in, on or under the ground in the Application Site Report (ASR) submitted with the Permit Application. The Scope of the investigation is detailed within the Design SPMP submitted in pursuance of Condition 4.1.7 of the above permit. This document should be read in conjunction with both documents.

This report sets the reference data for the installations which are summarised in Section 4 and Appendix G.

The Monitoring Programme for the site is presented in Section 4 of the SPMP.

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- 2.1.2 Constraints on Investigations
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- 2.1.4 Groundwater Investigation and Sampling Techniques and Protocols

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- 2.2.2 Zone 2
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- 2.2.7 Zone 7

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- 2.3.1 Justification of Analytical Suites
- 2.3.2 Justification of Analytical Detection Limits
- 2.3.3 Laboratory Accreditation

2.4 Findings of the Ground Investigation
- 2.4.1 Summary of Physical Conditions and Refinement of Conceptual Site Model

2.5 Data Interpretation
- 2.5.1 Results of Statistical Analysis.
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- 2.5.3 Sources of Identified Elevated Levels of Pollutants

Section 3 Inspection and Monitoring Programme

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- 3.1.1 Objectives of Environmental Monitoring Programme
- 3.1.2 Objectives of Infrastructure Monitoring Programme

3.2 Environmental Monitoring Infrastructure
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- 3.2.2 Groundwater Monitoring

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A2 - Site Layout and Exploratory Hole Locations

Annex B Records of Investigation Findings
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Annex C Analytical Data
C1 - Borehole Soil Chemical Testing
C2 - Surface Soil Samples and Perched Groundwater Testing
C3 - Borehole Soils Leachate Analysis
C4 - Zone 4 VOC Analysis
C5 - Permeability Analysis on Alluvium

SECTION 1 Introduction

Terra Firma (Wales) Limited were retained by Enersys (UK) Ltd to design and execute an intrusive investigation at their site on Stephenson Road, Newport. The investigation was designed to assess the specific chemicals employed at the site. The scope of the investigation is detailed in our Design Site Protection and Monitoring Programme (SPMP) submitted in August 2007.

The monitoring programme comprised a series of windowless sampler boreholes sunk 1.0m into natural soils beneath the site. Soils were subject to chemical analysis for specific determinants used within various zones of the factory. Surface samples were also taken to assess chimney fall-out and shallow wells allowed the assessment of the perched groundwater beneath the site.

The current site layout, identified zones and exploratory hole locations are shown in Drawings 02.

Enersys (UK) Ltd have requested that an intrusive investigation be performed in order to determine the ground conditions present beneath the site as part of an IPPC Application.

The Ground Investigation conducted and this report has been prepared for the sole internal reliance of Enersys (UK) Ltd and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-environmental and geo-technical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

Terra Firma (Wales) Ltd understand that a desk study has previously been undertaken on behalf of Enersys (UK) Ltd by another Consultant.

The site investigations was limited by the presence of services beneath the site, although the investigation was performed to the pre-agreed scope detailed in the Design SPMP (August 2007).

SECTION 2 Intrusive Investigation

2.1 Investigation and Sampling Strategy

The investigation and sampling undertaken at the site was in accordance with the Design Site Protection and Monitoring Programme (August 2007).

2.1.1 General

The intrusive investigation comprising ten windowless sampler boreholes performed between the 15th and 17th October 2007. The boreholes were sunk using a Terrier Mini Percussive Drilling Rig. Wells were installed in selected boreholes. All boreholes were terminated within the top 1.5m of the alluvial clay to maintain the integrity of the impermeable clay. Wells were installed in eight boreholes, allowing the perched groundwater to be monitored in these wells. Groundwater samples were collected from the wells on 22nd October 2007. Surface soil samples were collected on the same date to assess the potential impact of chimney fall-out on the open areas of the site.

Windowless Sampler Boreholes were performed by Southern Ground Testing in accordance with the protocols detailed in the Design SPMP. The works were performed under the supervision of Terra Firma Wales Ltd, who logged the samples in accordance with the requirements of BS5930.

2.1.2 Constraints on Investigations

An abundant network of drainage pipes underlie the site and these were taken into consideration during the creation of the Design Site Protection and Monitoring Programme. Since the buried services were considered at the design stage of the investigation, there was no need to alter the locations from those proposed in August 2007. A buried obstruction was encountered in Borehole BW6 and consequently this borehole was terminated within the made ground.

Boreholes were terminated at shallow depth within the alluvium to maintain the integrity of the impermeable seal that the clays form between the perched groundwaters and deeper groundwater bodies.

2.1.3 Soil Investigation and Sampling Techniques and Protocols

The mini percussive drilling rig operates by driving hollow steel casings into the soils using a percussive weight. The steel casing contains a single-use plastic sleeve which collects the soil as it is driven into the ground. The casings are withdrawn from the ground and the plastic sleeve is removed and split revealing the soil sequence beneath the site. Since the plastic sleeves are single use they cannot be re-used, eliminating the possibility of cross contamination between borehole locations or within a borehole.

The hand dug trial pits were performed using a shovel that was washed down between sampling locations.

Selected representative soil samples were taken from the split plastic sleeves or hand dug trial pits. Soil samples were also inspected for visual and olfactory evidence of contamination.

- Soil samples are transferred into the sample tubs/jars using a clean spatula to prevent cross contamination of soils
- Soil tubs/jars are filled such that the head-space is kept to a minimum to prevent the loss of volatile fractions of contamination.
- Soil tubs/jars are immediately transferred to cool-boxes on-site and transferred to the laboratory within 24 hrs of collection

Soil Investigation and Sampling protocols are detailed within the Design SPMP.

2.1.4 Groundwater Investigation and Sampling Techniques and Protocols

During the groundwater sampling the following protocols were followed;

- The wells were purged by a volume of at least three times the volume of the saturated zone within the borehole.
- Bottles were completely filled to prevent the volatilisation of contaminants into the headspace.
- Bottles were immediately transferred to cool boxes and transferred to the laboratory within 24 hrs of collection.

Groundwater Investigation and Sampling protocols are detailed within the Design SPMP.

The soil and groundwater samples were dispatched to Severn Trent Laboratories for analysis. The analytical methods, detection limits and accreditations are detailed in the Design SPMP.

2.2 Sample Location

The number and location of samples remain the same as agreed in the design SPMP. The locations were chosen to obtain representative samples from the various zones identified in the Revised Installation Zoning Plan (November 2007). The borehole and surface soil sample locations are presented in Appendix A2.

The samples collected during the recent works are detailed below;

Table 2.1: Details of Soil Samples

Installation Zone	Sample Locations	Sample Depth	Taken in Accordance with Design SPMP	Soil Description
Zone 1	BW1	0.50m	Y	Fill
	BW2	0.25m	Y	Fill
Zone 2	BW3	0.50m	Y	Fill
	BW4	0.15m	Y	Fill
Zone 3	BW7	0.50m	Y	Fill
Zone 4	BW8	0.50m	Y	Fill
	B1	0.50m	Y	Fill
	B2	0.50m	Y	Fill
Zone 5	BW5	0.50m	Y	Fill
Zone 6	S1	0.00m	Y	Clay topsoil
	S2	0.00m	Y	Clay topsoil
	S3	0.00m	Y	Clay topsoil
	S4	0.00m	Y	Clay topsoil
	S5	0.00m	Y	Clay topsoil
	S6	0.00m	Y	Clay topsoil
	S7	0.00m	Y	Clay topsoil
	S8	0.00m	Y	Clay topsoil
Zone 7	BW6	0.30m	Y	Fill
	BW1	0.50m	Y	Fill
	BW2	0.25m	Y	Fill
	BW3	0.50m	Y	Fill
	BW4	0.15m	Y	Fill
	BW5	0.50m	Y	Fill
	BW7	0.50m	Y	Fill

* - All sample locations are shown in Annex A2.
* - All borehole logs are presented in Annex B1

2.2 Sample Location (Continued)

Table 2.2: Details of Groundwater Samples		
Installation Zone	**Well Location**	**Comments**
Zone 1	BW1	Well Dry
	BW2	Perched Groundwater
Zone 2	BW3	Perched Groundwater
	BW4	Perched Groundwater
Zone 3	BW7	Perched Groundwater
Zone 4	BW8	Perched Groundwater
Zone 5	BW5	Perched Groundwater
Zone 7	BW6	Perched Groundwater
Distilled Water	BW12 (Spike Sample)	Sample of Distilled Water submitted as control sample

The findings of the investigation are discussed in Section 2.4 below and windowless sampler borehole logs are reproduced in Annex B1.

2.2.1 Zone 1

Section 3 of the Revised Installation Zoning Plan (November 2007) identifies sulphuric acid and lead contaminated water as being potentially present within Zone 1. Two windowless sampler boreholes were performed in this zone, both of which were fitted with wells to sample the shallow perched groundwater (BW1 and BW2).

BW1 was positioned in front of the 'lead contaminated water clarifier' and BW2 was positioned on the western side of the 'Lead Oxide Storage' area.

2.2.2 Zone 2

Section 3 of the Revised Installation Zoning Plan (November 2007) identifies sodium hydroxide and miscellaneous oils as being potentially present within Zone 2. Two windowless sampler boreholes were performed in this zone, both of which were fitted with wells to sample the shallow perched groundwater (BW3 and BW4).

BW3 was positioned in the vicinity of the 'New Oil Storage' area and BW4 was located in the vicinity of the 'Bunded Chemical Storage' area.

2.2.3 Zone 3

Section 3 of the Revised Installation Zoning Plan (November 2007) identifies oil/water mixtures, lead dross, lead sludge and scrap plates (lead) as being potentially present within Zone 3. One windowless sampler boreholes were performed in this zone, which was fitted with a well to sample the shallow perched groundwater (BW7).

2.2.4 Zone 4

Section 3 of the Revised Installation Zoning Plan (November 2007) identifies sulphuric acid, waste sulphuric acid, chlorinated hydrocarbons, methanol and epoxy resin as being potentially present within Zone 4. One windowless sampler borehole was performed in this zone, which was fitted with a well to sample the shallow perched groundwater (BW7).

2.2.5 Zone 5

Section 3 of the Revised Installation Zoning Plan (November 2007) identifies oil storage as a process being carried out within Zone 5. One windowless sampler borehole was performed in this zone adjacent to the 'New Oil Storage Zone', which was fitted with a well to sample the shallow perched groundwater (BW5).

2.2.6 Zone 6

Zone 6 is taken to be all areas of open land (i.e. areas without hardstanding cover) which could potentially be impacted by lead fall-out from the chimneys.

2.2.7 Zone 7

Zone 7 is the sub-surface drainage system beneath the entire site. Samples from zones 1-3 and Zone 5 are considered to be potentially at risk from spillages from the sewer system. In addition a well was installed in the proximity of the canteen (BW6) to provide broad site coverage.

2.3 Analytical Strategy

2.3.1 Justification of Analytical Suites

The analytical suites agreed in the Design SPMP were used in the analysis of samples from the investigation to collect reference data.

2.3.2 Justification of Analytical Detection Limits

The laboratory analytical techniques and detection limits for each analysis were as agreed in the Design SPMP.

2.3.3 Laboratory Accreditation

All chemical analysis was performed at STL Midlands. The laboratories are UKAS Accredited and, where possible, analysis was performed in accordance with MCERTS. Details of the analytical methods are presented in the Design SPMP.

Sample BW12 comprised a sample of distilled water, submitted as a control.

2.4 Findings of the Ground Investigation

2.4.1 Summary of Physical Conditions and Refinement of Conceptual Site Model

The 1:50,000 scale geological map of the area (Sheet 249) shows the site to be underlain by rocks of the Keuper Marl (Mercia Mudstone Group) of Triassic Age. The solid geology is overlain by thick deposits of alluvium which is capped in made ground.

The solid geology beneath the site is classified as a non-aquifer. However, a permeable sand and gravel band lies at the base of the alluvium in the region, which acts as an aquifer. Deep Groundwater is expected to flow towards the River Usk.

Records of two deep boreholes located on Stephenson Road were purchased from the British Geological Survey. The boreholes revealed that beneath a thin mantle of made ground lay between 7.20m and 10.90m of very soft to firm CLAY overlying between 4.30m and 7.20m of loose silty SAND. A dense SAND and GRAVEL horizon was encountered at between 15.80m and 16.30m and MARL bedrock lay at between 18.40m and 18.90m below ground level. Copies of these logs are contained within Annex B1.

The recent windowless sampler investigation encountered consistent ground conditions beneath the entire site. Between 0.20m and 1.50m of made ground were encountered, comprising predominantly ash and brick fill. Beneath the made ground natural alluvium was encountered, comprising soft to firm, to occasionally stiff, thinly laminated, grey and brown CLAY. All boreholes were terminated within the top of the alluvium to prevent the creation of a conduit between the perched groundwater and the deeper sand and gravel aquifer.

One sample of the alluvial clay from the site was subject to permeability testing which revealed that the material had a coefficient of permeability of 0.63×10^{-9} ms^{-1} (See Annex C5). This is consistent with other samples of alluvium from the Newport Docks area previously tested by Terra Firma Wales Ltd (Report Ref: 9142). The testing revealed that the material has a permeability in the region of 10^{-9} ms^{-1}.

Perched groundwater was found to be sporadic and was encountered in boreholes BW2 to BW7.

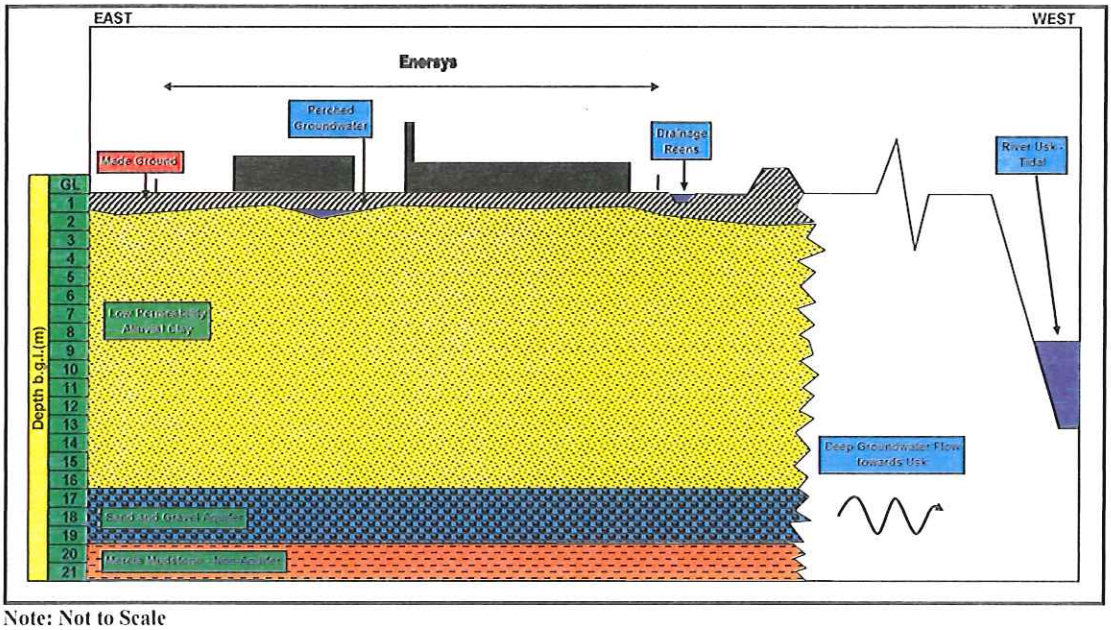
Details of the Groundwater Monitoring are presented in the Table below;

Table 2.3. Groundwater Monitoring on 22nd October 2007	
Well I.D.	**Groundwater Dip Depth (m. b.g.l.)**
BW1	Dry
BW2	0.70
BW3	0.95
BW4	0.50
BW5	1.45
BW6	0.50
BW7	1.15
BW8	Dry

Our experience from other locations in the Newport Dock area is that the groundwater within the deep sand and gravel aquifer is sub-artesian.

2.4.1 Summary of Physical Conditions and Refinement of Conceptual Site Model (Continued)

A Conceptual Site Model based on the above data is presented below;



Note: Not to Scale

2.5 Data Interpretation

2.5.1 Results and Statistical Analysis

Due to the number of samples taken within any one zone, statistical analysis could not be performed for each zone. Any recorded exceedances should, therefore, warrant further investigation in the vicinity of the exceedance to delimit its extent and allow statistical analysis within that zone. The chemical test results are presented below. Where available, the results have been compared to the CLEA or ATRISK Guideline for Human Health Risk Assessment to give an indication of the magnitude of the recorded concentrations. These guidelines are not, however, designed for Environmental Risk Assessment are used as an indication only.

Table 2.4: Summary of Soil Test Results for Borehole Samples of Made Ground

Determinant	CLEA/ATRISK Guideline (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	95% UCL	Exceedances of CLEA/ATRISK Guidelines
Lead	750	180	130,000	-	4
Sulphate	-	240	1300	-	-
pH	-	7.4	9.6	-	-
Petroleum Hydrocarbons					
Ali >C6 - C8	270	<0.1	0.39	-	0
Ali >C8 - C10	24	<0.1	0.17	-	0
Ali >C10 - C12	86	<1.0	7.9	-	0
Ali >C12 - C16	38	<1.0	13	-	0
Ali >C16 - C21	10^6	<1.0	28	-	0
Ali >C21 - C40	10^6	<1.0	57	-	0
Arom >C5 - C7	0.30	<0.010	<0.014	-	0
Arom >C7 - C8	150	<0.010	<0.014	-	0
Arom >C8 - C10	38	<0.10	<0.14	-	0
Arom >C10 - C12	210	<1.0	5.9	-	0
Arom >C12 - C16	290	<1.0	31	-	0
Arom >C16 - C21	10600	<1.0	92	-	0
Arom >21 - C40	10600	1.2	470	-	0
TCM				-	

Notes:

- Ali - Aliphatic hydrocarbon
- Arom - Aromatic hydrocarbon
- C - Equivalent Carbon Number
- CLEA/ATRISK Guidelines for Industrial/Commercial setting

2.5.1 Results and Statistical Analysis (Continued)

Seven sample of surface soil were collected to assess the impact of chimney fallout across the site. The results are summarised below;

Table 2.5: Summary of Soil Test Results for Surface Soil Samples

Determinant	CLEA/ATRISK Guideline (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	95% UCL	Exceedances of CLEA/ATRISK Guidelines
Lead	750	1000	4900	-	7

Due to the levels of Total Lead noted in the soils, soil leachate analysis was scheduled to determine the availability of the lead to the aquatic environment. The results are presented in the Table below, along with the Environmental Quality Standards for a marine/estuarine setting;

Table 2.6: Summary of Soil Leachate Test Results

Determinant	EQS for Marine/Esturine Setting (mg/l)	Minimum (mg/l)	Maximum (mg/l)	95% UCL	Exceedances of EQS Guidelines
Lead	0.025	<0.0010	0.4600	-	3

2.5.1 Results and Statistical Analysis (Continued)

The results of the perched groundwater testing are summarised in the following Table. The results are compared to the published Environmental Quality Standards (EQS) for a marine/estuarine setting, since the nearest sensitive receptor is the River Usk, located 600m southwest of the site.

Table 2.7: Summary of Perched Groundwater Test Results

Determinant	EQS for Marine/Esturine Setting (mg/l)	Minimum (mg/l)	Maximum (mg/l)	95% UCL	Exceedances of EQS Guidelines
Lead	0.025	<0.050	0.110	-	1 detected
Sulphate	250	<20	76	-	0
pH	-	7.2	11.2		-
Petroleum Hydrocarbons					
Ali >C6 - C8	-	<0.0050	0.0056	-	-
Ali >C8-C10	-	<0.0050	0.0120	-	-
Ali >C10 – C12	-	<0.0050	0.0440	-	-
Ali >C12 – C16	-	<0.0050	0.3600	-	-
Ali >C16 – C21	-	<0.0080	0.6700	-	-
Ali >C21 – C40	-	<0.0220	0.7700	-	-
Arom >C5 – C7	0.0300*	<0.0025	<0.0025	-	0
Arom >C7 – C8	0.0400**	<0.0025	<0.0025	-	0
Arom >C8 – C10	-	<0.0050	<0.0050	-	-
Arom >C10 – C12	-	<0.0050	0.0110	-	-
Arom >C12 – C16	-	<0.0050	0.0740	-	-
Arom >C16 – C21	-	<0.0080	0.1600	-	-
Arom >21 – C40	-	<0.0220	0.2100	-	-

* - Environmental Quality Standard for Benzene (EC No. 6.50)

** - Environmental Quality Standard for Toluene (EC No. 7.58)

2.5.2 Identified Elevated Levels of Pollutants

ZONE 1

Within Zone 1 two boreholes were performed (BW1 and BW2) and two samples of made ground soil were tested from this area. High concentrations of lead were recorded in these soils, ranging from 2,300 mg/kg to 130,000 mg/kg.

The Sulphate levels ranged from 240 mg/kg to 920 mg/kg and pH values ranged from 7.9 to 9.6. These levels are not considered excessive.

Hydrocarbons were detected in the soil from BW2. The oil comprised aliphatic hydrocarbons in the Equivalent Carbon Band C21 - C40 and aromatic hydrocarbons in the C10 - C40 band.

Leachate analysis revealed that the lead in the soil was present in a soluble form. Leachate concentration ranged from 0.016 mg/l to 0.460 mg/l. One of the two samples thus exceeded the Environmental Quality Standard for lead in a marine setting (0.025 mg/l).

One sample of perched groundwater were tested from this zone (BW2). The sample contained soluble lead at a concentration of 0.110 mg/l, which is in excess of the Environmental Quality Standards for a saltwater setting of 0.025 mg/l. The water contained 49 mg/l of sulphate and recorded a pH of 8.7. The groundwaters were impacted by a broad range of aliphatic and aromatic hydrocarbon fractions with a total concentration of 2.3 g/l extractable petroleum hydrocarbons. Whilst there are no published guidelines for Total Petroleum Hydrocarbons it is our usual practice to compare total hydrocarbon concentrations against either the UK Drinking Water (Supply) Standard of 0.010 mg/l or the Environmental Quality Standards for the aromatic species Benzene (Equivalent Carbon No. 6.5), 0.030 mg/l, or Toluene (Equivalent Carbon No. 7.58), 0.040 mg/l. The recorded concentration of Total Extractable Petroleum Hydrocarbons exceeded these values.

ZONE 2

Two boreholes were performed in Zone 2 (BW3 and BW4) and two samples of made ground soils were tested. The testing revealed elevated levels of lead in the soil, ranging from 180 mg/kg to 4200 mg/kg.

The sulphate levels ranged from 300 mg/kg to 1300 mg/kg and pH values ranged from 7.4 to 8.6. These levels are not considered excessive.

Hydrocarbons were detected in the soil from BW4. The oil comprised aromatic hydrocarbons in the C21 - C40 band.

Leachate analysis revealed that the lead in the soil was leachable, achieving leachate concentrations of between 0.0021 mg/l to 0.0430 mg/l. Thus the EQS was exceeded in one of the two samples from this zone.

Two samples of groundwater were recovered from this zone. Lead was not detected in either sample (analytical detection limit for lead was 0.050 mg/l). The sulphate concentration ranged from 30 mg/l to 51 mg/l, which is below the marine Environmental Quality Standard of 250 mg/l. An alkali pH of 11.2 was recorded in sample BW4. Hydrocarbons were not detected in the groundwater from this zone.

2.5.2 Identified Elevated Levels of Pollutants (Continued)

ZONE 3

One borehole was performed in Zone 3 (BW7) and one sample of made ground soil was tested. The testing revealed a lead concentration of 450 mg/kg. Whilst this concentration is below the CLEA Guideline for the protection of human health in an industrial setting, the level can still be considered as significant.

A sulphate concentration of 1300 mg/kg and a pH of 8.6 were recorded. These levels are not considered excessive.

Leachable lead was not detected during the analysis of the soil from BW7.

One sample of groundwater was retrieved from this zone. The sample did not contain lead, sulphate or hydrocarbons above the detection limit of the analysis. The sample recorded a pH of 8.0.

ZONE 4

Three boreholes were performed in this zone (BW8, B1 and B2), one of which was fitted with a well. Three samples of made ground were submitted for analysis. Sulphate levels in this zone ranged from 340 mg/kg and 15,000 mg/kg and pH values ranged from 8.1 and 8.8.

The elevated level of sulphate may be indicative of a former sulphuric acid spill (H_2SO_4). The recorded pH suggests that if the sulphate is related to an acid spill, the soil has subsequently been deprotonated, resulting in an alkali pH and the sulphate has complexed with an alternative counter-ion. It should be noted that brick fill can also contain elevated levels of sulphate.

Three soils samples from Zone 4 were subject to Volatile Organic Compound (VOC) Analysis which revealed that dichloromethane was not present in these samples. The analysis suite included a further 53 common chlorinated, brominated and low molecular weight aromatic hydrocarbons, all of which were absent.

Groundwater could not be retrieved from BW8 as it was dry during inspection.

ZONE 5

One borehole was performed in Zone 5 (BW5). Made ground soil from this borehole revealed an elevated lead concentration of 21,000 mg/kg.

Hydrocarbons were detected in the soil from BW5. The oil comprised aliphatic hydrocarbons in the Equivalent Carbon Band C16 – C40 and aromatic hydrocarbons in the C12 – C40 band.

Leachate analysis revealed that lead was leachable from the soil sample at a concentration of 0.190 mg/l, which is in excess of the EQS Guideline.

Groundwater testing revealed that lead was not present above the detection limit of the analysis and sulphate had a concentration of 43 mg/l, which is below the Environmental Quality Standard. Aromatic and aliphatic hydrocarbons were present with a total concentration of Extractable Petroleum Hydrocarbons of 0.330 mg/l. The concentration is above the abovementioned guidelines.

2.5.2 Identified Elevated Levels of Pollutants (Continued)

ZONE 6
Zone 6 comprises all areas of landscaped ground. Seven samples of surface soil were collected from landscaped areas across the site and tested for lead to determine the effects of fallout from the chimneys.

Lead was found to be elevated in these samples, ranging from 1000 mg/kg to 4900 mg/kg.

ZONE 7
Zone 7 comprises the drainage network beneath the site. All wells were considered to assess the potential impact of any leakages from this network into the perched groundwater. In addition to the wells located in other zones, a supplementary well was installed in the vicinity of the canteen (BW6).(Between 1A + Canteen)

Hydrocarbons were detected in the soil from BW6. The oil comprised aliphatic hydrocarbons in the Equivalent Carbon Band C12 – C40 and aromatic hydrocarbons in the C12 – C40 band.

The groundwater monitoring across the site revealed that soluble lead was present in the groundwater from Zone 1 and hydrocarbons were present in the perched groundwater from Zones 1 and 5 and in the ground at BW6.

2.5.3 Sources of Identified Elevated Levels of Pollutants

A high general background level of lead was encountered across the site. As the lead was often encountered beneath areas of hardstanding and above the perched groundwater it is likely to originate from operations pre-dating the laying of the current concrete surface. However, since lead is synonomous with the current processes performed on site the possibility of lead impact originating from current/recent operations cannot be ruled out.

The surface soil testing (Zone 6) indicated that there is likely to be a fall-out component to the lead encountered in the soils.

The perched groundwater testing encountered one incident of dissolved lead above the detection limit of the analysis which may originate from the drain system beneath the site or from the soils. If the contamination originates from the drains one would expect the recorded concentrations to be prone to fluctuation as anthropogenic input varies whilst groundwater contamination from lead in the soils may result in a more consistent concentration as a partitioning equilibriums will be set up between the soil and groundwater phases. The general absence of light hydrocarbon fractions within the oils detected in the soil suggests that they were either initially heavy oils or that they are aged and weathering has depleted the less recalcitrant lighter fractions. A programme of groundwater monitoring over a prolonged period will indicate whether the concentrations fluctuate.

Leachate analysis has revealed that several soil samples contained significantly leachable lead.

SECTION 3 Inspection and Monitoring Programme

The investigations to collect reference data have revealed that a further Inspection and Monitoring Programme should be performed at the site using the existing environmental monitoring infrastructure. Further intrusive investigations are also recommended to assess addition shallow soils and deep groundwaters.

3.1 Objectives of the Monitoring Programme

3.1.1 Objectives of the Environmental Monitoring Programme

The recent investigatory works have identified elevated lead in soils in all zones and lead in the perched groundwater beneath Zone 1. Sporadic hydrocarbon impact was also noted. The extent of these hotspots is currently unknown and further shallow boreholes are recommended to delimit the extent of hotspot. In addition, a potential risk to deep groundwater (i.e. in the suspected sands and gravels at c. 15m depth below ground level) has been identified and deep boreholes are recommended to assess whether the deeper groundwater has been impacted. Due to the presence of contamination at shallow depth, any deep drilling should incorporate measures to protect the deep aquifer and maintain the integrity of the alluvium as a hydrological seal.

3.1.2 Objectives of the Infrastructure Monitoring Programme

The recently installed Environmental Monitoring Infrastructure will allow the perched groundwaters beneath the site to be monitored and tested. This monitoring will indicate whether variations in chemical concentrations occur over time due to seasonal change or change in anthropogenic input into the groundwater system. The long term monitoring should identify any anomalies due to anthropogenic input.

The buried drainage infrastructure beneath the site has been inspected by a specialist contractor to identify potential points of leakage. Their findings are detailed in a separate report held by Enersys (UK) Ltd.

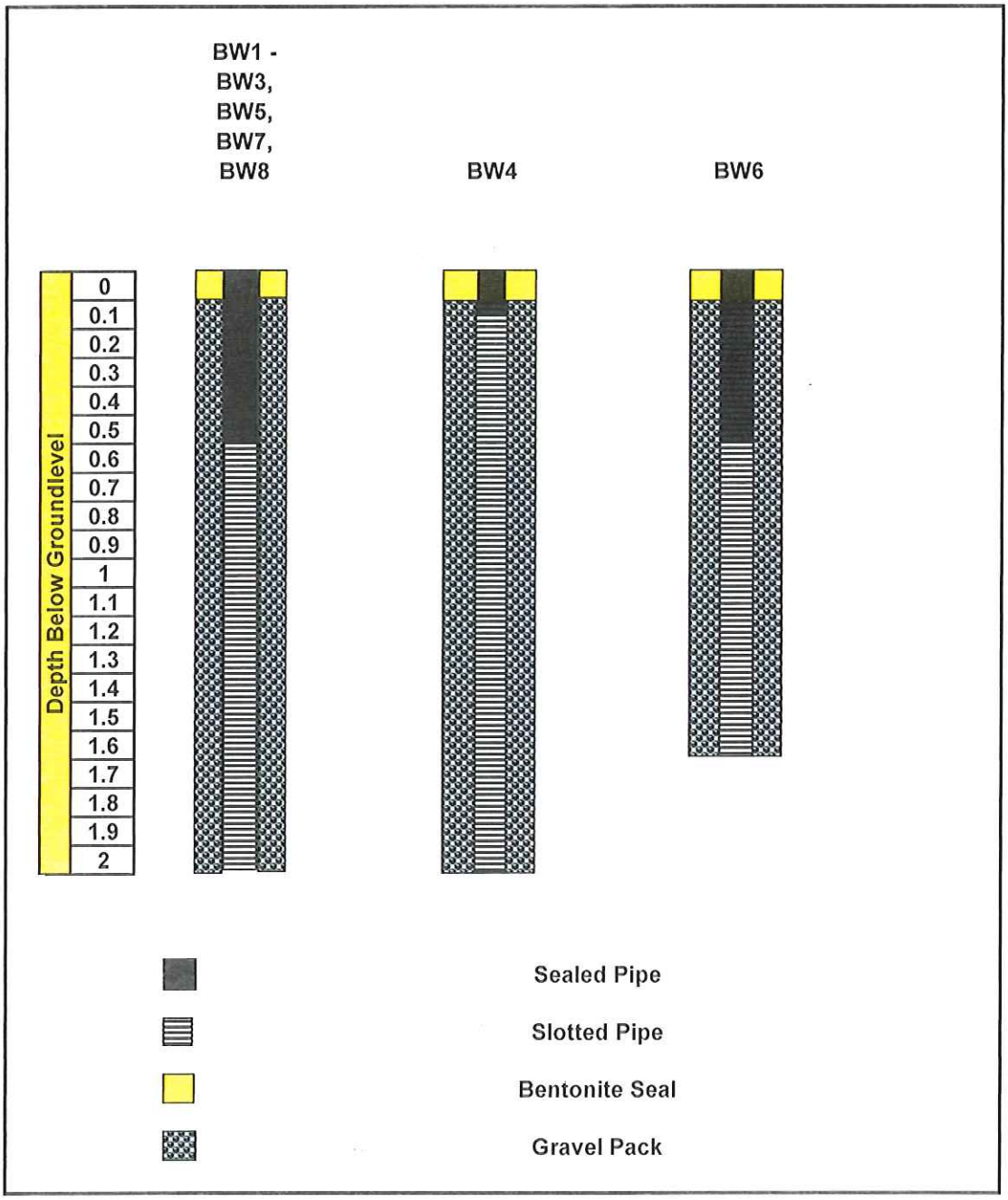
3.2 Environmental Monitoring Infrastructure

3.2.1 Locations

The Environmental Monitoring Infrastructure, comprising wells extending into the perched groundwater, was installed at the locations agreed in the Design SPMP. The locations are displayed in Annex A2.

3.2.2 Groundwater Monitoring

The construction of the installed wells is detailed below;



Each groundwater well was finished with a bolted, watertight cover to prevent the ingress of surface water.

3.3 Monitoring Programme

One round of Environmental Monitoring has been performed. On the basis of this data a further monitoring programme should be agreed with the Environment Agency.

We recommend that all future monitoring is performed in accordance with the protocols presented within the Design SPMP. The Environment Agency may request that additional determinants be added to the test regime. All Environmental Monitoring should be performed by a competent Environmental Consultant.

We anticipate that the Environment Agency will request the installation of deep-wells to assess the condition of the groundwater within the deep sand and gravel aquifer beneath the site, which has not been inspected during the recent investigation.

3.4 Assessment and Reporting Procedure

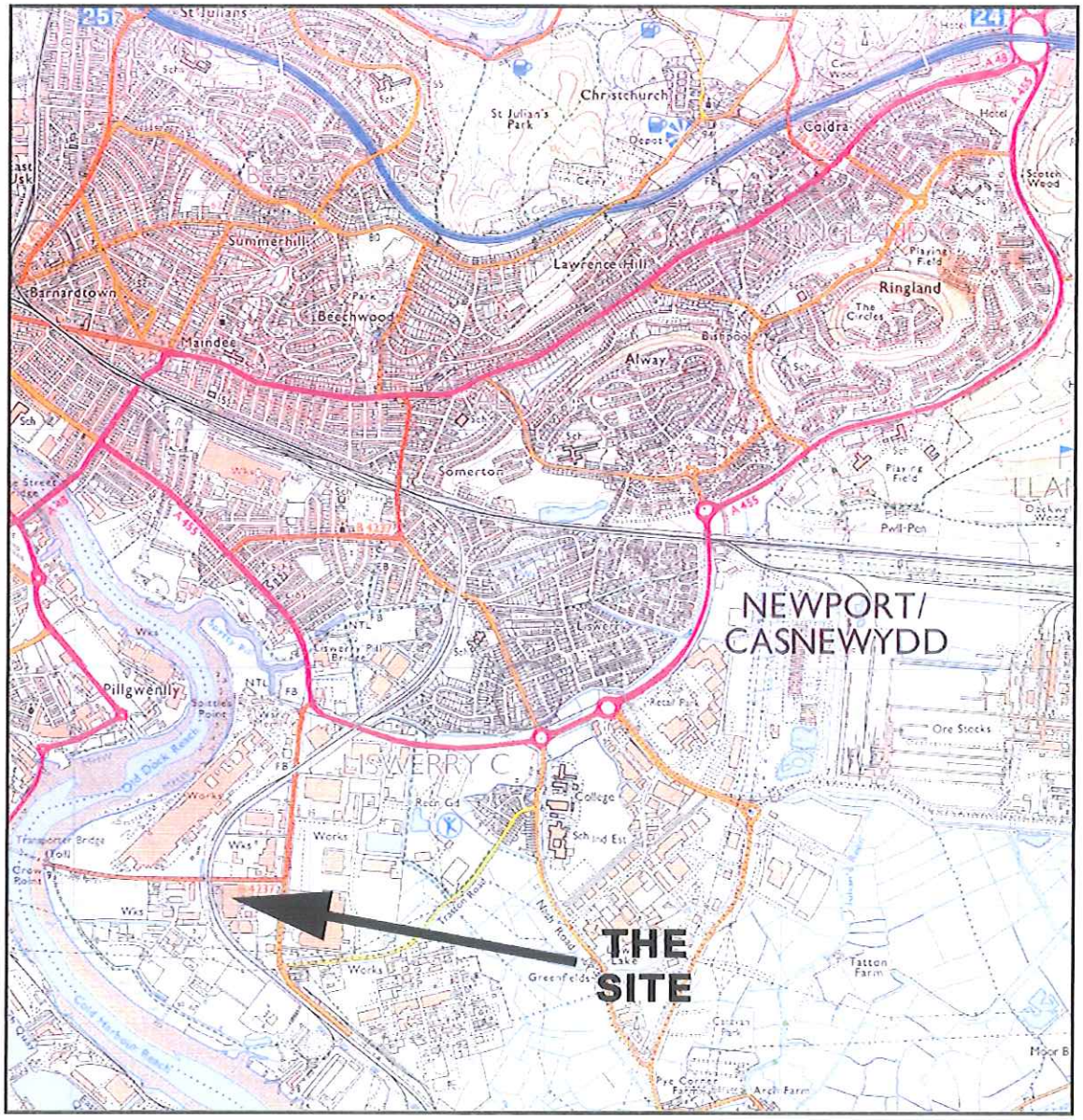
3.4.1 Assessment Procedure

Once the required testing suite and testing frequency has been agreed with the Environment Agency, the test data should be considered in a time series to assess the variation of chemical concentrations over the monitoring programme. If sudden increases in determinant concentrations are recorded an additional round of testing should be performed immediately and an enquiry should be set up into the cause of the anomaly. The Environment Agency should be informed of any anomalies and an amended monitoring regime (i.e. increased testing frequency) may need to be implemented in such instances.

3.4.2 Reporting Procedure

The frequency of the reporting of monitoring data should be agreed with the Environment Agency. Any anomalies should be reported immediately in interim reports.

ANNEX A
Figures and Plans
A1 – Site Location Plan
A2 – Site Layout and Exploratory Hole Locations


NEWPORT/
CASNEWYDD
THE
SITE
Christchurch
Goldra
Ringland
Lawrence Hill
Summerhill
Barnardtown
Maindee
Alway
Somerton
Pillgwenlly
Tatton Farm


S1
BW1
ZONE 1
BW2
S6
W1
S5
BW5
BW3
BW4
S4
ZONE 5
ZONE 2
BW6
BW7
B1
S3
BW8
ZONE 4
B2
S7
S2
S1
Used contaminated water (clarifier)
Chemical storage area (bunded)
Oil storage (new)
Oil storage (used)
Bulk chemical tanks
Oily water storage
Oxide storage
S1 Discharge to foul sewer
W1 Surface water discharge via purpose built interceptor
- WS Boreholes with wells
- WS Boreholes
- Surface Soil Sample
Dichloromethane storage

ANNEX B
Records of Investigation Findings
B1 – Windowless Sampler Borehole Logs

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW1
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 17/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.05			CONCRETE
								MADE GROUND: Loose to medium dense, brown to black, sandy GRAVEL to COBBLE of brick and sandstone fragments with interstitial ash.
					0.65			MADE GROUND: Soft, grey, sandy CLAY with occasional ash fragment.
					1.10			Firm to stiff, grey to brown mottled, thinly laminated CLAY
					2.00			End of Borehole at 2.00 m
			Type	Results				

Remarks:

AGS

HoleBASE III (Ed 412.22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 16/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.10			MADE GROUND: Firm, brown, very sandy CLAY
								MADE GROUND: Loose, orange, gravely SAND with concrete and brick fragments.
					0.75			Firm, grey, thinly laminated CLAY with occasional small pockets of green silt.
					2.00			End of Borehole at 2.00 m

Type	Results

Remarks:

AGS

HoleBASIC III (Bid 412.22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW3
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 16/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.05			CONCRETE
					0.20			MADE GROUND: Loose, brown, GRAVEL of aggregate.
					0.50			MADE GROUND: Firm , brown, gravely CLAY. Contains brick and concrete fragments.
					0.80			MADE GROUND: Loose, black, sandy GRAVEL of ash.
					1.00			MADE GROUND: Firm, grey, sandy CLAY.
					1.10			MADE GROUND: Loose, black, sandy GRAVEL. Includes ash fragments.
								Firm, grey to brown mottled, thinly laminated CLAY .
					2.00			End of Borehole at 2.00 m
			Type	Results				

Remarks:

AGS

HoleDASE III (Ed 412-22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW4
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 17/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.05			CONCRETE
					0.20			MADE GROUND: Loose, brown, slightly clayey sandy GRAVEL of concrete and brick fragments.
								Firm to stiff, grey to brown mottled, thinly laminated CLAY.
					2.00			End of Borehole at 2.00 m

Type	Results

Remarks:

AGS

HoleBASE III (Std - 12.22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW5
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 16/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			MADE GROUND: Soft, brown, sandy CLAY with turf.
								MADE GROUND: Brown, firm, sandy CLAY to clayey GRAVEL. Contains brick and sandstone fragments.
					1.50			Soft to firm, grey to brown mottled, CLAY.
					2.00			End of Borehole at 2.00 m
			Type	Results				

Remarks:

AGS

HoleDASL III (DB 412-22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW6
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 17/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.12			CONCRETE
								MADE GROUND: Loose, brown to black, sandy GRAVEL including brick and ash fragments. Terminated at 1.20m on obstruction.
					1.20			End of Borehole at 1.20 m

Type	Results

Remarks:

AGS

Hole(n/a)L III (D)(412-22) Standard Borehole Log V2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW7
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 17/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.08			CONCRETE
								MADE GROUND: Loose to medium dense, black to brown, sandy GRAVEL. Includes brick, ash and concrete fragments.
					1.20			Soft becoming firm, brown to grey mottled, thinly laminated CLAY.
					2.00			End of Borehole at 2.00 m
			Type	Results				

Remarks:

AGS

HoleBASIC III (Std 412-22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
BW8
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 15/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			CONCRETE
					0.55			MADE GROUND: Stiff, grey, CLAY with occasional rounded sandstone gravel.
					1.10			MADE GROUND: Soft to firm, grey, gravelly CLAY with sandstone and brick fragments.
					2.00			Firm, grey, thinly laminated CLAY.
								End of Borehole at 2.00 m
			Type	Results				

1 2 3 4 5 6 7 8 9

Remarks:

AGS

HoleBASIC III (Std 412-22) Standard Borehole Log v2 dated 27th Nov 07

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
B1
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 15/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
								CONCRETE
					0.25			MADE GROUND: Loose, black, sandy GRAVEL of ash with occasional sandstone gravel fragments.
					0.70			MADE GROUND: Red-brown, sandy GRAVEL of brick fragments.
					0.80			MADE GROUND: Grey to brown, very clayey GRAVEL.
					1.00			Soft, grey to brown mottled, thinly laminated CLAY.
					2.00			End of Borehole at 2.00 m
			Type	Results				

Remarks:

AGS

HoleBASE III (BM 412-22) Standard Borehole Log v2 dated 27th Nov 03

TERRA FIRMA (WALES) LIMITED
TEL: 02920 735354 FAX: 02920 735433

Borehole No
B2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
ENERSYS	9565		MP
Location:		Level: -	Scale 1:50
Client:		Dates: 15/10/2007	Logged By

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.15			CONCRETE
								MADE GROUND: Soft to firm, grey-brown, sandy gravely CLAY with ash, brick and sandstone fragments.
					0.90			Soft becoming firm, grey to brown mottled, thinly laminated CLAY.
					2.00			End of Borehole at 2.00 m

Type	Results

Remarks:

AGS

HoleBASE III (Std 412.22) Standard Borehole Log v2 dated 27th Nov 03

ANNEX C
Analytical Test Data
C1 – Borehole Soil Chemical Testing (STL – 464960)
C2 – Surface Soil Samples and Perched Groundwater Testing (STL – 465403)
C3 – Borehole Soils Leachate Analysis (STL – 469122)
C4 – Zone 4 VOC Analysis (STL – 468412)
C5 – Alluvium Soil Permeability Test Result (GEOLAB – 4990)

Report Summary

1314
0897
1229
1510

Mr Dave Emanuel
Terra Firma
5 Deryn Court
Wharfedale
Pentwyn
Cardiff
CF23 7HB

Date of Issue: **07 November 2007**

Report Number: **MID/465403/2007** Issue **1**

Job Description: Dave Emanuel - General

Job Location: Enersys

Number of Samples included in this report **7**

Job Received: **24 October 2007**

Number of Test Results included in this report **21**

Analysis Commenced: **24 October 2007**

Signed:

Name: **S. Clancy** Date: **07 November 2007**

Title: **Organic Chemistry Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.
MCERTS accreditation refers to analysis carried out at our STL Midlands site only.
Analysis carried out on air-dried and ground test portion of the sample(s), unless otherwise stated. Air drying is carried out at not greater than 30 degrees C. Samples are not preserved on site, unless otherwise stated. All results are reported on an air-dried basis.

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**

Laboratory Number: **10237269** Sample **1** of **7**

Sample Source: **Terra Firma**

Sample Point Description: **Terra Firma**

Sample Description: **S1 0.00m**

Visual Description: **Brown loam with occasional organic matter.**

Sample Date: Sample Time: **1** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	7.7	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	28	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	1500	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237269: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**

Laboratory Number: **10237270** Sample **2** of **7**

Sample Source: **Terra Firma**

Sample Point Description: **Terra Firma**

Sample Description: **S2 0.00m**

Visual Description: **Brown loam with occasional organic matter.**

Sample Date: Sample Time: **2** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	12	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	31	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	1400	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237270: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**

Laboratory Number: **10237271** Sample **3** of **7**

Sample Source: **Terra Firma**

Sample Point Description: **Terra Firma**

Sample Description: **S3 0.00m**

Visual Description: **Brown loam with occasional organic matter.**

Sample Date: Sample Time: **3** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	59	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	33	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	1000	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237271: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**
Laboratory Number: **10237272** Sample **4** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **S4 0.00m**
Visual Description: **Brown loam with occasional organic matter.**
Sample Date: Sample Time: **4** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	13	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	7.5	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	4900	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237272: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**

Laboratory Number: **10237273** Sample **5** of **7**

Sample Source: **Terra Firma**

Sample Point Description: **Terra Firma**

Sample Description: **S5 0.00m**

Visual Description: **Brown loam with occasional organic matter.**

Sample Date: Sample Time: **5** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	51	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	31	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	1500	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237273: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**
Laboratory Number: **10237274** Sample **6** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **S6 0.00m**
Visual Description: **Brown loam with occasional organic matter.**
Sample Date: Sample Time: **6** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	41	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	22	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	2100	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237274: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/465403/2007** Issue **1**
Laboratory Number: **10237275** Sample **7** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **S7 0.00m**
Visual Description: **Brown loam with occasional organic matter.**
Sample Date: Sample Time: **7** Sample Received: **24 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	47	%	29/10/2007		N	Mid	Stones
Moisture content at 30 C	24	%	29/10/2007		N	Mid	33A
Lead, as Dry Weight	4000	mg/kg	06/11/2007		M	Mid	30

Analyst Comments for 10237275: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Signed: Name: **S. Clancy** Date: **07 November 2007**
Title: **Organic Chemistry Manager**

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233995** Sample **6** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **B2 0.50m**
Visual Description: **Brown and grey clay with some gravel and occasional organic matter**
Sample Date: **15 October 2007** Sample Time: **10** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	3.8	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	19	%	24/10/2007		N	Mid	33A
Sulphate (Total) as SO3	1.5	%	01/11/2007		M	Mid	45
pH	8.1	pH units	31/10/2007		Y	Mid	39
chloroform	<0.12	mg/kg	05/11/2007		M	Mid	327
1,1,1-trichloroethane	<0.12	mg/kg	05/11/2007		M	Mid	327
carbon tetrachloride	<0.12	mg/kg	05/11/2007		M	Mid	327
trichloroethylene	<0.12	mg/kg	05/11/2007		M	Mid	327
bromodichloromethane	<0.12	mg/kg	05/11/2007		M	Mid	327
trans-1,3-dichloropropene	<0.12	mg/kg	05/11/2007		M	Mid	327
cis-1,3-dichloropropene	<0.12	mg/kg	05/11/2007		M	Mid	327
1,1,2-trichloroethane	<0.12	mg/kg	05/11/2007		M	Mid	327
tetrachloroethylene	<0.12	mg/kg	05/11/2007		M	Mid	327
dibromochloromethane	<0.12	mg/kg	05/11/2007		M	Mid	327
1,1,1,2-tetrachloroethane	<0.12	mg/kg	05/11/2007		M	Mid	327
bromoform	<0.12	mg/kg	05/11/2007		M	Mid	327
1,3-dichlorobenzene	<0.12	mg/kg	05/11/2007		M	Mid	327
1,4-dichlorobenzene	<0.12	mg/kg	05/11/2007		M	Mid	327
1,2-dichlorobenzene	<0.12	mg/kg	05/11/2007		M	Mid	327

Analyst Comments for 10233995: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233996** Sample **7** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW5 0.00m**
Visual Description: **Dark brown loam with much sand, roots and grass**
Sample Date: **16 October 2007** Sample Time: **11** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	46	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	14	%	24/10/2007		N	Mid	33A
Lead, as Dry Weight	21000	mg/kg	05/11/2007		M	Mid	30

Analyst Comments for 10233996: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Signed: Susan Clancy Name: **S. Clancy** Date: **07 November 2007**
Title: **Organic Chemistry Manager**

SEVERN TRENT STL

METHOD COMMENTS FOR REPORT MID/464960/2007 Issue 1

Date of Issue :

Method	Statement
30	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). The measurement of metal concentrations is determined directly on an ICP-OES at defined wavelengths.
327	Based on USEPA methodology 8260. The VOC content of land samples is determined by GC-MS using a headspace analyser. This analysis is carried out on an as received portion of sample.
33A	Moisture Content is the weight difference between an as received sample and the air dried sample at 30 degrees C.
39	The test is carried out by extraction using deionised water with agitation. The pH of this suspension is read directly from an electronic pH meter.
45	The sulphates are extracted from land samples using boiling hydrochloric acid solution. After cooling and filtration the determination of sulphate is obtained from an aliquot of solution, via a turbidimetric measurement.
Stones	The percentage weight of the stones that are naturally occurring and are greater than 10mm in diameter of the total weight of sample.

Report Summary

Mr Dave Emanuel
Terra Firma
5 Deryn Court
Wharfedale
Pentwyn
Cardiff
CF23 7HB

UKAS TESTING
1314
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1510

SEVERN TRENT STL

Date of Issue: **07 November 2007**

Report Number: **MID/464960/2007** Issue **1**

Number of Samples included in this report **4**

Number of Test Results included in this report **74**

Site Name: **Enersys**
Job Received: **22 October 2007**
Analysis Commenced: **22 October 2007**
Order No: **9565**

Signed: Susan Clancy Name: **S. Clancy** Date: **07 November 2007**
Title: **Organic Chemistry Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Certificate of Analysis

UKAS TESTING
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/464960/2007** Issue **1**
Site Name: **Enersys**

Group	Determinand	Unit	Method/ Accreditation			Soil 10233989 BW4 0.15m 17/10/2007	Soil 10233990 BW5 0.50m 16/10/2007	Soil 10233991 BW6 0.30m 17/10/2007	Soil 10233994 B1 0.50m 15/10/2007
Metals	Lead, as Dry Weight	mg/kg	30	Y	Mid	180	21000	340	-
Inorganics	Sulphate (Total) as SO3	%	45	Y	Mid	0.082	0.11	0.038	0.076
	pH	pH units	39	Y	Mid	8.3	9.0	9.0	8.8
TPH	>C6 to C8 Aliphatics	mg/kg	304	Y	Mid	<0.10	0.22	<0.10	-
	>C8 to C10 Aliphatics	mg/kg	304	Y	Mid	<0.10	0.17	<0.10	-
	>C10 to C12 Aliphatics	mg/kg	317EPH	Y	Mid	<1.0	<1.0	<1.0	-
	>C12 to C16 Aliphatics	mg/kg	317EPH	Y	Mid	<1.0	<1.0	13	-
	>C16 to C21 Aliphatics	mg/kg	317EPH	Y	Mid	<1.0	3.9	28	-
	>C21 to C40 Aliphatics	mg/kg	317EPH	Y	Mid	<1.0	18	49	-
	Total Aliphatics (>C6 to C40)	mg/kg	304/317EPH	Y	Mid	<5.0	23	90	-
	>C5 to C7 Aromatics	mg/kg	304	Y	Mid	<0.010	<0.010	<0.010	-
	>C7 to C8 Aromatics	mg/kg	304	Y	Mid	<0.010	<0.010	<0.010	-
	>C8 to C10 Aromatics	mg/kg	304	Y	Mid	<0.10	<0.10	<0.10	-
	>C10 to C12 Aromatics	mg/kg	317EPH	Y	Mid	<1.0	<1.0	<1.0	-
	>C12 to C16 Aromatics	mg/kg	317EPH	Y	Mid	<1.0	<1.0	8.5	-
	>C16 to C21 Aromatics	mg/kg	317EPH	Y	Mid	<1.0	4.4	92	-
	>C21 to C40 Aromatics	mg/kg	317EPH	Y	Mid	10	33	470	-
	Total Aromatics (>C6 to C40)	mg/kg	304/317EPH	Y	Mid	10	37	570	-
	Total EPH (>C6 to C40)	mg/kg	304/317EPH	Y	Mid	10	60	660	-
VOC	chloroform	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,1,1-trichloroethane	mg/kg	327	Y	Mid	-	-	-	<0.10
	carbon tetrachloride	mg/kg	327	Y	Mid	-	-	-	<0.10
	trichloroethylene	mg/kg	327	Y	Mid	-	-	-	<0.10
	bromodichloromethane	mg/kg	327	Y	Mid	-	-	-	<0.10

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

UKAS TESTING
1314
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SEVERN TRENT STL

Report Number: **MID/464960/2007** Issue **1**

Site Name: **Enersys**

Group	Determinand	Unit	Method/ Accreditation			Soil			
						10233989 BW4 0.15m 17/10/2007	10233990 BW5 0.50m 16/10/2007	10233991 BW6 0.30m 17/10/2007	10233994 B1 0.50m 15/10/2007
VOC	trans-1,3-dichloropropene	mg/kg	327	Y	Mid	-	-	-	<0.10
	cis-1,3-dichloropropene	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,1,2-trichloroethane	mg/kg	327	Y	Mid	-	-	-	<0.10
	tetrachloroethylene	mg/kg	327	Y	Mid	-	-	-	<0.10
	dibromochloromethane	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,1,1,2-tetrachloroethane	mg/kg	327	Y	Mid	-	-	-	<0.10
	bromoform	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,3-dichlorobenzene	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,4-dichlorobenzene	mg/kg	327	Y	Mid	-	-	-	<0.10
	1,2-dichlorobenzene	mg/kg	327	Y	Mid	-	-	-	<0.10

Signed: Susan Clancy

Name: **S. Clancy** Date: **07 November 2007**

Title: **Organic Chemistry Manager**

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Severn Trent Laboratories Ltd.

Rayner House, 80 Lockhurst Lane, Coventry, CV6 5PZ Tel:+44 (0)24 7658 4800 Fax:+44 (0)24 7658 4848

SEVERN TRENT STL

ANALYST COMMENTS FOR REPORT MID/464960/2007 Issue 1

Date of Issue: **07 November 2007**

Sample No	Analyst Comments
10233986	
10233987	
10233988	
10233989	
10233990	
10233991	
10233992	
10233993	
10233994	
10233995	
10233996	

Signed: Susan Clancy

Name: **S. Clancy** Date: **07 November 2007**

Title: **Organic Chemistry Manager**

SEVERN TRENT STL

DETERMINAND COMMENTS FOR REPORT

ISSUE 1

Date of Issue : **07 November 2007**

Sample No	Description	Determinand	Comments

Signed:

Name:

Title:

Date: **07 November 2007**

SEVERN TRENT LABORATORIES LIMITED
TERMS AND CONDITIONS FOR THE SALE OF SERVICES

Severn Trent Laboratories Limited, STL Business Centre, Torrington Avenue, Coventry, CV4 9GU United Kingdom

(1) GENERAL

(a) In these terms and conditions of sale ("Conditions") "STL" means Severn Trent Laboratories Limited, "the Customer" means the person, firm or company named in the quotation or order acknowledgement. These Conditions shall form part of every request for services by the Customer to STL ("Contract"). Any variation of the Conditions shall only be effective if mutually agreed in writing and signed by a duly authorised representative of STL.

(b) Every Contract between STL and the Customer shall be subject to English Law. The Customer hereby submits to the exclusive jurisdiction of the English Courts for the determination of any question or dispute, howsoever arising.

(2) QUOTATIONS AND ACCEPTANCE OF ORDERS

(a) Any tender or quotation given by STL shall, unless otherwise stated, remain valid for acceptance for a period of 60 days from the date of the tender.

(b) No contract shall arise between STL and the Customer unless and until a firm order from the Customer is either accepted (i) in writing by STL; or (ii) STL has rendered the services or otherwise complied with the Customer's order.

(3) DESCRIPTION, DRAWINGS AND SPECIFICATION

All descriptions, drawings, specifications, representations and other particulars furnished by STL in catalogues, price lists and elsewhere (whether verbally or in writing) are given for general information and are not binding upon STL unless specifically confirmed in writing as being applicable to the services rendered under this Contract.

(4) PRICE AND PAYMENT

(a) Charges are exclusive of Value Added Tax.

(b) A separate invoice may be issued for each item listed in the quotation.

(c) Liability for payment shall arise upon completion of the whole or part of the services provided under the Contract (or as otherwise agreed in writing between STL and the Customer), whether pursuant to a written order or pursuant to submission to STL of a sample or any document whatsoever. STL will issue invoices in respect of the sums payable by the Customer prior to the relevant payment date.

(d) The services or an item of the services will be deemed to be completed and the relevant element of the Contract price to be due and payable forthwith:

(i) when STL issues a written notice to the Customer confirming such completion; or

(ii) if STL is available to perform the services under this Contract but is prevented from doing so at the time agreed for the provision of the services by reason of the lack of relevant assistance from the Customer (such as lack of availability of test components from the Customer) and/or by reason of the condition or accessibility of the Customer's premises on the site at which the services are to be provided and/or the facilities at or the services available therein.

(e) Payment shall be made by the Customer within 30 days after the earlier of the date of invoice or the provision of the services (or item of services). No payment shall be deemed to have been received until STL has received cleared funds. Time for payment shall be of the essence.

(f) Sums unpaid after the due date shall bear interest until the day payment is received at the statutory rate of interest for late payment from time to time, such interest accruing from month to month. Without prejudice to any other rights or remedies of STL any default by the Customer in making payment on the due date shall entitle STL to supend services under this or any other contract so long as the default continues and to treat this Contract as repudiated by the Customer if the Customer has not within 14 days of receiving written notice from STL paid all sums due to STL.

(g) No payments may be withheld nor any counterclaims of the Customer be set off against any payment due hereunder without the written consent of STL.

(5) SERVICE LEVELS

(a) STL will endeavour to:

(i) ensure that all samples are analysed and the results of such analysis notified to the Customer;

(ii) ensure that all samples are analysed in accordance with best analytical practices;

(iii) ensure that its staff whilst on premises under control of the Customer will act responsibly and in accordance with safe working procedures;

(iv) ensure that all information relating to the business and activities of the Customer which are known to STL and the staff of STL as a consequence of the services provided by STL are not divulged to any third party without prior written approval from the Customer;

(b) Any special analytical precedures set out in STL's quotation shall not be varied without the prior written agreement between the Customer and STL.

(c) STL reserves the right to reject any samples which in its opinion by reason of its nature, volume or presentation is not such as to permit STL to conduct an adequate analysis.

(6) CUSTOMER'S OBLIGATIONS

(a) The Cusomer shall:

(i) unless otherwise agreed be responsible for the delivery of all samples and materials to the laboratory specified by STL;

(ii) clearly and accurately label all samples and materials delivered to STL;

(iii) ensure that reasonable notice of bottle requirements/collection arrangements is made during normal working hours;

(iv) notify STL if the analysis is required for legal proceedings prior to STL carrying out the analysis. For such purposes, the Customer should prepare a chain of custody form to be signed by STL as acknowledgement of receipt;

(v) provide STL with such quantities of samples for analysis and in such forms as STL requires. The Customer shall submit a full schedule with the samples together with any other relevant information likely to be useful during analysis, in particular, without limitation, where the Customer has any suspicion that there may be present in the sample substances hazardous to health or dangerous to employees, servants or agents of STL. The Customer fully indemnifies STL against all claims, demands, actions, proceedings and all damages, losses, costs and expenses which are made or brought against or incurred or suffered by STL directly or indirectly and whether wholly or partly resulting from the Customer's failure to comply with the provision of this Condition.

(b) If access to the Customer's premises is necessary for the fulfilment by STL of its obligations under the Contract, the Customer shall allow STL full access and if such access is hindered or prevented, then STL shall have the right to terminate the Contract immediately without prejudice to its rights to charge in respect of services rendered up to the date of such termination.

(7) WARRANTY AND LIABILITY OF STL

(a) All Conditions and warranties whether expressed or implied by statute or otherwise shall be construed subject to these Conditions and insofar as they are inconsistent therewith, shall be excluded to the fullest extent allowed by law.

(b) If STL has failed to perform the services (or any part thereof) due to a breach of its obligations under this Contract, the Customer shall be entitled to require STL to remedy such breach by re-executing the relevant part of the services without additional charge up to the amount of the charges received by STL for the provision of such services.

(c) STL will use its reasonable endeavours to meet any date quoted by STL for completion of services but any date named by STL for completion is given and intended as an estimate only and is not to be of the essence of the contract. STL shall not be liable in any way in respect of late completion of the services howsoever caused, nor shall such late completion be deemed to be a breach of contract. Any exclusion or limitation of liabilty in these Conditions or the Contract shall not apply in the case of liability for fraudulent misrepresentation, death or personal injury resulting directly from STL's negligence.

(d) Save for any liability for death or personal injury arising from STL's negligence or fraudulent misrepresentation (which is not limited), STL's total aggregate liability in respect of any loss or damage sustained by the Customer, whether for negligence or breach of contract or otherwise, shall in no event exceed the value of the services provided under this Contract as set out in the quotation for the provision of services. STL shall in no event be liable for any economic loss or loss of profit (direct or indirect), or any indirect, special or consequential loss or damage howsoever caused, or any liability arising to any third party. STL confirms and the Customer acknowledges that the services are specifically costed on the basis that this clause applies.

(8) BREACH BY OR INSOLVENCY OF THE CUSTOMER

STL shall have the right forthwith to terminate this and any other contract with the Customer but without affecting any other claim, right or remedy of STL against the Customer, if:

(a) the Customer fails to comply with any of its obligations to STL under this or any other contract; or

(b) upon the occurrence of any of the following events:

(i) any notice to the Purchaser that a Receiver or Manager of the Purchaser is to be or has been appointed; or

(ii) any notice to the Purchaser that a petition to wind it up is to be or has been presented or any notice conveying a meeting of the Purchaser at which such a resolution is to be proposed to wind up the Purchaser (save for the purposes of and followed by a bona fide reconstruction or amalgamation); or

(iii) a decision by the Purchaser that it intends to make an arrangement with its Creditors; or

(iv) any act or bankruptcy by the Purchaser.

(9) CANCELLATION, SUSPENSION AND TERMINATION

(a) The Customer can only cancel an order (or any part of an order) which STL has already accepted with STL's prior agreement in writing and provided that the Customer indemnifies STL in full in terms established by STL. STL is not bound to agree to any such cancellation and may complete such order even in the Customer purports to cancel it.

(b) If for any cause whatsoever beyond its control, STL is unable to perform any of its obligations under the Contract STL may by notice in writing to the Customer terminate the Contract or suspend the Contract in respect of any one or more part or parts of its obligations without liability for any loss or damage thereby incurred by the Customer.

(10) DESIGN IMPROVEMENTS, CONFIDENTIALITY AND INTELLECTUAL PROPERTY

(a) In the interest of continuous design improvements STL reserves the right from time to time and at any time without prior notice to make such changes in design, construction, composite materials layout or equipment as in its absolute discretion it shall deem appropriate.

(b) Any intellectual property rights (including, without limitation, patents, registered and unregistered designs, trade marks and service marks (registered or not) and copyright and any applications for them) created by STL in the course of the performance of the Contract or otherwise created or used in the provision of the services shall remain STL's property. Nothing in this Contract shall be deemed to have given the Customer a licence or any other right to use any of the intellectual property rights of STL.

(c) STL shall have no liability whatsoever to the Customer in respect of any actual or alleged infringement of any intellectual property of third parties in relation to the services specified in the order or their testing, except to the extent (if any) that such infringement occurs by reason of the design of STL.

(d) Both parites shall keep and procure to be kept secret and confidential all information disclosed or obtained as a result of the relationship of the parites under the Contract and shall not use or disclose the same save for the pruposes or the proper performance of the Contract or with the prior written consent of the other party; except that this obligation of confidentiality shall not extend to any matter which can be shown to be part of the public domain other than as a result of a breach of the obligations of confidentiality under this Contract; or where any applicable law requires the disclosure of the relevant matter.

(11) RECOMMENDED THIRD PARTIES, SUB-CONTRACTING AND THIRD PARTIES' RIGHTS

(a) Where STL recommends that the Customer should engage other laboratories to carry out certain services, STL shall have no liability in respect of such recommendation or the performance of such services by others.

(b) STL shall be entitled to sub-contract any of the services under the Contract if it anticipates that it will be unable to meet the timescale set out in the Contract or if a particular determinand cannot be analysed in-house. In any other circumstances, STL will not sub-contract any of the services without the Customer's written agreement. The Customer is not entitled to assign the benefit under this Contract.

(c) The Contract (Rights of Third Parties) Act 1999 shall not apply to the Contract and no third party shall have the benefit of the right to enforce these Conditions.

(12) FORCE MAJEURE

(a) Neither STL nor the Customer shall be liable for a failure to perform arising from any causes or events beyond the control and without the fault or negligence of STL or the Customer and without prejudice to the generality of the foregoing to include acts of God or a public enemy, acts of the Government of STL's or Purchaser's country or any public athority or governmental agency in either country, acts of any person engaged in subversive activity or sabotage, fires, floods, explosion or other catastrophes, epidemics or quarantine restrictions, power outages, major equipment failure, strikes, slowdowns, lockouts, or labour stoppages or disputes of any kind, freight embargoes, unusually severe weather or delays of the Customer due to any of the above causes or events.

(b) In the event of a failure by the Customer to perform arising under sub-paragraph (a) of this clause, STL shall be entitled to delay its obligations of supply for a period up to and including 30 days in which case all obligations including payment provisions under this Contract shall apply.

(13) MISCELLANEOUS

(a) This Contract sets out the entire agreement and understanding between the Customer and STL in connection with the provision of services and shall supersede and replace all documentation previously issued by STL purporting to set out its terms and conditions for provisions of services.

(b) If any provision of this Contract is held to be illegal or invalid the remaining provisions of this Contract shall remain in full force and effect and shall not be affected by the illegal or invalid provision.

SEVERN TRENT STL

Mr Emanuel
Terra Firma
5 Deryn Court
Wharfedale
Pentwyn CF23 7HB
Cardiff

07 November 2007

Test Report: MID/465403/2007

Dear Mr Emanuel

Analysis of your sample(s) submitted on 24 October 2007 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7658 4800 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed: Susan Clancy

Name: S. Clancy

Title: Organic Chemistry Manager

SEVERN TRENT STL

Mr Emanuel
Terra Firma
5 Deryn Court
Wharfedale
Pentwyn CF23 7HB
Cardiff

07 November 2007

Test Report: MID/464960/2007

Dear Mr Emanuel

Analysis of your sample(s) submitted on 22 October 2007 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7658 4800 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name: S. Clancy

Title: Organic Chemistry Manager

Report Summary

1314
0897
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Mr Dave Emanuel
Terra Firma
5 Deryn Court
Wharfedale
Pentwyn
Cardiff
CF23 7HB

Date of Issue: **07 November 2007**

Report Number: **MID/464960/2007** Issue **1**

Job Description: Dave Emanuel - General

Job Location: Enersys

Number of Samples included in this report **7**

Job Received: **22 October 2007**

Number of Test Results included in this report **125**

Analysis Commenced: **22 October 2007**

Signed: Susa Clancy

Name: **S. Clancy** Date: **07 November 2007**

Title: **Organic Chemistry Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.
MCERTS accreditation refers to analysis carried out at our STL Midlands site only.
Analysis carried out on air-dried and ground test portion of the sample(s), unless otherwise stated. Air drying is carried out at not greater than 30 degrees C. Samples are not preserved on site, unless otherwise stated. All results are reported on an air-dried basis.

Certificate of Analysis

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Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233986** Sample **1** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW1 0.50m**
Visual Description: **Brown and black clay with occasional stones**
Sample Date: **17 October 2007** Sample Time: **1** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	12	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	26	%	24/10/2007		N	Mid	33A
Lead, as Dry Weight	2300	mg/kg	03/11/2007		M	Mid	30
Sulphate (Total) as SO3	0.024	%	01/11/2007		M	Mid	45
pH	7.9	pH units	31/10/2007		Y	Mid	39
>C6 to C8 Aliphatics	0.15	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aliphatics	<0.14	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aliphatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aliphatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aliphatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aliphatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aliphatics (>C6 to C40)	<6.8	mg/kg	07/11/2007		Y	Mid	304/317EPH
>C5 to C7 Aromatics	<0.014	mg/kg	07/11/2007		Y	Mid	304
>C7 to C8 Aromatics	<0.014	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aromatics	<0.14	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aromatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aromatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aromatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aromatics	<1.4	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aromatics (>C6 to C40)	<6.8	mg/kg	07/11/2007		Y	Mid	304/317EPH
Total EPH (>C6 to C40)	<6.8	mg/kg	07/11/2007		Y	Mid	304/317EPH

Analyst Comments for 10233986: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

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Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233987** Sample **2** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW2 0.25m**
Visual Description: **Brown, black, red and white sand with much gravel, loam and bricks**
Sample Date: **16 October 2007** Sample Time: **2** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	2.5	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	13	%	24/10/2007		N	Mid	33A
Lead, as Dry Weight	130000	mg/kg	05/11/2007		M	Mid	30
Sulphate (Total) as SO3	0.092	%	01/11/2007		M	Mid	45
pH	9.6	pH units	31/10/2007		Y	Mid	39
>C6 to C8 Aliphatics	0.39	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aliphatics	<0.11	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aliphatics	<1.1	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aliphatics	<1.1	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aliphatics	7.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aliphatics	57	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aliphatics (>C6 to C40)	66	mg/kg	07/11/2007		Y	Mid	304/317EPH
>C5 to C7 Aromatics	<0.011	mg/kg	07/11/2007		Y	Mid	304
>C7 to C8 Aromatics	<0.011	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aromatics	<0.11	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aromatics	<1.1	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aromatics	<1.1	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aromatics	5.9	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aromatics	31	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aromatics (>C6 to C40)	37	mg/kg	07/11/2007		Y	Mid	304/317EPH
Total EPH (>C6 to C40)	100	mg/kg	07/11/2007		Y	Mid	304/317EPH

Analyst Comments for 10233987: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

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Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233988** Sample **3** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW3 0.50m**
Visual Description: **Dark grey and black clay with much gravel**
Sample Date: **16 October 2007** Sample Time: **3** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	12	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	19	%	24/10/2007		N	Mid	33A
Lead, as Dry Weight	4200	mg/kg	05/11/2007		M	Mid	30
Sulphate (Total) as SO3	0.030	%	01/11/2007		M	Mid	45
pH	7.4	pH units	31/10/2007		Y	Mid	39
>C6 to C8 Aliphatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aliphatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aliphatics	7.9	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aliphatics	12	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aliphatics (>C6 to C40)	20	mg/kg	07/11/2007		Y	Mid	304/317EPH
>C5 to C7 Aromatics	<0.012	mg/kg	07/11/2007		Y	Mid	304
>C7 to C8 Aromatics	<0.012	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aromatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aromatics	17	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aromatics (>C6 to C40)	17	mg/kg	07/11/2007		Y	Mid	304/317EPH
Total EPH (>C6 to C40)	37	mg/kg	07/11/2007		Y	Mid	304/317EPH

Analyst Comments for 10233988: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233992** Sample **4** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW7 0.50m**
Visual Description: **Grey and brown clay with much gravel, some grass and occasional roots**
Sample Date: **17 October 2007** Sample Time: **7** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	42	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	16	%	24/10/2007		N	Mid	33A
Lead, as Dry Weight	450	mg/kg	03/11/2007		M	Mid	30
Sulphate (Total) as SO3	0.13	%	01/11/2007		M	Mid	45
pH	8.6	pH units	31/10/2007		Y	Mid	39
>C6 to C8 Aliphatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aliphatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aliphatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aliphatics (>C6 to C40)	<6.0	mg/kg	07/11/2007		Y	Mid	304/317EPH
>C5 to C7 Aromatics	<0.012	mg/kg	07/11/2007		Y	Mid	304
>C7 to C8 Aromatics	<0.012	mg/kg	07/11/2007		Y	Mid	304
>C8 to C10 Aromatics	<0.12	mg/kg	07/11/2007		Y	Mid	304
>C10 to C12 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C12 to C16 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C16 to C21 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
>C21 to C40 Aromatics	<1.2	mg/kg	07/11/2007		Y	Mid	317EPH
Total Aromatics (>C6 to C40)	<6.0	mg/kg	07/11/2007		Y	Mid	304/317EPH
Total EPH (>C6 to C40)	<6.0	mg/kg	07/11/2007		Y	Mid	304/317EPH

Analyst Comments for 10233992: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Matrix: **Soil**

Report Number: **MID/464960/2007** Issue **1**
Laboratory Number: **10233993** Sample **5** of **7**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma**
Sample Description: **BW8 0.50m**
Visual Description: **Brown and grey clay with much sand**
Sample Date: **15 October 2007** Sample Time: **8** Sample Received: **22 October 2007**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones BG 2.6/3.0	25	%	24/10/2007		N	Mid	Stones
Moisture content at 30 C	22	%	24/10/2007		N	Mid	33A
Sulphate (Total) as SO3	0.034	%	01/11/2007		M	Mid	45
pH	8.3	pH units	31/10/2007		Y	Mid	39
chloroform	<0.13	mg/kg	05/11/2007		M	Mid	327
1,1,1-trichloroethane	<0.13	mg/kg	05/11/2007		M	Mid	327
carbon tetrachloride	<0.13	mg/kg	05/11/2007		M	Mid	327
trichloroethylene	<0.13	mg/kg	05/11/2007		M	Mid	327
bromodichloromethane	<0.13	mg/kg	05/11/2007		M	Mid	327
trans-1,3-dichloropropene	<0.13	mg/kg	05/11/2007		M	Mid	327
cis-1,3-dichloropropene	<0.13	mg/kg	05/11/2007		M	Mid	327
1,1,2-trichloroethane	<0.13	mg/kg	05/11/2007		M	Mid	327
tetrachloroethylene	<0.13	mg/kg	05/11/2007		M	Mid	327
dibromochloromethane	<0.13	mg/kg	05/11/2007		M	Mid	327
1,1,1,2-tetrachloroethane	<0.13	mg/kg	05/11/2007		M	Mid	327
bromoform	<0.13	mg/kg	05/11/2007		M	Mid	327
1,3-dichlorobenzene	<0.13	mg/kg	05/11/2007		M	Mid	327
1,4-dichlorobenzene	<0.13	mg/kg	05/11/2007		M	Mid	327
1,2-dichlorobenzene	<0.13	mg/kg	05/11/2007		M	Mid	327

Analyst Comments for 10233993: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

APPENDIX I
SWAN ENVIRONMENTAL SERVICES – PHASE 1
HYDROLOGICAL REVIEW – H8228 (MAY 2018)

Phase 1 Hydrological Review
May 2018

Enersys
Stephenson Street
Newport
South Wales
NP19 4XJ

This report has been prepared by Swan Environmental within the terms of the contract with the client and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside of the scope agreed.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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Figure 002: Site Location Plan – Aerial Photograph
Figure 003: Borehole Location Plan
Figure 004: Natural Resources Wales Development Advice Map – Surface Water Flooding

DRAWINGS

RM1410-06 Survey (Drainage)

1.0 INTRODUCTION

1.1 Background

1.1.1 Swan Environmental Ltd. has been commissioned by Enersys Ltd. (The Client) to prepare a Phase 1 Hydrological Review for a 3.83ha site to the south of Stephenson Street, Newport, Wales, NP19 4XJ. The application area falls under the administration of Newport City Council.

1.1.2 Data downloaded from the Natural Resources Wales website (Figure 001) indicates the plot to be situated predominantly within the Low risk flood zone for the adjacent River Usk, with an annual probability of flooding of between 1:100 years and 1:1000 years, taking account of the presence of flood defences. A small section in the north western corner is indicated to be at Medium Risk from flooding, with an annual probability of between 1:30 years and 1:100 years.

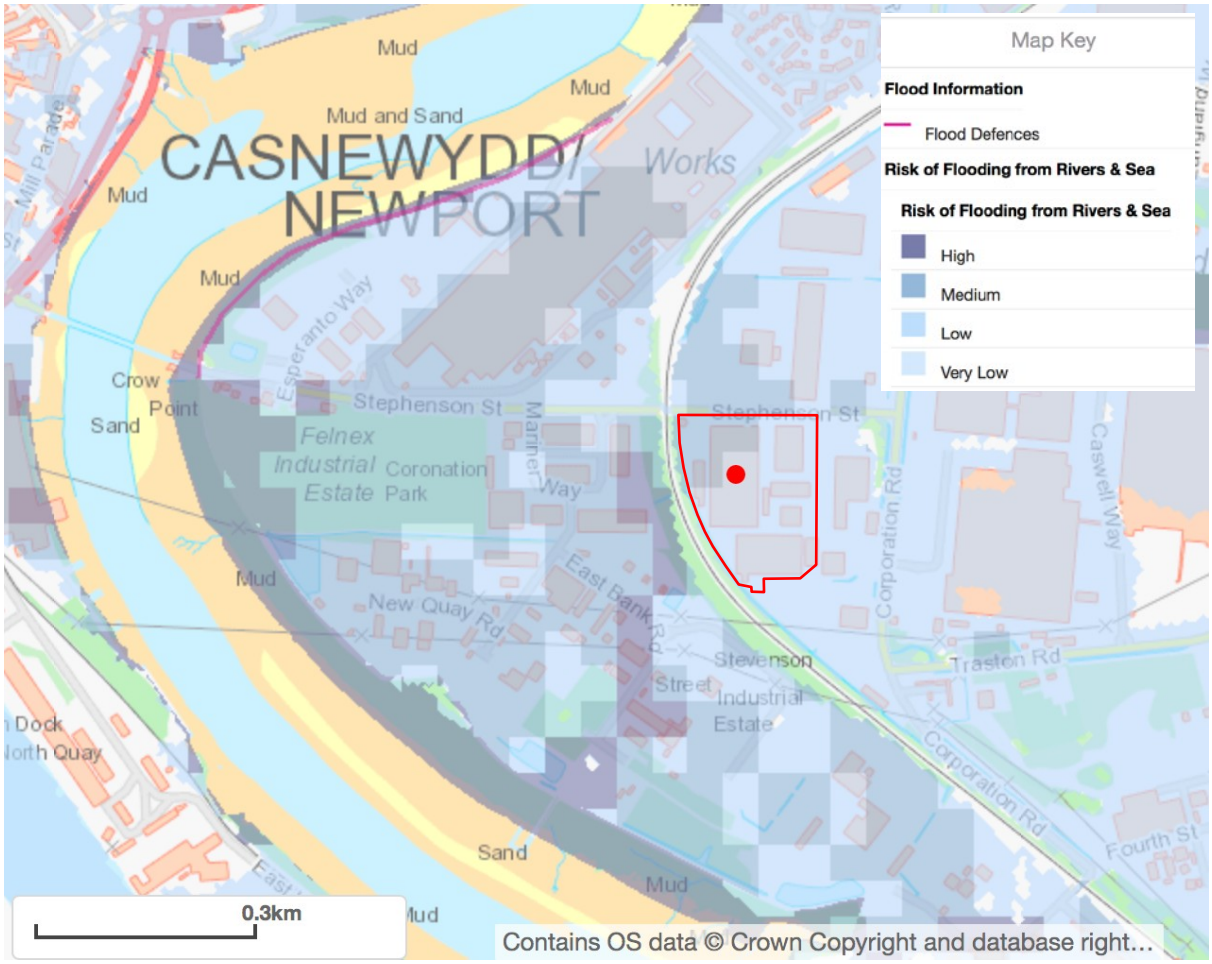


Figure 001: Natural Resources Wales Development Advice Map - Fluvial Flooding

1.2 Objectives

1.2.1 The objectives of this Phase 1 Hydrological Review are to:

- Review national and local planning policy documents and studies as input to the hydrological review;
- Review site specific data provided by the client in respect of hydrology and hydrogeology;
- Undertake a hydrological review identifying potential receptors for surface water runoff;
- Review potential influences on groundwater levels and indicate the potential direction of groundwater flow; and
- Summarise the above in a brief report.

1.2.2 Local development framework documents, as well as strategic policy and technical studies, have been reviewed as part of this study.

1.3 Sources of Information

1.3.1 In preparing this assessment background information has been sought from the following sources:

- Natural Resources Wales (2004). Technical Advice Note 15;
- Natural Resources Wales (Living Document). Development Advice Maps[1];
- Construction Industry Research and Information Association (CIRIA) 2015. Publication C753: *The SuDS Manual*;
- Newport City Council Planning Policy page[2];
- Newport City Council (2011). Preliminary Flood Risk Assessment;
- Newport City Council (2014). Local Flood Risk Management Strategy;
- Newport City Council (2015). Flood Risk Management Plan;
- Natural Resources Wales website[3];
- British Geological Survey online mapping[4];
- Flood Estimation Handbook (FEH) Web Service catchment and rainfall data[5];
- Topographical survey (2006). Obtained from Drawing RM1410-06 (Survey); and
- Environmental Compliance Ltd. (2017). Groundwater Monitoring Report.

1.4 Confidentiality

1.4.1 Swan Environmental has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Swan Environmental.

[1] https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en
[2] http://www.newport.gov.uk/en/Planning-Housing/Planning/Planning-policy/Planning-policy.aspx
[3] https://naturalresources.wales/?lang=en
[4] http://mapapps.bgs.ac.uk/geologyofbritain/home.html
5 https://fehweb.ceh.ac.uk

2.0 BACKGROUND AND DATA REVIEW

2.1 Site Setting

Property Address	Land at Stephenson Street, Newport, South Wales, NP19 4XJ
National Grid Reference	332687, 186012
Area	3.83ha

Table 001: Site Setting

2.2 Current Layout



Figure 002: Site Location Plan – Aerial Photograph

2.2.1 The study area comprises a 3.83ha plot located to the south of Stephenson Street and west of Corporation Road. Surface finishing is entirely impervious including concrete and tarmacadam, refer to Figure 002.

2.3 Topographical Survey

2.3.1 Survey data (Drawing RM1410-06) indicates fairly even ground levels throughout the plant ranging between 6.830m AOD and 7.235m AOD, with lowest levels present on the western boundary.

2.4 Hydrogeology

2.4.1 Regional geological mapping indicates the bedrock beneath the site to comprise Mercia Mudstone, overlain by more permeable Tidal Flat Deposits (Clay and Silt), with this superficial geology laterally extensive throughout the wider area.

2.4.2 Data downloaded from the Magic[6] website indicates the property to be external to Groundwater Source Protection Zones.

2.4.3 Detailed borehole data has been obtained by Enersys for the site over an extended period, as summarised in Table 002 below. This includes groundwater data.

Sampling Date	Logged By
Oct. 2007	Terrafirma
Jul. 2008	Terrafirma
Nov. 2010	Terrafirma
Apr. 2013	Environmental Compliance Ltd.
Apr. 2014	Environmental Compliance Ltd.
Apr. 2015	Environmental Compliance Ltd.
May 2016	Environmental Compliance Ltd.
Apr. 2017	Environmental Compliance Ltd.

Table 002: Borehole Sampling Dates

2.4.4 The borehole locations are shown in Figure 003 and the data gathered at each are summarised in Table 002. The results show uneven groundwater levels across the site, with these subject to very little pattern from which to establish a direction for groundwater flow.

2.4.5 In the absence of site notes for the borehole sampling it is not possible to comment formerly on the likely gradient for groundwater in this area. However, given the proximity to the tidal River Usk it is considered likely that groundwater levels are tidally influenced, either via direct intrusion into the overlying Tidal Flat Deposits, or through blocking the outflow of infiltrated water (groundwater), which is likely situated at the interface between the underlying mudstone and overlying Tidal Flat Deposits. The impervious nature of the underlying bedrock means it is unlikely that groundwater levels are driven by activity within an underlying aquifer.

2.4.6 It is recommended that future data logs include a measure for salinity to investigate the potential for tidal influence on groundwater levels. Site notes should also log the exact date and time of groundwater measurements at each borehole, to enable direct comparison with tidal data.

[6] http://magic.defra.gov.uk/MagicMap.aspx

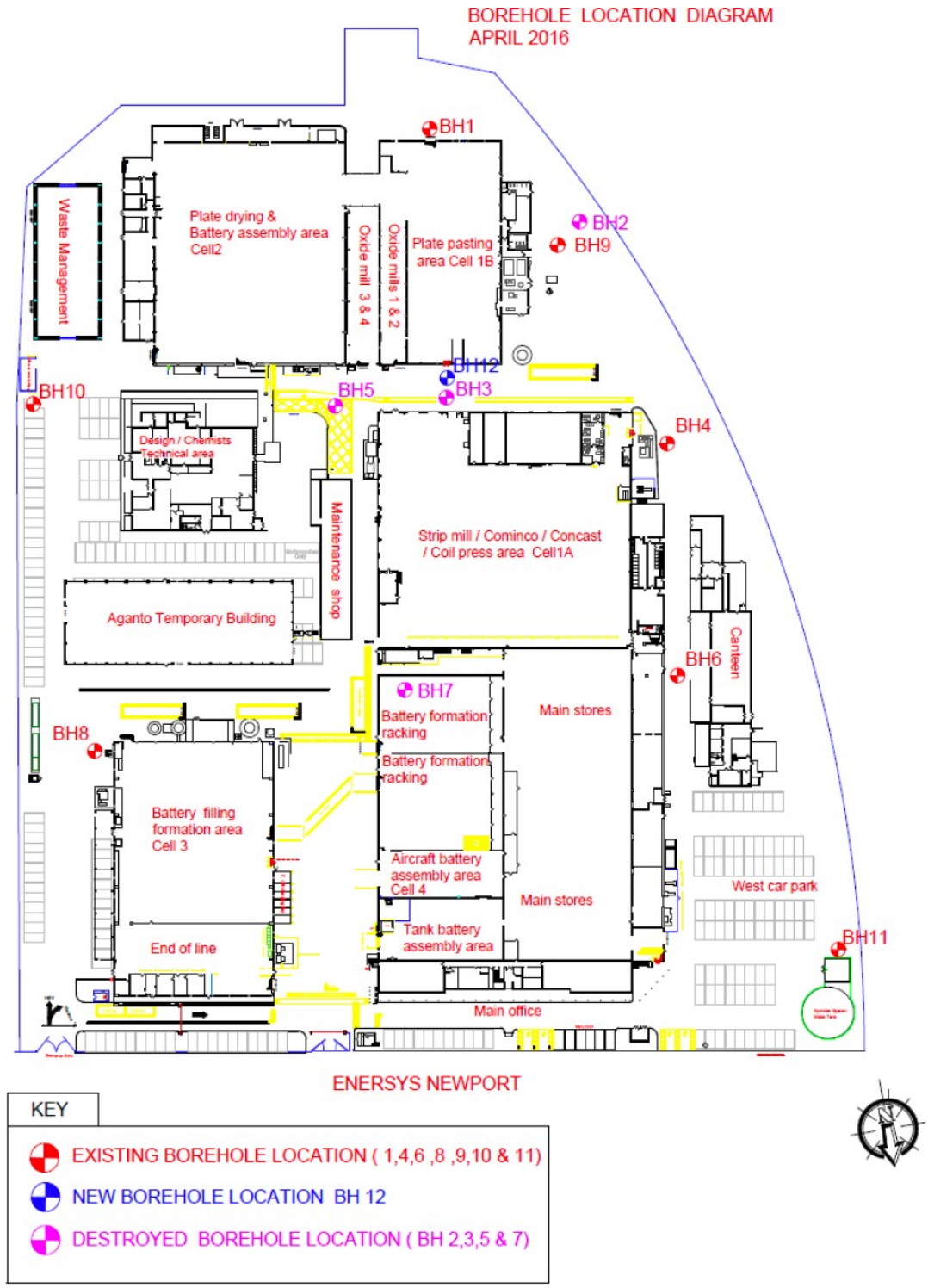


Figure 003: Borehole Location Plan

Date	Apr. 17	Dec. 16	May 16	Apr. 15	Apr. 14	May 13	Apr. 13
BH Ref.							
1	5.930	6.330	5.925	6.030	6.390		6.095
2/9	5.610	5.970	5.570	5.570	5.650		5.820
3/12	5.190	5.250	5.150	6.250	6.390		6.350
4	5.935		6.115	5.710		6.520	6.715
6	6.245		6.195	5.900	6.250		6.225
8	6.195		6.275	6.080	6.330		6.355
10	5.950		6.050	5.320	6.070		6.130
11	4.910		4.960	4.820	4.990		5.470

Table 003: Borehole Data

2.5 Hydrology

2.5.1 The site is located within a meander of the River Usk, with this river located 425m north west of the northern boundary and 450m south west of the southern boundary. In this locale the Usk flows along a meandering route in a generally southerly direction, discharging into the Tidal River Severn (Bristol Channel) some 3.25km downstream.

2.5.2 A number of minor watercourses are present in the area comprising land drainage channels. The nearest is present on the western boundary and appears to commence in an open channel adjacent to the south western corner of the site canteen, tracking south along the western boundary. A second drainage channel is located c. 110m east of the eastern boundary and flows south along the western edge of Corporation Road.

Catchment Data

2.5.3 Catchment descriptor information for the River Usk has been downloaded from the Flood Estimation Handbook Web Service. The nearest point at which data could be extracted was at Newbridge which comprises the Nominal Tidal Limit and which is located 20km upstream of the Enersys Plant at NGR 338564, 194731. This data is summarised in Table 003, below.

2.5.4 This indicates a large, essentially rural catchment with permeable geology and with a low coefficient for surface water runoff. The permeable nature of the catchment geology would lead to infiltration of a significant proportion of incident rainfall, with flows in local watercourses predominated by baseflow (BFIHOST) and with more minor contributions via overland flow (SPRHOST), and with a lag between incident rainfall and peak flows being seen within local watercourses.

2.5.5 During the winter months when antecedent conditions are likely to be wet, with an increased groundwater table, the shallow depth of the overlying permeable deposits (at the site level), coupled with the impermeable nature of the underlying bedrock, and elevated Propwet value (which indicates catchment wetness) may elevate the response of local watercourses to incident rainfall. The Standard Average Annual Rainfall value (SAAR) is also elevated in this area.

2.5.6 The River Usk adjacent to the Enersys plant is subject to significant tidal influence, the Nominal Tidal Limit being located 20km upstream. Given the proximity of the river to the site, this may also influence groundwater levels within overlying permeable sediments.

Catchment Descriptor	Value
Area	1,113km^2
BFIHOST	0.600
SPRHOST	29.14
DPLBAR	63.21km
DPSBAR	149.3m/km
FARL	0.983
PROPWET	0.48
SAAR	1,323mm
URBEXT (2000)	0.0068

Table 004: FEH Catchment Descriptor Information

Historic Flooding

2.5.7 Newport City Council records indicate recurrent surface water flooding within the main highway on Stephenson Street, with the surface water sewer / highway drains prone to blockage owing to a shallow gradient.

2.5.8 NCC records also note tide locking of the Great Spytty Reen adjacent to Corporation Road leading to flooding upstream, although this is not indicated to affect the site.

2.5.9 No historic flooding from groundwater is noted for the Liswerry Ward, within which the plant is located.

2.6 Flood Zone Classification

2.6.1 The site is indicated to be situated predominantly within the Low risk flood zone, with an annual probability of flooding of between 1:100 years and 1:1000 years, taking account of the presence of flood defences. A small section in the north western corner is indicated to be at Medium Risk from flooding, with an annual probability of between 1:30 years and 1:100 years.

2.7 Infrastructure Failure

Reservoir Flooding

2.7.1 Flooding from artificial sources occurs when raised channels or surface water storage features, including reservoirs, become overwhelmed leading to dam or bank failure. The probability of failure is low owing to regular inspection and maintenance regimes. However, in the event of a breach occurring, the consequences can be significant.

2.7.2 The plant is indicated to be unaffected by reservoir flooding according to the Development Advice Maps provided by Natural Resources Wales.

Flood Defences

2.7.3 The Stephenson Street area benefits from the presence of flood defences the failure of which could lead to flooding.

2.8 Surface Water Flooding

2.8.1 Detailed pluvial mapping downloaded from the Natural Resources Wales website (Figure 004), assesses three main scenarios, Low Risk (0.1%-1% probability of flooding annually), Medium Risk (3.3% - 1%) and High Risk (>3.3%). This indicates the Enersys site to be at negligible risk from surface water flooding.

2.8.2 The Enersys plant is served by a comprehensive surface water management system (Drawing RM1410-06), which drains via an outfall to the watercourse on the western boundary.

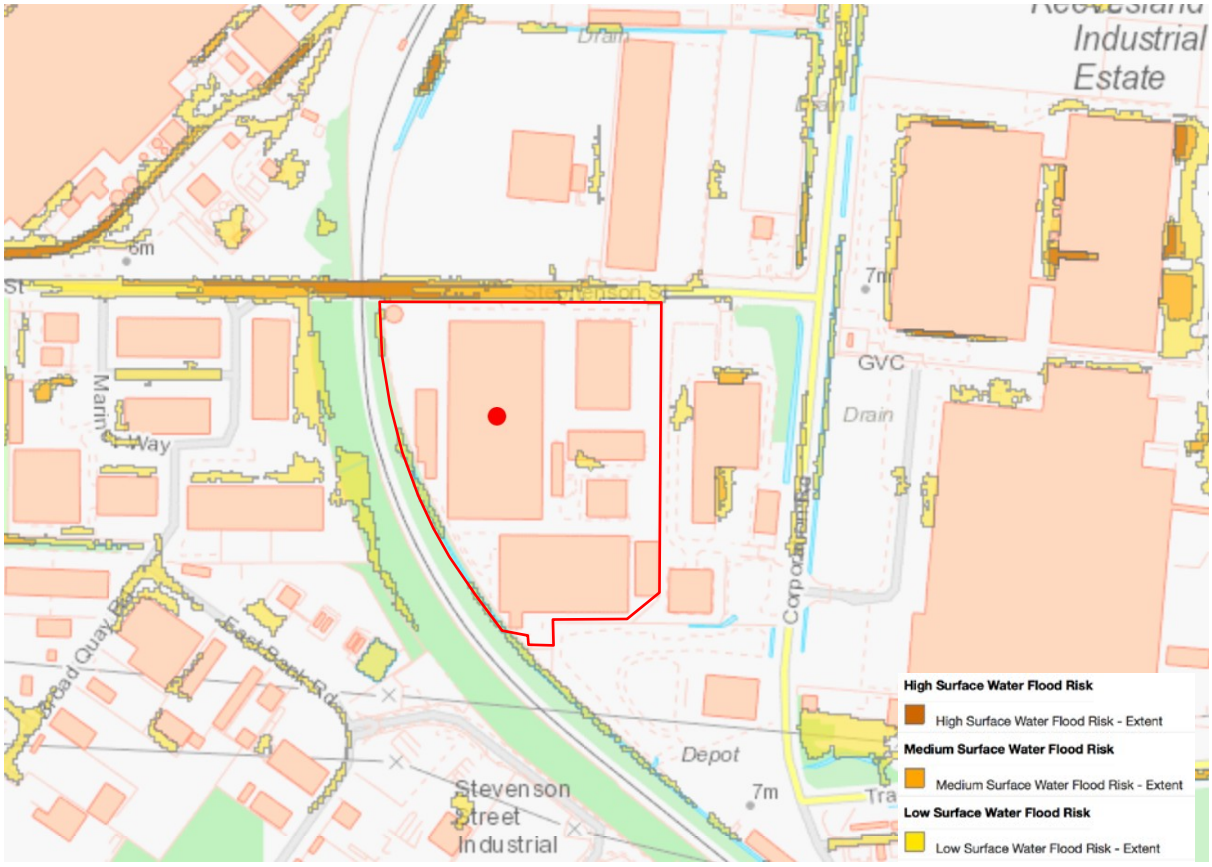


Figure 004: Natural Resources Wales, Development Advice Map - Surface Water Flooding

2.9 Sewers

2.9.1 The flowpaths for sewer flooding generally mirror those for surface water, with the site likely to be at low risk from this source.

3.0 CONCLUSIONS & RECOMMENDATIONS

3.1 The site is situated within the catchment of the Tidal River Usk, which discharges into the Bristol Channel downstream. All local minor watercourses are subject to significant tidal influence.

3.2 The hydrological review indicates the plant to be at generally low risk of flooding from all sources, taking account of the presence of flood defences.

3.3 Records of historic flooding are held for the Stephenson Street area, although the site is indicated to be unaffected.

3.4 An in-depth review of the groundwater data logged for the site has been undertaken, with the results at this stage suggesting tidally influenced groundwater flowing in a northwest direct towards the River Usk.

3.5 It is recommended that future borehole monitoring capture salinity to confirm tidal influence on groundwater levels in this locale. Site notes should also log the date and time measurements were taken to enable comparison with tidal data.

4.0 CLOSURE

4.1 This report has been prepared by Swan Environmental Ltd. with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

4.2 Reliance has been placed on factual and anecdotal data obtained from the sources identified. Swan Environmental Ltd. cannot be held responsible for the scope of work, or any omissions, misrepresentation, errors or inaccuracies with the supplied information. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part in the event of delay between the writing of the report and submission of the planning application.

4.3 This report is for the exclusive use of the client; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Swan Environmental.

4.4 Swan Environmental disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Cell 3

Aganto Building

Technical
Centre / Design

Cell 2

Cell 4

Maintenance

Cell 1A

Cell 1B

Stores

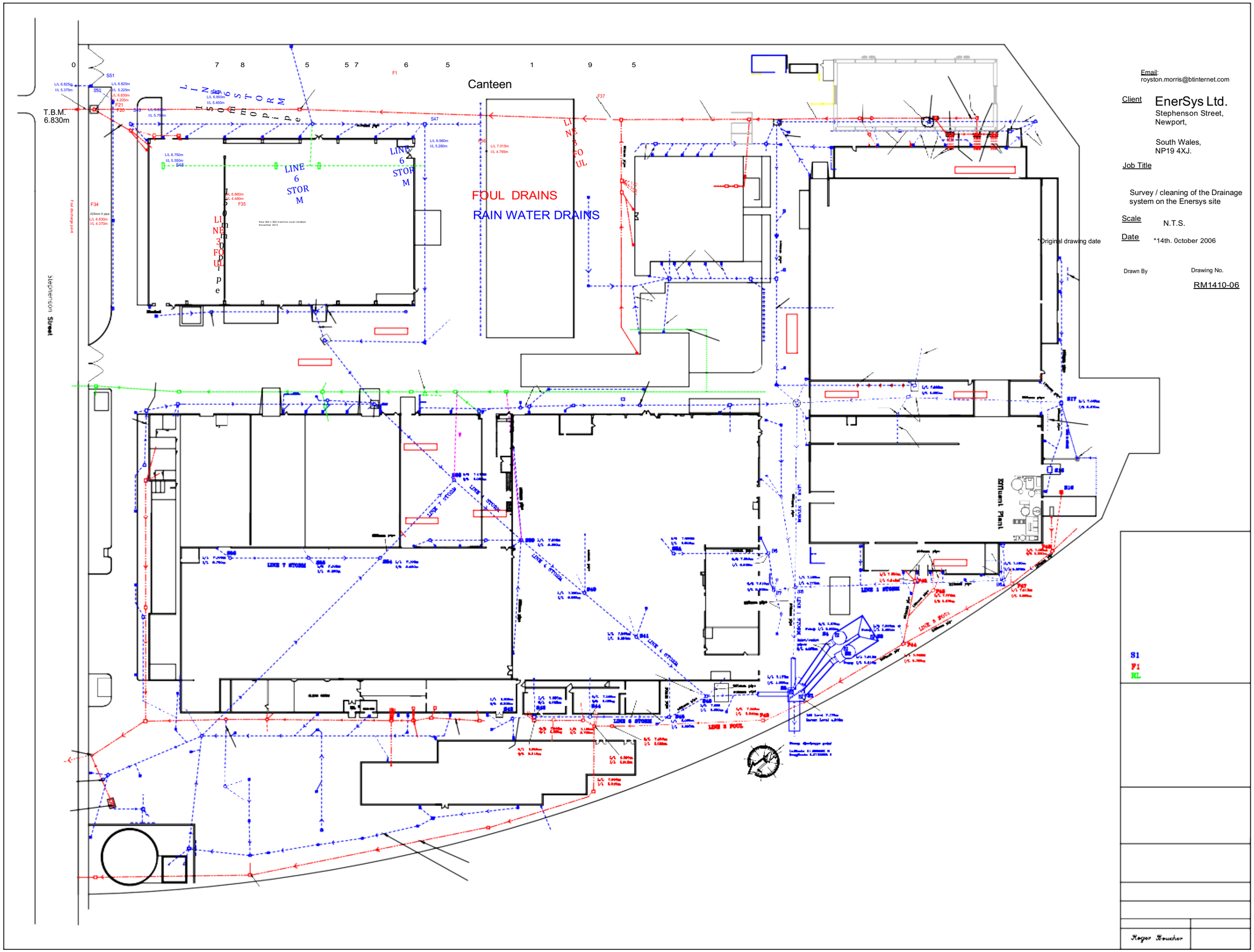
NOTES

Contractor will comply with all Enersys and current European Health & Safety requirements to complete the works.

Active Layers
Building Lay-out
Drainage
Effluent Plant
Interceptor

Key
L / L :- Lid Level
I / L :- Invert Level
:- Storm (Manhole No.)
:- Foul (Manhole No.)
:- Redundant Line

Roy Morris
Building Services,
1 Brynderwen,
Ynysddu,
Newport,
NP11 7JP.
Tel: (01495) 200550
Fax: (01495) 201143
Mobile: 07970 493633



Email:
royston.morris@btinternet.com

Client
EnerSys Ltd.
Stephenson Street,
Newport,

South Wales,
NP19 4XJ.

Job Title

Survey / cleaning of the Drainage system on the Enersys site

Scale N.T.S.

Date *14th. October 2006

*Original drawing date

Drawn By

Drawing No.

RM1410-06

APPENDIX J
CHAIN OF CUSTODY FORM FOR GROUNDWATER SAMPLES – APRIL 2019 SURVEY

Concept Life Sciences – Chain of Custody Record

CONCEPT LIFE SCIENCES

Concept Life Sciences, Hadfield House, 9 Hadfield Street, Cornbrook, Manchester, M16 9FE
Tel: 0161 874 2400 Fax: 0161 874 2404 https://www.conceptlifesciences

Customer Name: Environmental Compliance Limited			
Address: Unit G1, The Willowford, Treforest Industrial Estate, Pontypridd. CF37 5YL			
Project Manager:	Tim Heard	Project Name:	GWM
Tel Number:	01443841760	Project Code:	012.01.03
Fax Number:	01443841761	Quote Number:	192651-1
E-mail Address:	T.Heard@ecl.world	Purchase order:	E9250

Customer Sample Reference

(Note: All fields are required for AGS Sample Data)

Hole ID:	Sample Ref	Depth:	Sample Type:	Date Sampled dd/mm	# Containers	CLS Ref	Analysis Requested: as quote 192651-1	MCERTS Required
BH1	ECL/19/2289 / 2290 / 2291	0.86m	Groundwater	30/04/2019	3		✓	
BH4	ECL/19/2292 / 2293 / 2294	1.29m	Groundwater	30/04/2019	3		✓	
BH6	ECL/19/2295 / 2296 / 2297	0.62m	Groundwater	30/04/2019	3		✓	
BH8	ECL/19/2298 / 2299 / 2300	0.71m	Groundwater	30/04/2019	3		✓	
BH10	ECL/19/2304 / 2305 / 2306	1.13m	Groundwater	30/04/2019	3		✓	
BH11	ECL/19/2307 / 2308 / 2309	0.72m	Groundwater	30/04/2019	3		✓	
BH12	ECL/19/2310 / 2311 / 2312	1.82m	Groundwater	30/04/2019	3		✓	
				/				
				/				

Relinquished by: Tim Heard	Time:	02/05/2019	Sign:	Received by:	Time:	Date:	Sign:

Turnaround required **(Please Tick)**

10 working day

5 working day

3 working day

other (specify)

Additional report formats:

AGS☐ CSV ☐GIS ☐Other ☐.....

Comments (Inc. Hazards, Preservatives etc)

1 litre plastic, 1 litre amber glass, 40ml vial - respectively (in accordance with sample refs)

Temperature of Received Samples Required (Please Tick) ☐ °C