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Meritor Heavy Vehicle Braking Systems (UK) Limited
Grange Road
Cwmbran
Gwent
NP44 3XU
South Wales

Baseline Site-Wide Groundwater Monitoring Report
Grange Road
Cwmbran
Gwent
NP44 3XU
South Wales

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Prepared by:

ARCADIS (UK) Limited
2 Craven Court
Newmarket
CB8 7FA
Tel: 01638 674767
Fax: 01638 668191
www.arcadis-uk.com

Report Details

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		David Cassels Environmental Consultant	Victoria Morten Senior consultant	Victoria Morten Senior consultant
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		Eleanor Jarratt Environmental Consultant	Victoria Morten Senior consultant	Victoria Morten Senior consultant

If you have any queries regarding this project, please contact Victoria Morten.

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List of Abbre*via*tions that may be used in this report

ARCADIS	ARCADIS (UK) Limited
BOD	Biological Oxygen Demand
BTEX	Benzene, toluene, ethylbenzene and xylenes
cis-DCE	*cis*-1,2-dichloroethene
CLR	Contaminated Land Report
CoC	Contaminants of Concern
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
CWG	Criteria Working Group
DEFRA	Department of Environment, Food and Rural Affairs
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
EA	Environment Agency
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
GC-FID	Gas Chromatography Flame Ionisation Detector
GC-MS	Gas Chromatography Mass Spectrometry
HDPE	High Density Polyethylene
HGV	Heavy Goods Vehicle
HSA	Hazard Safety Assessment
ICP-MS	Inductively Coupled Plasma Mass Spectroscopy
ISO	International Standards Organisation
LNAPL	Light Non-Aqueous Phase Liquid
mbgl	Meters Below Ground Level
MDL	Method Detection Limit
Meritor	Meritor Heavy Vehicle Braking Systems (UK) Limited
MTBE	Methyl *tertiary*-butyl ether
NAPL	Non-Aqueous Phase Liquid
ORP	Oxidation Reduction Potential
OS	Ordnance Survey
PCE	Tetrachloroethene
PRO	Petroleum Range Organics
QA / QC	Quality Assurance / Quality Control
ROA	Remediation Options Appraisal
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SPR	Source-Pathway-Receptor
SSAC	Site Specific Assessment Criteria

List of Abbreviations that may be used in this report

SWDS	Storm Water Drainage System
TCBC	Torfaen County Borough Council
TCE	Trichloroethene
TEA	Terminal Electron Acceptor
TPH	Total Petroleum Hydrocarbons
trans-DCE	*trans*-1,2-dichloroethene
UKAS	United Kingdom Accreditation Service
VOC	Volatile Organic Compounds

1 INTRODUCTION

In February 2011, ARCADIS (UK) Limited (ARCADIS) was commissioned by Meritor Heavy Vehicle Braking Systems (UK) Limited (Meritor) to undertake a Site-wide baseline groundwater monitoring visit, at the facility located on Grange Road, Cwmbran, Gwent NP44 3XU, South Wales (the Site).

The environmental works were conducted at the request of Meritor whom ARCADIS understands will divest the freehold ownership of the northern two thirds of the Site (Zones 1 & 2), including a parking area to the north of the main production building, for redevelopment. ARCADIS also understands that Meritor will retain the southern third of the Site and will undertake the refurbishment of the existing production building and southern yard area.

The work was conducted in accordance with the scope of work detailed in ARCADIS' proposal (reference 563920002_01, dated February 2011) and the Global Master Services Agreement (2008) between ARCADIS and Meritor, Inc (formerly ArvinMeritor, Inc).

The work was also performed in accordance with UK and Welsh legislation and regulatory guidance for the assessment of contaminated land, an overview of which is presented in Appendix A.

1.1 Planning Conditions

ARCADIS has been supporting Meritor with professional and technical environmental services relating to a Site-wide environmental assessment of the Meritor facility, Cwmbran. The environmental assessment has been conducted in support of planned redevelopment of the Site, as evidenced by a joint planning application submitted to Torfaen County Borough Council (TCBC) in February 2011 by Meritor and Morrisons Supermarkets Plc.

A planning application (reference Application Number 11/P/00101) has been submitted to the Local Planning Authority, TCBC, for the redevelopment of the northern zones at the Site (Zones 1 & 2) and for the refurbishment of the southern zone (Zone 3). Detailed redevelopment plans which have been provided to ARCADIS and are presented in the planning application indicated that three main commercial developments will be carried out on site, as follows:

- **Zone 1** – Employee car park to the north of the main production plant, to be redeveloped with a new supermarket, associated petrol filling station and two smaller retail units (as well as a pedestrian bridge from the Site into Cwmbran town centre).

- **Zone 2** – Central portion of the Meritor Site including the Heavy Goods Vehicle (HGV) entrance, loading bay and the northern third of the existing production building to be redeveloped as commercial offices with a hotel (and associated bar/ restaurant) and car parking areas.

- **Zone 3** – The reminder of the production building (south of building column row M) and the southern yard area and visitors car park to be retained as a heavy vehicle braking systems production building with associated employee and visitor car parking areas; an engineering centre; and Meritor's offices.

ARCADIS anticipates that TCBC will impose environmental planning conditions for the redevelopment of Zones 1 & 2 and for the refurbishment of Zone 3. It is likely that this information contained in this report can be used to assist in the discharge of the environmental planning conditions at a later date.

The general Site location and the physiogeographic features of the surrounding area are presented on Figure 1 at a map scale of 1:50,000. The current Site layout is presented on Figure 2, the proposed redevelopment areas are presented on Figure 3.

1.2 Previous Works

In December 2009, ARCADIS was commissioned to undertake an updated Phase I Environmental Site Assessment (ESA) of the Site and to develop a scope of works for a subsequent Phase II ESA. The environmental works to date conducted on a voluntary basis by Meritor are detailed in the following reports:

- *Phase I Environmental Site Assessment*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909361804_02, January 2010.
- *Phase II Environmental Site Assessment Report*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran. ARCADIS report ref: 909361904_03, February 2010.
- *Phase IIB Environmental Site Assessment Report*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran. ARCADIS report reference 909362203_03, May 2010.
- *Detailed Quantitative Risk Assessment Report,* Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909362802_01, January 2011.
- *Remediation Options Appraisal Report*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909362302_02, August 2010.
- *Remediation Method Statement,* Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909362819_01, January 2011.
- *Supplementary Site Investigation Report,* Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909362509_01, April 2011.
- *Remediation Pilot Testing (Oil Recovery) Report*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909362711_01, June 2011.
- *Updated Detailed Quantitative Risk Assessment*, Meritor Heavy Vehicle Braking Systems (UK) Limited, Cwmbran, ARCADIS report reference 909363202_01, June 2011.

The primary objective of the Supplementary Site Investigation was to further assess the presence, nature, likely severity and extent of contamination which may be present beneath Zone 3, its potential risk to receptors and likely requirements for further environmental work. The scope of works for the Supplementary Site Investigation was guided by the Remediation Options Appraisal (ROA) report which identified data gaps and the works also included the installation of a number of extraction wells to enable future remediation techniques to be pilot tested. During previous assessment works at the Site, the measured concentrations of Contaminants of Concern (CoC) in soil and groundwater samples collected from Zones 1 and 2 were not considered to present a significant risk to the human health and water resource receptors associated with the proposed future end use of the Site. Therefore no additional intrusive investigation works was undertaken in Zones 1and 2 during the Supplementary Site Investigation and no future remediation works are planned for Zones 1 and 2.

During the Supplementary Site Investigation the extent of the Light Non-Aqueous Phase Liquid (LNALP) in the sub-surface beneath the main production building was delineated, further solvent delineation was undertaken and additional source areas were identified. ARCADIS recommend that these source areas are further assessed through revisiting, and if appropriate, updating the Detailed Quantitative Risk Assessment (DQRA) for the Site.

The indoor and outdoor air sampling undertaken during the Supplementary Site Investigation has indicated that not all of the Source-Pathway-Receptor (SPR) linkages identified during previous phases of assessment are likely to present a significant risk to current site users, based on the existing layout. However, the near-source soil gas data indicates that there is a potentially unacceptable risk to future commercial workers and neighbouring land users, which should be considered during development of the risk management strategy.

The future remediation works at the Site will be focused on Zone 3 and the driver for remediation in Zone 3 is considered to be the protection of water resource receptors associated with the Site. However, the remediation of the Site will also be beneficial for the associated human health receptors, and the Conceptual Site Model (CSM) should be revisited, and refined if appropriate, as remediation works are implemented.

This report follows on from and should be read in conjunction with the previous reports detailed above.

1.3 Objectives

The objectives of the groundwater monitoring were to:

- Measured resting groundwater levels across the Site and collect samples of groundwater from the on- and off-Site monitoring wells and surface water samples from the Afon Lwyd for subsequent laboratory analysis;
- Establish baseline groundwater conditions across the Site, prior to proposed remediation works;
- Measure the concentrations of CoC in the groundwater and compare with risk-based Site-Specific Assessment Criteria (SSAC) for the Site;
- Continue to assess trends in groundwater quality at the Site;
- Assess the potential for natural attenuation processes in groundwater beneath the Site; and,
- Develop a Sampling and Analysis Plan for a future groundwater monitoring programme.

1.4 Scope of Work

The works conducted included the following tasks:

- Groundwater Monitoring;
- Laboratory Analysis;
- Risk Assessment (by comparison to SSAC); and,
- Reporting.

The scope of work has also been developed in accordance with the Environment Agency (EA) and Department for Environment Food and Rural Affairs (DEFRA) document '*Model Procedures for the Management of Land Contamination'* Contaminated Land Report (CLR) 11, dated 2004 and the Welsh Local Government Association, Welsh Assembly Government and EA document *Land Contamination: A Guide for Developers*, dated 2006.

1.5 Reliability of Information / Limitations

This report is only valid when read in its entirety. Any information or advice included in this report should not be relied on unless considered in the context of the whole report. Reference should be made to the notes on study limitations at the end of this report.

A copy of ARCADIS' study limitations are presented in Section 8.

1.6 User Reliance

There are neither third party rights nor benefits conferred under this report. Use of this report is strictly limited to Meritor and Meritor, Inc and its direct and indirect subsidiaries, which are the sole parties to whom ARCADIS intends to confer any rights. Any reliance on the contents of this report by any other party is the sole responsibility of that party.

2 FIELD INVESTIGATIONS

A groundwater monitoring visit was completed between 15th February 2011 and 23rd March 2011.

The Site layout and monitoring well locations are presented on Figure 2.

2.1 Rationale

A one-off groundwater monitoring visit was undertaken to establish groundwater conditions across the Site, prior to proposed remediation works. In addition, laboratory analysis was performed for biogeochemical parameters to assess the potential for natural attenuation processes to be occurring beneath the Site.

This baseline groundwater monitoring visit will be used to develop a Sample and Analysis Plan for the future periodic groundwater monitoring programme.

2.2 Methodology

Groundwater monitoring involved the inspection of the monitoring wells on Site for the presence of groundwater, non-Aqueous Phase Liquid (NAPL), measurement of depths to groundwater and thickness of NAPL, if present, using an oil-water interface probe and sampling *via* low-flow technique.

Low-flow sampling is a specific water delivery technique that is designed to produce a sample that most closely resembles the water quality in the aquifer adjacent to the screened zone of a well by reducing sample turbidity, which in turn reduces the variability in the sampling results. During low-flow sampling, purge water is passed through a flow cell and water quality parameters are measured using a multi-parameter meter. Dissolved Oxygen (DO), Oxidation-Reduction Potential (ORP), electrical conductivity and pH are measured at regular intervals until the DO and ORP readings stabilise to within 10% of the previous reading, or three saturated well volumes of groundwater has been removed from the well. A sample of the groundwater was subsequently collected.

2.3 Collection, Preservation and Transport of Samples

Collection
Groundwater samples were placed into appropriate glass bottles and glass *via*ls supplied by the laboratory. Glass bottles and *via*ls were used for the transport of groundwater samples to the laboratory for analyses of volatile and semi-volatile contaminants.

Preservation
Samples were stored in dedicated sample boxes with cooling aids to reduce microbial degradation and the containers for volatile analysis were filled so that no headspace remained prior to sealing the container.

This, in combination with a low storage temperature, reduced the potential for volatile loss. No additional sample preservation was required for the scheduled analysis.

Transport
Samples and analytical requests were recorded on the laboratory chain of custody form, prior to dispatching for analysis, on the day of sampling, where possible.

2.4 Analytical Strategy

Groundwater samples were submitted for analysis for CoC based on the CoC identified during previous phases of works including the DQRA:

- Total Petroleum Hydrocarbons (TPH) Criteria Working Group (CWG) *via* Gas Chromatography - Flame Ionisation Detector (GC-FID) methods;
- Volatile Organic Compounds (VOCs) *via* Gas Chromatography – Mass Spectrometry (GC-MS) methods;
- pH *via* meter;
- Selected Metals *via* Inductively Coupled Plasma – Mass Spectrometry (ICP-MS);
- Manganese *via* ICP-MS;
- Free Cyanide *via* spectrophotometric methods; and,
- Total Cyanide *via* spectrophotometric methods.

In addition, selected groundwater samples were submitted for analysis for biogeochemical indicator parameters:

- Nitrate *via* methods photometric analyser;
- Nitrite *via* photometric analyser;
- Sulphate *via* photometric analyser;
- Sulphide *via* photometric analyser;
- Total Organic Carbon *via* ICP-MS;
- Dissolved Carbon Dioxide *via* GC-FID;
- Dissolved Methane *via* GC-FID
- Chemical Oxygen Demand (COD) *via* colourimetric measurement; and,
- Biological Oxygen Demand (BOD) *via* dissolved oxygen probe.

Samples were submitted to a certified United Kingdom Accreditation Service (UKAS) accredited laboratory with full chain of custody identifying ARCADIS as the client, the ARCADIS project reference, the Consultant / Project Manager, the nature of the sample (*i.e.* water) and the parameters to be tested.

Quality Assurance/ Quality Control (QA/ QC) at the laboratory was carried out as part of their standard procedures. ARCADIS' QA/ QC was conducted in line with in-house procedures, as part of our International Standards Organisation (ISO) 9001 and ISO 14001 accreditation.

3 FIELD INVESTIGATION RESULTS

3.1 Groundwater Occurrence

On the 11th and 12th January 2011, prior to the groundwater monitoring visit, rest groundwater levels were recorded in the monitoring wells installed across the Site. Resting groundwater levels were again recorded between 15th February 2011 and 23rd March 2011, during the groundwater sampling visit.

Monitoring well and groundwater elevation data are presented in Table 1 of Appendix B.

3.1.1 Groundwater Occurrence in Alluvium On-Site

During the groundwater monitoring visits, the rest groundwater levels were recorded in the monitoring wells screening the Alluvium on-Site:

Date	Range in Resting Depths to Groundwater in the Alluvium (mbgl)	
	Minimum	Maximum
January 2011	0.54 (BH130)	4.27 (BH204AS)
February – March 2011	0.65(BH130)	4.27(BH204AS)

Notes:

mbgl Metres below ground level

No groundwater was encountered in monitoring wells BH134 and BH908, Light Non-Aqueous Phase Liquid (LNAPL) was encountered in and to the base of the monitoring well. No groundwater or LNAPL was encountered in monitoring wells BH116, BH302_S, BH916 or BH931 *i.e*. the monitoring wells were dry.

3.1.2 Groundwater Occurrence in Alluvium Off-Site

During the groundwater monitoring visits, the rest groundwater levels were recorded in the monitoring wells screening the Alluvium off-Site:

Date	Range in Resting Depths to Groundwater in the Alluvium (mbgl)	
	Minimum	Maximum
January 2011	0.26 (BHOS407)	1.29 (BHOS413)
February – March 2011	0.52 (BHOS409)	1.77 (BHOS 414)

Notes:

mbgl Metres below ground level

3.1.3 Groundwater Occurrence in Raglan Marl Group On-Site

During the groundwater monitoring visits, the rest groundwater levels were recorded in the monitoring wells screening the Raglan Marl Group on-Site:

Date	Range in Resting Depths to Groundwater in the Raglan Marl Group (mbgl)	
	Minimum	Maximum
January 2011	1.56 (BH201D)	4.52 (BH305)
February – March 2011	0.83 (BH202D)	4.84 (BH303D)

Notes:

mbgl Metres below ground level

On both occasions, the groundwater in monitoring well BH203D was overflowing on removal of the well cap.

3.1.4 Groundwater Occurrence in Raglan Marl Group Off-Site

During the groundwater monitoring visits, the rest groundwater levels were recorded in the monitoring wells screening the Raglan Marl Group off-Site:

Date	Range in Resting Depths to Groundwater in the Raglan Marl Group (mbgl)	
	Minimum	Maximum
January 2011	1.11 (BHOS307)	1.99 (BHOS306D)
February – March 2011	1.90 (BHOS306S)	2.37 (BH3OS307)

Notes:

mbgl Metres below ground level

3.2 Groundwater Flow

Groundwater elevation data has been used in combination with topographic data to infer the relative rest level of groundwater across the Site. This information has been used to determine a groundwater flow direction at the Site of south-east.

Groundwater elevations and flow direction for Zone 1, Zone 2 and Zone 3 are presented on Figure 4 to Figure 6, respectively.

3.3 LNAPL

During the January and February to March 2011site visits, LNAPL was encountered in 33 of the 92 monitoring wells across Zone 3. No LNAPL was encountered in the monitoring wells networks installed in Zone 1 and Zone 2. No LNAPL was encountered in the off-Site monitoring wells.

In Zone 3, the maximum LNAPL thickness was recorded in monitoring well BH204AS (2,027 mm) in January 2011 and in monitoring wells BH136 (1,640 mm) in February 2011.

3.4 Laboratory Analysis Results

The measured hydrogeochemical parameters and the results of the laboratory analysis of the groundwater samples obtained during the monitoring visit are presented in Tables 2 to 28 in Appendix B.

3.5 Biogeochemical Parameters

Laboratory analysis was also performed for the following parameters to assist with assessing the potential for natural attenuation process to be active beneath the Site:

- Nitrate and Nitrite
- Sulphate and Sulphide
- Manganese
- Chlorinated hydrocarbons
- Total Iron
- Dissolved Carbon Dioxide
- Dissolved Methane
- COD
- BOD

The laboratory analysis results are presented in Tables 25 to 28 in Appendix B

Terminal Electron Acceptors (TEA) such as oxygen, iron [III], sulphate and nitrate ions and dissolved carbon dioxide are used in oxidation-reduction reactions to enable electron transfer for microbial respiration and degradation of hydrocarbon compounds.

The presence of the oxidised forms *e.g.* sulphate, nitrate, carbon dioxide and iron [III] ions are indicative of a higher degradation potential in the aquifer or an absence of organic contaminants and suggest that recharge of these ions is occurring in the aquifer. This is required if on-going natural attenuation is to occur. If all electron acceptors are reduced, then electron transfer is limited and natural attenuation is likely to stall.

Chlorinated VOCs also act as TEAs to facilitate the degradation of hydrocarbons. The occurrence and distribution of the biogeochemical parameters can be seen compared with the distribution of TCE and daughter products, *cis*-1,2-dichloroethene and vinyl chloride, to provide additional understanding of the natural degradation processes beneath the Site. The TCE does not readily degrade under aerobic conditions however, *cis*-DCE and vinyl chloride do. Therefore the co-existence of LNAPL and TCE creates complex geochemical conditions that can be hard to interpret.

3.5.1 Nitrate and Nitrite

Nitrate is used as a TEA by micro-organisms, but metabolism using nitrate is thermodynamically less favourable than when oxygen is used as the TEA.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised below:

Zone 1			Minimum	Maximum
Alluvium	Nitrate	µg/l	1,000 (BH127)	3,700 (BH126)
Raglan Marl Group	Nitrate	µg/l	1,300 (BH201D)	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2			Minimum	Maximum
Alluvium	Nitrate	µg/l	400 (BH104)	32,700 (BH105)
Raglan Marl Group	Nitrate	µg/l	1,000 (BH203D)	6,100 (BH202D)

Zone 3			Minimum	Maximum
Alluvium	Nitrate	µg/l	Less than Method Detection Limit	23,200 (BH124)
Raglan Marl Group	Nitrate	µg/l	Less than Method Detection Limit	39,200 (BH304D)

Off-Site Wells			Minimum	Maximum
Alluvium	Nitrate	µg/l	Less than Method Detection Limit	4,600 (BHOS410)
Raglan Marl Group	Nitrate	µg/l	400 (BHOS306D)	500 (BHOS306S)

There were no detections of nitrite in the groundwater samples submitted for analysis from Zone 1 or from the off-Site monitoring wells.

Nitrite was detected in one groundwater sample from the monitoring wells screening the Alluvium across Zone 2; the measured concentration of nitrite in the groundwater sample from monitoring well BH130 was 50 µg/l. Nitrite was also detected in one groundwater sample from the monitoring wells screening the Raglan Marl Group in Zone 2; the measured concentration of nitrite in the groundwater sample from monitoring well BH202_D was 40 µg/l.

The nitrite concentrations in groundwater samples ranged from less than the laboratory MDL of 20 µg/l and 2,420 µg/l (BH205AS) in the groundwater samples from the monitoring wells screening the Alluvium across Zone 3. The nitrite concentrations in groundwater samples ranged from less than the laboratory MDL of 20 µg/l and 230 µg/l (BH301D) in the groundwater samples from the monitoring wells screening the Raglan Marl Group across Zone 3.

The measured concentrations of TCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 7 and Figure 8, respectively. The measured concentrations of *cis*-DCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 9 and Figure 10, respectively and the measured concentrations of vinyl chloride in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 11 and Figure 12, respectively.

The measured concentrations of nitrate in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 13 and Figure 14, respectively.

3.5.2 Manganese

After nitrate, manganese is the next preferential terminal electron acceptor. During microbial degradation where manganese IV is used as a TEA, manganese IV is reduced to manganese II. Manganese II is more readily soluble, and therefore, elevated measured total manganese concentrations in groundwater are considered likely to be indicative of manganese II, and provide evidence to support biological activity.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised overleaf:

Zone 1			Minimum	Maximum
Alluvium	Manganese	µg/l	Less than Method Detection Limit	33 (BH201S)
Raglan Marl Group	Manganese	µg/l	2,652 (BH201D)	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2			Minimum	Maximum
Alluvium	Manganese	µg/l	3 (BH120)	1,299 (BH104)
Raglan Marl Group	Manganese	µg/l	5 (BH202D)	8 (BH203D)

Zone 3			Minimum	Maximum
Alluvium	Manganese	µg/l	Less than Method Detection Limit	31,180 (BH119)
Raglan Marl Group	Manganese	µg/l	303 (BH304S)	16,230 (EX1)

Off-Site Wells			Minimum	Maximum
Alluvium	Manganese	µg/l	11 (BHOS414)	3,945 (BHOS411)
Raglan Marl Group	Manganese	µg/l	5,870 (BHOS306D)	5,895 (BHOS306S)

The measured concentrations of TCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 7 and Figure 8, respectively. The measured concentrations of *cis*-DCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 9 and Figure 10, respectively and the measured concentrations of vinyl chloride in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 11 and Figure 12, respectively.

The measured concentrations of manganese in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 15 and Figure 16, respectively.

3.5.3 Iron

Thermodynamically, ferric [III] iron is the next preferential terminal electron acceptor used by bacteria after oxygen, nitrate and manganese. During microbial processes where ferric [III] iron is used as an electron acceptor, ferrous [II] iron is reduced to ferrous [II] iron. Total iron concentrations in groundwater are considered likely to be indicative of ferrous [II] iron which can be oxidised during transit to the laboratory for analysis.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised overleaf:

Zone 1			Minimum	Maximum
Alluvium	Total Iron	µg/l	Less than Method Detection Limit	795 (BH201S)
Raglan Marl Group	Total Iron	µg/l	176 (BH201D)	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2			Minimum	Maximum
Alluvium	Total Iron	µg/l	Less than Method Detection Limit	2,364 (BH104)
Raglan Marl Group	Total Iron	µg/l	Less than Method Detection Limit	

Zone 3			Minimum	Maximum
Alluvium	Total Iron	µg/l	Less than Method Detection Limit	32,870 (BH204AS)
Raglan Marl Group	Total Iron	µg/l	Less than Method Detection Limit	6,723 (EX2)

Off-Site Wells			Minimum	Maximum
Alluvium	Total Iron	µg/l	Less than Method Detection Limit	762 (BHOS409A)
Raglan Marl Group	Total Iron	µg/l	Less than Method Detection Limit	31 (BHOS306S)

The measured concentrations of TCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 7 and Figure 8, respectively. The measured concentrations of *cis*-DCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 9 and Figure 10, respectively and the measured concentrations of vinyl chloride in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 11 and Figure 12, respectively.

The measured concentrations of iron in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 17 and Figure 18, respectively.

3.5.4 Sulphate and Sulphide

Sulphate is also used as a TEA during microbial degradation and is reduced to sulphide during the process.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised below:

Zone 1			Minimum	Maximum
Alluvium	Sulphate	µg/l	4,500 (BH126)	35,560 (BH127)
Raglan Marl Group	Sulphate	µg/l	72,350 (BH201D)	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2			Minimum	Maximum
Alluvium	Total Iron	µg/l	16,790 (BH121)	72,320 (BH105)
Raglan Marl Group	Total Iron	µg/l	10,700 (BH203D Duplicate)	58,450 (BH203)

Zone 3			Minimum	Maximum
Alluvium	Total Iron	µg/l	430 (EX10)	95,960 (BH110)
Raglan Marl Group	Total Iron	µg/l	2,020 (BH303S)	78,840 (BH304D)

Off-Site Wells			Minimum	Maximum
Alluvium	Total Iron	µg/l	6,590 (BHOS408)	21,060 (BHOS409A)
Raglan Marl Group	Total Iron	µg/l	7,290 (BHOS306D)	7,340 (BHOS306S)

There were no detections of sulphide in the groundwater samples submitted for analysis from on- or off-Site.

The measured concentrations of TCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 7 and Figure 8, respectively. The measured concentrations of *cis*-DCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 9 and Figure 10, respectively and the measured concentrations of vinyl chloride in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 11 and Figure 12, respectively.

The measured concentrations of sulphate in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 19 and Figure 20, respectively.

3.5.5 Carbon Dioxide and Methane

The least preferred TEA for use during microbial degradation is carbon dioxide, which is reduced to methane. Dissolved methane and carbon dioxide concentrations are indicative of microbial respiration and their relative contribution will depend on whether aerobic or anaerobic (methanogenic) conditions are present.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised overleaf:

Zone 1		Minimum	Maximum
Alluvium	Carbon Dioxide µg/l	37,548 (BH127)	73,693 (BH201S)
Raglan Marl Group	Carbon Dioxide µg/l	110,531 (BH201D)	
Zone 1		Minimum	Maximum
Alluvium	Methane µg/l	Less than Method Detection Limit	
Raglan Marl Group	Methane µg/l	47 (BH201D)	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2		Minimum	Maximum
Alluvium	Carbon Dioxide µg/l	22,609 (BH129)	134,882 (BH120)
Raglan Marl Group	Carbon Dioxide µg/l	Less than Method Detection Limit	464 (BH121)
Zone 1		Minimum	Maximum
Alluvium	Methane µg/l	35,111(BH203D)	49,366 (BH202D)
Raglan Marl Group	Methane µg/l	Less than Method Detection Limit	

Zone 3		Minimum	Maximum
Alluvium	Carbon Dioxide µg/l	7,562 (EX22)	433,808 (BH919)
Raglan Marl Group	Carbon Dioxide µg/l	41,089 (BH301D)	69,773 (BH303S)
Zone 1		Minimum	Maximum
Alluvium	Methane µg/l	Less than Method Detection Limit	39,737 (EX23)
Raglan Marl Group	Methane µg/l	39 (BH302D)	23,631 (BH204AD)

Off-Site Wells		Minimum	Maximum
Alluvium	Carbon Dioxide µg/l	52,871 (BHOS414)	88,501 (BHOS409A)
Raglan Marl Group	Carbon Dioxide µg/l	15,551 BHOS307	
Zone 1		Minimum	Maximum
Alluvium	Methane µg/l	Less than Method Detection Limit	3,145 (BHOS411)
Raglan Marl Group	Methane µg/l	6,678 (BHOS306S)	6,851 (BHOS306D)

The measured concentrations of TCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 7 and Figure 8, respectively. The measured concentrations of *cis*-DCE in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 9 and Figure 10, respectively and the measured concentrations of vinyl chloride in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 11 and Figure 12, respectively.

The measured concentrations of carbon dioxide in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 21 and Figure 22, respectively. The measured concentrations of methane in the groundwater at the Site, in the Alluvium and Raglan Marl Group are presented on Figure 23 and Figure 24, respectively.

3.5.6 Biological Oxygen Demand & Chemical Oxygen Demand

The chemical and biological oxygen demands are indirectly a measure of the organic compounds in the groundwater and therefore are indicative of the presence of organic contaminants.

The laboratory analysis results for biogeochemical parameters are presented in Tables 25 to 28 in Appendix B and summarised below:

Zone 1			Minimum	Maximum
Alluvium	COD	µg/l	Less than Method Detection Limit	
Raglan Marl Group	COD	µg/l	Less than Method Detection Limit	
Zone 1			Minimum	Maximum
Alluvium	BOD	µg/l	Less than Method Detection Limit	
Raglan Marl Group	BOD	µg/l	Less than Method Detection Limit	

There is only one well screening the Raglan Marl Group in Zone 1.

Zone 2			Minimum	Maximum
Alluvium	COD	µg/l	Less than Method Detection Limit	62,000 (BH121)
Raglan Marl Group	COD	µg/l	Less than Method Detection Limit	
Zone 1			Minimum	Maximum
Alluvium	BOD	µg/l	Less than Method Detection Limit	26,000 (BH121)
Raglan Marl Group	BOD	µg/l	Less than Method Detection Limit	

Zone 3			Minimum	Maximum
Alluvium	COD	µg/l	Less than Method Detection Limit	201,000 (BH204AS)
Raglan Marl Group	COD	µg/l	Less than Method Detection Limit	70,000 (BH204AD)
Zone 1			Minimum	Maximum
Alluvium	BOD	µg/l	Less than Method Detection Limit	42,000 (BH401)
Raglan Marl Group	BOD	µg/l	Less than Method Detection Limit	15,000 (EX1)

Off-Site Wells			Minimum	Maximum
Alluvium	COD	µg/l	Less than Method Detection Limit	18,000 (BHOS411)
Raglan Marl Group	COD	µg/l	Less than Method Detection Limit	30,000 (BHOS306S & D)
Zone 1			Minimum	Maximum
Alluvium	BOD	µg/l	Less than Method Detection Limit	1,000 (BHOS411)
Raglan Marl Group	BOD	µg/l	Less than Method Detection Limit	3,000 (BHOS306D)

3.6 Discussion of Biogeochemical Parameters

There are no clear correlations between the measured concentrations of biogeochemical parameters and the measured concentrations of CoC in the groundwater samples analysed from Zones 1 and 2.

The measured concentrations of total VOCs and TPH compared to the measured concentrations of oxidised and reduced forms of the biogeochemical parameters across Zone 3 are presented on Figure 25 and Figure 26, respectively. The measured concentrations of total VOCs and TPH compared to the measured concentrations of oxidised and reduced forms of the biogeochemical parameters across off-Site are presented on Figure 27 and Figure 28, respectively

The depletion of carbon dioxide concentrations in locations across the Site may be as a result of reduction of carbon dioxide to methane during degradation of hydrocarbons and chlorinated hydrocarbons by bacteria. Higher concentrations of methane correlate with higher measured concentrations of hydrocarbon CoC and hydraulically down-gradient of impacts to groundwater quality.

The higher methane concentrations, indicating that there are methanogenic conditions, correlate with higher concentrations of CoC in groundwater samples from Zone 3 and the off-Site monitoring wells. The hydraulically up-gradient and down-gradient locations typically have the lower dissolved methane concentrations. The high methane concentrations are markers for the lower degradation areas of the Site, where the electron acceptors are reduced, electron transfer is limited and natural attenuation of TH compounds is likely to stall. In these areas if chlorinated VOCs are also present, we would expect to see the greatest concentrations of TCE degradation products.

3.7 Hydrogeochemical Parameters

The stabilised hydrogeochemical parameters are presented in Tables 29 to 32 in Appendix B.

3.7.1 Zone 1

The stabilised hydrogeochemical parameters for the monitoring wells installed in Zone 1 are presented on Table 29 in Appendix B and summarised below:

			Minimum	Maximum
Zone 1 Alluvium	Electrical conductivity	µS/cm	161	475
	Dissolved Oxygen	mg/l	2.32	10.42*
	pH		8.42	9.45
	ORP	mV	-63.8	+39.1

* Fault with oxygen probe overestimating DO values

There is only one well screening the Raglan Marl Group in Zone 1.

			BH201D
Zone 1 Raglan Marl Group	Electrical conductivity	µS/cm	653
	Dissolved Oxygen	mg/l	0.60
	pH		8.00
	ORP	mV	-18.6

3.7.2 Zone 2

The stabilised hydrogeochemical parameters for the monitoring wells installed in Zone 2 are presented in Table 30 in Appendix B and summarised below:

			Minimum	Maximum
Zone 2 Alluvium	Electrical conductivity	µS/cm	266	4,646
	Dissolved Oxygen	mg/l	0.25	6.03*
	pH		6.74	11.69
	ORP	mV	-180.3	+98.0

			Minimum	Maximum
Zone 2 Raglan Marl Group	Electrical conductivity	µS/cm	525	640
	Dissolved Oxygen	mg/l	0.21	0.34
	pH		7.50	9.72
	ORP	mV	-116.8	-16.5

* Fault with oxygen probe overestimating DO value

3.7.3 Zone 3

The stabilised hydrogeochemical parameters for the monitoring wells installed on-Site in Zone 3 are presented in Table 31 in Appendix B and summarised below:

			Minimum	Maximum
Zone 3 Alluvium	Electrical conductivity	µS/cm	233	2,477
	Dissolved Oxygen	mg/l	0.15	11.35*
	pH		6.02	12.69
	ORP	mV	-207.5	+89.1

			Minimum	Maximum
Zone 3 Raglan Marl Group	Electrical conductivity	µS/cm	541	916
	Dissolved Oxygen	mg/l	0.10	0.76
	pH		7.05	11.66
	ORP	mV	-126.9	+3.0

* Fault with oxygen probe overestimating DO value

3.7.4 Off-Site Wells

The stabilised hydrogeochemical parameters for the monitoring wells installed off-Site are presented in Table 32 in Appendix B and summarised below:

			Minimum	Maximum
Off-Site Wells Alluvium	Electrical conductivity	µS/cm	90	543
	Dissolved Oxygen	mg/l	0.23	5.90*
	pH		5.61	9.91
	ORP	mV	-103.9	+126.9

			Minimum	Maximum
Off-Site Wells Raglan Marl Group	Electrical conductivity	µS/cm	288	426
	Dissolved Oxygen	mg/l	0.31	0.39
	pH		7.33	7.46
	ORP	mV	-11.6	+40.1

* Fault with oxygen probe overestimating DO value

3.8 Discussion of Hydrogeochemical Parameters

3.8.1 Zones 1 & 2

The electrical conductivity parameters are used as indicators to verify that Site groundwater samples have been collected from the different aquifer system. Electrical conductivity values are also influenced by contaminants in the groundwater.

The electrical conductivity recorded at the well-head of monitoring wells installed in the Alluvium across Zone 1 ranged from 161 µS/cm to 475 µS/cm. The electrical conductivity recorded at the well-head of monitoring well BH201D, installed in the Raglan Marl Group in Zone 1, was 653µS/cm.

The electrical conductivity recorded at the well-head of monitoring wells installed in the Alluvium across Zone 2 ranged from 266 µS/cm to 753 µS/cm. The electrical conductivity recorded at the well-head of monitoring wells installed in the Raglan Marl Group across Zone 2 ranged from 536 µS/cm to 640 µS/cm.

Hydrogeochemical parameters such as DO and pH in groundwater are factors influencing the efficiency and extent of the biodegradation of potential contaminants in groundwater. The EA's guidance on the assessment of Natural Attenuation (*Guidance on the Assessment and Monitoring of Natural Attenuation of Contaminants in Groundwater [R&D Publication 95]*, published 2000) suggests the optimal pH range for microbial degradation lies between 6.0 and 8.5.

The stabilised biogeochemical parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 8.42 to 9.45, in the Alluvium monitoring wells. The pH recorded at the well-head of monitoring well BH201D, installed in the Raglan Marl Group in Zone 1, was 8.00. The pH of the groundwater within Zone 1 was generally outside of the optimum pH range.

The stabilised biogeochemical parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 6.74 to 11.69, in the Alluvium monitoring wells. The stabilised parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 7.50 to 9.72, in the Raglan Marl Group monitoring wells. The pH of the groundwater within Zone 2 was generally within the optimum pH range.

In ideal conditions, elevated DO concentrations would generally be associated with areas of low TPH contaminant concentrations and/or located hydraulically up-gradient of on-Site sources. Depleted concentrations of DO would generally be associated with areas of elevated TPH contaminant concentrations and areas hydraulically down-gradient of on-Site sources. Conversely, ORP readings are expected to be more negative in areas where reducing environments predominate, potentially associated with elevated contaminant concentrations. Positive values of ORP are likely to be associated with areas of low TOH contaminant concentrations and/or located hydraulically up-gradient of on-Site sources.

In general more positive DO concentrations and ORPs were measured at the well-head during the groundwater monitoring visit in the Alluvium monitoring wells installed across Zone 1. A review of the available data for Zone 2, indicates that no clear trends can be identified with the DO and ORP measurements and the measured concentrations of CoC in groundwater.

3.8.2 Zone 3

The electrical conductivity recorded at the well-head of monitoring wells installed in the Alluvium across Zone 3 ranged from 233.2 µS/cm to 2,477 µS/cm. The electrical conductivity recorded at the well-head of monitoring wells installed in the Raglan Marl Group across Zone 3 ranged from 541 µS/cm to 916 µS/cm.

The stabilised biogeochemical parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 6.02 to 12.69, in the Alluvium monitoring wells across Zone 3. The stabilised parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 7.05 to 11.66, in the Raglan Marl Group monitoring wells. The pH of the groundwater within Zone 3 was generally within the optimum pH range.

The measured concentration of total VOCs and TPH compared to the dissolved oxygen and ORPs measured at the well-head across Zone 3 are presented on Figure 29 and Figure 30, respectively.

The trends on Figures 29 and 30 indicate some correlation between DO and ORP values and the measured concentrations of CoC in the groundwater samples. In general the more positive DO concentrations were recorded at the well-head of monitoring wells were less elevated concentrations of CoC were measured in the groundwater samples analysed. Conversely where more elevated concentrations of CoC were present in the groundwater samples analysed the DO concentrations were lower, this may suggest the consumption of DO within the impacted area. The most positive ORP values were recorded at the well-head of monitoring wells were less elevated concentrations of CoC were measured in the groundwater samples analysed. This mirrors the trend observed between DO concentrations and the concentrations of CoC in the groundwater samples.

The co-existence of contaminant species that degrade aerobically (TPH, *cis*-DCE and vinyl chloride) and anaerobically, TPH as an electron donor and tetrachloroethene (PCE) and TCE, *cis*-DCE and vinyl chloride as electron acceptors complicate the interpretation of the data trends however, overall, the data suggests that the microbial degradation processes may be taking place in the Alluvium and Raglan Marl Group aquifers beneath the Site.

3.8.3 Off-Site Wells

The electrical conductivity recorded at the well-head of monitoring wells installed in the Alluvium off-Site ranged from 90 µS/cm to 543 µS/cm. The electrical conductivity recorded at the well-head of monitoring wells installed in the Raglan Marl Group off-Site ranged from 288 µS/cm to 426 µS/cm.

The stabilised biogeochemical parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 5.61 to 9.91, in the Alluvium monitoring wells off-Site. The stabilised parameters measured at the well-head during the groundwater monitoring visit indicated that the pH of the groundwater ranged from 7.33 to 7.46, in the Raglan Marl Group monitoring wells. The pH of the groundwater off-Site was generally within the optimum pH range.

In general more positive DO concentrations and ORPs were measured at the well-head during the groundwater monitoring visit in the Alluvium and Raglan Marl Group monitoring wells installed off-Site.

4 RISK ASSESSMENT

4.1 Derivation of Site Specific Assessment Criteria

The SSAC and the methodology leading to their derivation are presented in the DQRA for the Site referenced previously in this report (ARCADIS report reference 909362802, January 2011).

4.1.1 Human Health Assessment Criteria

The SSAC derivation was undertaken based on detailed redevelopment plans that were provided to ARCADIS. The redevelopment plans indicated that three main commercial developments will be carried out on Site:

- **Zone 1** – Employee car park to the north of the main production plant, to be redeveloped with a new supermarket, associated petrol filling station and two smaller retail units (as well as a pedestrian bridge from the Site into Cwmbran town centre).

- **Zone 2** – Central portion of the Meritor Site including the Heavy Goods Vehicle (HGV) entrance, loading bay and the northern third of the existing production building to be redeveloped as commercial offices with a hotel (and associated bar/ restaurant) and car parking areas.

- **Zone 3** – The reminder of the production building (south of building column row M) and the southern yard area and visitors car park to be retained as a heavy vehicle braking systems production building with associated employee and visitor car parking areas; an engineering centre; and Meritor's offices, including the use of the adjacent playing fields by the current on-Site commercial workers during their leisure time.

4.1.2 Water Resource Assessment Criteria

Specific source areas were defined in the DQRA (previously referenced 909363202_01 dated June 2011) for each of the CoC groups being considered in the water resource risk assessment. Each defined source area is based on the known distribution of the CoC in question. The SSAC are presented alongside the applicable groundwater CoC data.

The extent of the various source areas are presented on Figure 31 and Figure 32.

4.2 Comparison of Groundwater Analysis Results to Assessment Criteria

The results of the comparison of measured concentrations of CoC in the groundwater samples with the SSAC are detailed for the individual Zones and source areas below.

A summary of the measured concentrations in the groundwater samples exceeding the SSAC protective of human health are presented in Table 1; and a summary of the measured concentrations in the groundwater samples exceeding the SSAC protective of water resources are presented in Table 2.

4.2.1 Zone 1 – Human Health Receptors

None of the measured concentrations of CoC in the groundwater samples submitted for analysis exceeded the SSAC protective of human health receptors.

4.2.2 Zone 1 – Water Resource Receptors

No SSAC were derived in relation to Zone 1, as the results of risk assessment demonstrated the concentrations of CoC do not present significant level of risk to water resource receptors associated with the Site.

4.2.3 Zone 2 – Human Health Receptors

None of the measured concentrations of CoC in the groundwater samples submitted for analysis exceeded the SSAC protective of human health receptors.

4.2.4 Zone 2 (Source Area 2) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
cis-DCE	**Alluvium:** BH104, BH104 Duplicate, BH203S and BH203S Duplicate
Trichloroethene (TCE)	**Alluvium:** BH104, BH104 Duplicate, BH203S and BH203S Duplicate

4.2.5 Zone 2 (Source Zone 3R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below.

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH926
cis-DCE	**Alluvium:** BH926
TCE	**Alluvium:** BH926 & BH927

4.2.6 Zone 3 – Human Health Receptors

None of the measured concentrations of individual TPH compounds exceeded the SSAC protective of human health receptors in the groundwater samples submitted for analysis.

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH118, BH119, BH204AS, BH400, BH912, BH919, BH919 Duplicate, BH921, EX3, EX4, EX6 and EX7 **Raglan Marl Group:** BH204AD, BH305, EX1 and EX2

4.2.7 Zone 3 (Source Zone 3R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed overleaf.

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH131, BH301S, BH912 and BH925
	Raglan Marl Group: BH301D
cis-DCE	**Alluvium:** BH131, BH301S, BH912 and BH925
	Raglan Marl Group: BH301D
TCE	**Alluvium:** BH131, BH132, BH301S and BH925
	Raglan Marl Group: BH301D

4.2.8 Zone 3 (Source Zone 4R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below:

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH904, BH917, BH919, BH919 Duplicate, BH921, BH922, BH923, EX12, EX13, EX14 and EX15 **Raglan Marl Group:** BH302D
trans-DCE	**Alluvium:** BH919, BH919 Duplicate and BH921
cis-DCE	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH919, BH919 Duplicate, BH921, BH922, EX12, EX13, EX14 and EX15 **Raglan Marl Group:** BH302D
TCE	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH904, BH917, BH919, BH919 Duplicate, BH921, BH922, EX12, EX13 and EX14 **Raglan Marl Group:** BH302D
PCE	**Alluvium:** BH402, EX12, EX13 and EX14 **Raglan Marl Group:** BH302D

4.2.9 Zone 3 (Source Zone 5) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below:

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH102, BH103, BH107, BH303S, EX20 and EX21 **Raglan Marl Group:** BH303D
cis-DCE	**Alluvium:** BH102, BH103, BH107, BH303S, EX20 and EX21 **Raglan Marl Group:** BH303D
TCE	**Alluvium:** BH107 and EX21

4.2.10 Zone 3 (Source Zone 6R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed overleaf:

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
cis-DCE	**Raglan Marl Group:** BH205AD
TCE	**Raglan Marl Group:** BH205AD

4.2.11 Zone 3 (Source Zone 7R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below:

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BH109, BH118, BH119, BH204AS, BH400, EX3, EX4, EX6, EX7 and EX8 **Raglan Marl Group:** BH204AD, BH304S, BH304D, BH305, EX1, EX2 and EX5
trans-DCE	**Alluvium:** BH119, BH204AS, BH400, EX3 and EX6 **Raglan Marl Group:** BH204AD, BH304D and BH305
cis-DCE	**Alluvium:** BH109, BH118, EX4, EX7 and EX8 **Raglan Marl Group:** BH304S, BH304D, EX1 and EX5
TCE	**Alluvium:** BH109, BH119, BH204AS, EX03, EX6, EX7 and EX8 **Raglan Marl Group: Raglan Marl Group:** BH304S, BH304D, EX1, EX2 and EX5
PCE	**Alluvium:** , BH400 and EX8 **Raglan Marl Group:** BH204AD, BH304S, BH304D and BH305

4.2.12 Zone 3 (Source Zone 8R) – Water Resource Receptors

None of the measured concentrations of CoC in the groundwater samples submitted for analysis exceeded the SSAC protective of water resource receptors.

4.2.13 Zone 3 (Source Zone 9R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below.

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
p/m-Xylene	**Alluvium:** BH921

4.2.14 Zone 3 (Source Zone 10) – Water Resource Receptors

None of the measured concentrations of CoC in the groundwater samples submitted for analysis exceeded the SSAC protective of water resource receptors.

4.2.15 Off-Site – Human Health

None of the measured concentrations of CoC in the groundwater samples submitted for analysis exceeded the SSAC protective of human health receptors.

4.2.16 Off-Site (Source Zone 7R) – Water Resource Receptors

The results of the comparison of measured concentrations in the groundwater samples with the SSAC are detailed below.

CoC	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Vinyl chloride	**Alluvium:** BHOS411 **Raglan Marl Group:** BHOS306S & BHOS306D
cis-DCE	**Alluvium:** BHOS411 **Raglan Marl Group:** BHOS306S & BHOS306D
TCE	**Alluvium:** BHOS411 **Raglan Marl Group:** BHOS306S & BHOS306D

5 RECOGNISED ENVIRONMENTAL CONDITION 25H

5.1 Background

The objective of the Phase I ESA (909361804_02 dated January 2010 referenced previously) was to assess the presence, to the extent practical, of the *Recognised Environmental Conditions* (RECs) located in, under, or originating from the site.

A REC is defined by ASTM Standard E 1527-05 as:

"The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."

5.2 REC25H

In accordance with ASTM E-1527-05, there were several RECs identified relating to historical areas (denoted by H) of concern at the site including:

REC25H	Former Ammonia Above-ground Storage Tank (AST) located externally, in south-west of main production building.

It was identified during the Site-wide groundwater monitoring that REC25H remained active, therefore additional groundwater samples were collected and analysed for ammoniacal nitrogen as detailed below:

Sample Identity	Rationale	Analysis Methodology	Analysis Result (µg/L)
BH114A	Monitoring well locations in immediate vicinity of REC25H	Ammoniacal nitrogen *via* methods photometric analyser	40
BH923			Less than Method Detection Limit
BH914	Monitoring well location hydraulically up-gradient of former ammonia AST		2,340

Based on the analytical data, and the measured concentration of ammoniacal nitrogen being notably greater in the monitoring well location hydraulically up-gradient of former ammonia AST (REC25H) ARCADIS conclude that REC25H is no longer active and the storage of ammonia in the south-western corner of the Site has not had a detrimental effect on the groundwater quality in this area of the Site.

REC		Evidence	Findings
REC25H	Former Ammonia AST	Potential for historical spillages/ leaks of ammonia to enter soil and groundwater at the site.	No evidence of impacts to groundwater quality. **REC Inactive**

6 DISCUSSION

In February 2011, ARCADIS was commissioned by Meritor to undertake a Site-wide baseline groundwater monitoring visit at the Site.

A one-off groundwater monitoring visit was undertaken to establish groundwater conditions across the Site, prior to the proposed remediation works. In addition, laboratory analysis was performed for biogeochemical parameters to assess the potential for natural attenuation processes to be occurring beneath the Site.

6.1 Impacts Related to Presence of LNAPL

During the baseline groundwater monitoring, no LNAPL was encountered in the monitoring well networks installed across Zone 1 and Zone 2. No LNAPL was encountered in the monitoring well network off-Site.

During the baseline groundwater monitoring, LNAPL was encountered in 33 monitoring well across Zone 3. The LNAPL thicknesses ranged from a sheen on the groundwater surface <5 mm to 2,027 mm, measured in monitoring well BH204_A_S in January 2011.

None of the measured concentrations of TPH, MTBE and BTEX compounds in the groundwater samples analysed during the baseline groundwater monitoring exceeded the SSAC protective of the human health receptors associated with the Site. However, LNAPL and TPH impacts exceeding the SSAC protective of the water resource receptors associated with the Site remain. The CSM has been revisited (Section 5.3) to understand the significance of the additional findings in relation to the potential risk to both human health and water resource receptors. Trends in the measured concentrations of TPH over time are presented on Figure 33.

The anticipated extent of LNAPL above residual (saturation) levels, which may represent LNAPL which is potentially mobile and therefore, potentially recoverable, in the sub-surface at the Site is presented on Figure 34.

6.2 TCE Impacts

During the baseline monitoring, no free-phase TCE (DNAPL) was encountered in the monitoring well networks installed across the Site or in the monitoring well network off-Site.

None of the measured concentrations of VOCs in the groundwater samples from Zone 1 and Zone 2 analysed during the baseline groundwater monitoring exceeded the SSAC protective of the human health receptors associated with the Site.

During the baseline groundwater monitoring, PCE, TCE and its associated breakdown product *cis*-DCE have been measured at concentrations exceeding the SSAC protective of water receptors in the groundwater samples from Zone 2

Measured concentrations of PCE, TCE and its associated breakdown products *trans*-DCE, *cis*-DCE and vinyl chloride in the groundwater samples from Zone 3 are presented on Figure 35. Vinyl chloride and *cis*-DCE were measured at concentrations exceeding the SSAC protective of human health receptors in the groundwater samples from the monitoring wells across Zone 3. Primary areas of concern are the south-east corner of Zone 3, where virgin TCE was formerly stored; the south-west corner of the main production building formerly the heat treatment process and plating process area and the central western area of the main production building.

In the southern yard area, in particular the south-east corner of the Site, and in the south-eastern corner of the main production building both solvent and LNAPL impacts are present. Figure 35 suggests that where there is LNAPL and a more reductive environment is present, daughter products such as *cis*-DCE and vinyl chloride are the dominant compounds in the groundwater. Whereas in the central and south-western corner of the main production building, where no LNAPL has been encountered the solvent impacts in the groundwater have not progressed as far through the dechlorination process.

Measured concentrations of 1,1-dichloroethene, 1,1,2-tichloroethane, PCE, TCE and its associated breakdown products *trans*-DCE, *cis*-DCE and vinyl chloride, have been measured at concentrations exceeding the SSAC protective of water receptors in the groundwater samples from Zone 3.

None of the measured concentrations of VOCs in the groundwater samples from the off-Site monitoring wells analysed during the baseline groundwater monitoring exceeded the SSAC protective of the human health receptors associated with the Site.

Measured concentrations of TCE and its associated breakdown products *trans*-DCE, *cis*-DCE and vinyl chloride, have been measured at concentrations exceeding the SSAC protective of water receptors in the groundwater samples from the off-Site wells BHOS411, BHOS306S and BHOS306D.

Trends in the measured concentrations of VOCs over time are presented on Figure 36.

6.3 Refinement to the CSM

The impacts to groundwater quality, exceeding the SSAC, are presented graphically on Figure 37 and Figure 38. It is noted that these figures do not take the findings of the soil gas and air monitoring into account, therefore, further consideration of all the data is required to refine the CSM.

6.3.1 Zone 1

Zone 1 comprises currently an employee car park to the north of the main production plant. During the proposed redevelopment, a new supermarket, associated petrol filling station and two smaller retail units (as well as a pedestrian bridge from the Site into Cwmbran town centre) will be constructed in Zone 1.

None of the measured concentrations of COC in the groundwater samples from Zone 1 analysed during the baseline groundwater monitoring exceeded the SSAC protective of the human health receptors associated with the Site. No SSAC were derived in relation to Zone 1, as the results of risk assessment demonstrated the concentrations of CoC do not present significant level of risk to water resource receptors associated with the Site.

6.3.2 Zone 2

Zone 2, the central portion of the current Meritor Site, will be redeveloped as commercial offices with a hotel (and associated bar/ restaurant) and car parking areas during the planned works at the Site.

None of the measured concentrations of CoC in the groundwater samples from Zone 2 analysed during the baseline groundwater monitoring exceeded the SSAC protective of the human health receptors associated with the Site. During the baseline groundwater monitoring, PCE, TCE and its associated breakdown product *cis*-DCE have been measured at concentrations exceeding the SSAC protective of water receptors in the groundwater samples from Zone 2

No future remediation works are planned for Zone 2.

6.3.3 Zone 3

Zone 3 comprises the reminder of the production building (south of building column row M), the southern yard area and visitors car park. This zone will be retained by Meritor as a heavy vehicle braking systems production building with associated employee and visitor car parking areas; an engineering centre; and Meritor's offices.

The findings of the soil gas assessment to date indicated a potential for unacceptable risk to current and future on-site human health *via* chronic exposure in Zone 3. However, the air monitoring assessment undertaken during the Supplementary Site Investigation (ARCADIS report reference 909362509_01, April 2011) provided evidence that the risk is in fact acceptable, based on the current site layout, for current site workers. The potential risks to neighbouring residents and future commercial workers, following redevelopment, may be acceptable but the near-source soil gas data – a useful predictor for the vapour pathways – suggests that further works/ risk management is required.

Based on the assessment undertaken to date, there were several areas within Zone 3 where potential risks were identified based on impacts to soil, soil gas, air and groundwater quality exceeding the SSAC based on the future end-use. The specific Source-Pathway-Receptor linkages are presented in the table below:

Media	Contaminant	Driving Pathway	Receptor
Air	Vinyl chloride	Inhalation of indoor air	Current Commercial Workers
	cis-1,2-dichloroethene		
	Trichloroethene		
	Vinyl chloride	Inhalation of outdoor air	
	cis-1,2-dichloroethene		
	Trichloroethene		
	Tetrachloroethene		
Soil	Vinyl chloride	Inhalation of indoor air	Future Commercial Worker
	cis-1,2-dichloroethene		
	Trichloroethene		
	Benzo(a)pyrene	Incidental direct contact (assuming shallow soils left uncovered)	
Groundwater	Vinyl chloride	Inhalation of indoor air	
	cis-1,2-dichloroethene		
Soil	Vinyl chloride	Leaching and migration in groundwater	Water resources receptors within compliance point distance
	cis-1,2-dichloroethene		
	Trichloroethene		
	Tetrachloroethene		
Groundwater	Vinyl chloride	Migration within groundwater	Water resources within compliance point distance
	cis-1,2-dichloroethene		
	trans-1,2-dichloroethene		
	Trichloroethene		
	Tetrachloroethene		
	1,1,2-trichloroethane		
Soil Hotspots	Hydrocarbons/ oil	Introduction of pathways during construction activities (*e.g.* pipe permeation)	Abnormal development costs. No risk proven, but may be identified during construction

Media	Contaminant	Driving Pathway	Receptor
Light Non-Aqueous Phase Liquid	Free-Phase Oil	Spreading and migration on groundwater	Data indicative of limited mobility of LNAPL, but further data collection warranted
		Dissolution of CoC to groundwater and subsequent off-site migration	Groundwater beneath the Site, and other water resource receptors within compliance point distance
		Volatilisation and inhalation in indoor air	Future commercial worker
		Volatilisation and inhalation in outdoor air	Future commercial worker
		Off-site migration, volatilisation and inhalation in indoor air	Neighbouring land users
		Off-site migration, volatilisation and inhalation in outdoor air	Neighbouring land users

Notes

Pathway no longer considered to present a significant risk, based on the data collected

Data indicates plausible pathway is absent, but further assessment required to confirm this conclusion

The driver for remediation in Zone 3 is considered to be the protection of water resource receptors associated with the Site. However, it is recognised that the remediation of the Site will also be beneficial for the associated on-Site and off-Site human health receptors. ARCADIS propose that the CSM is continually reviewed, and if necessary refined, following the collection of additional data and/ or commissioning of the full-scale oil recovery system.

6.4 Data Gaps

The LIF and MIP probe holes, boreholes and monitoring wells have been primarily located to target RECs at the Site and they should identify significant areas of concern with regard to soil and groundwater impacts. However, there is potential for higher concentrations of the CoC, as hotspots, to be present in areas of the Site that have not been investigated due to current structures, or equipment.

A number of wider-diameter extraction wells have been installed in the southern yard area and along the southern end of East Road to facilitate future remediation pilot testing and full-scale oil recovery works. However, to date no remediation pilot testing works have been conducted at the Site.

7 SAMPLING AND ANALYSIS PLAN

7.1 Introduction

ARCADIS understands will divest the freehold ownership of the northern two thirds of the Site (Zones 1 & 2), including a parking area to the north of the main production building, for redevelopment. ARCADIS also understands that Meritor will retain the southern third of the Site and will undertake the refurbishment of the existing production building and southern yard area. Tee main commercial developments will be carried out on Site, as follows:

- **Zone 1** – Employee car park to the north of the main production plant, to be redeveloped with a new supermarket, associated petrol filling station and two smaller retail units (as well as a pedestrian bridge from the Site into Cwmbran town centre).

- **Zone 2** – Central portion of the Meritor Site including the Heavy Goods Vehicle (HGV) entrance, loading bay and the northern third of the existing production building to be redeveloped as commercial offices with a hotel (and associated bar/ restaurant) and car parking areas.

- **Zone 3** – The reminder of the production building (south of building column row M) and the southern yard area and visitors car park to be retained as a heavy vehicle braking systems production building with associated employee and visitor car parking areas; an engineering centre; and Meritor's offices.

A one-off groundwater monitoring visit was undertaken in February 2011, to establish groundwater conditions across the Site, prior to the proposed remediation works. This baseline groundwater monitoring visit will be used to develop the Sampling and Analysis Plan (SAP), for the future periodic groundwater monitoring programme. A future periodic groundwater monitoring programme is likely to be required by the Regulators and will provide data for the tracking of future remediation performance and progress towards the remediation objectives, and allow necessary adjustments to be made to optimise the remediation approach.

ARCADIS also anticipates that Torfaen County Borough Council will impose environmental planning conditions for the redevelopment of Zones 1 & 2 and for the refurbishment of Zone 3. It is considered likely that the data obtained during the proposed groundwater monitoring programme can be used to assist in the discharge of the environmental planning conditions at a later date.

7.2 Sampling Rationale

7.2.1 Groundwater Sampling

Additional groundwater monitoring visit will be undertaken to establish groundwater conditions across the Site and to continue to assess trends in groundwater quality. A future periodic groundwater monitoring programme is likely to be required by the Regulators and will provide data for the tracking of future remediation performance and progress towards the remediation objectives, and allow necessary adjustments to be made to optimise the remediation approach.

ARCADIS recommends the quarterly monitoring for the first two years of the groundwater monitoring programme. An appraisal of the results of the monitoring should be undertaken after every visit with a thorough review and reporting undertaken after the first year. The need for such a comprehensive monitoring schedule for the remaining period will be reviewed.

The following programme is proposed for Year 1and 2 of the groundwater monitoring programme

Proposed Date	Monitoring Wells from which Zones to be Sampled	All or Selected Monitoring Wells to be Sampled	Analytes	Hydro-geochemical Parameters to be Collected?	Analysis for Bio-geochemical Parameters to be Undertaken?
June 2011	Zone 3 Only	Selected wells	VOCs	✓	X
September 2011				✓	X
December 2011				✓	X
March 2012	Zones 1, 2, 3 and off-Site wells		VOCs TPH^ Metals^ Cyanide^ TOC^ pH	✓	✓
June 2012	Zone 3 Only		VOCs	✓	X
September 2012				✓	X
December 2012				✓	X
March 2013	Zones 1, 2, 3 and off-Site wells	All	VOCs TPH^ Metals^ Cyanide^ TOC^ pH	✓	✓

Notes:

^ Selected Wells Only

The following selected monitoring wells located across Zone 3 of the Site will be sampled during the June, September and December monitoring visits:

- BH103
- BH107
- BH108
- BH114A
- BH115
- BH204AS
- BH204AD
- BH205AS
- BH205AD
- BH301S
- BH301D
- BH302D
- BH303S
- BH303D
- BH304S
- BH304D
- BH400
- BH402
- BH909
- BH912
- BH919
- BH922
- BH923
- BH925
- BH926
- BH928
- EX05
- EX08
- EX10
- EX13
- EX15
- EX17
- EX18
- EX23

The following selected monitoring wells located across Zone 1, Zone 2 of the Site and off-Site will be sampled during the March monitoring visits:

Zone 1

- BH127
- BH128
- BH201S
- BH201D

Zone 2

- BH120
- BH121
- BH202S
- BH202D
- BH203S
- BH203D

During the each groundwater monitoring visit, the depth to resting groundwater and Non-Aqueous Phase Liquid (NAPL) thickness (if present) will be measured across the existing monitoring wells on-Site and in the monitoring wells located in the adjacent playing fields, prior to collecting groundwater samples from the monitoring wells identified above.

High levels of dissolved hydrocarbons and solvents may be erroneously identified in groundwater, caused by particulates in the sample or by a product sheen, which is strongly influenced by the sampling methodology. It is therefore proposed that where possible, low-flow sampling is used to collect groundwater samples. It is anticipated that this will provide a better representation of groundwater concentrations by reducing the particulates in the samples.

7.2.2 Surface Water Sampling

Inspection of the Ordnance Survey (OS) map for the area indicates the nearest surface water feature to the site is the Afon Lwyd, located 250 m to the east. ARCADIS has been monitoring the discharge of potentially impacted surface run-off water to the Afon Lwyd *via* the Northern and Southern Storm Water drainage System (SWDS), on behalf of Meritor for several years.

Surface water monitoring is therefore recommended to assess the impact of these discharges on water quality in the Afon Lwyd. ARCADIS recommends the annual surface water monitoring for the first two years of the groundwater monitoring programme.

The following programme is proposed for Year 1and 2 of the monitoring programme:

Proposed Date	Locations from which Surface Water to be Sampled	Analytes
March 2012	Locations SWA - SWE	VOCs
March 2013		

Five surface water sampling locations (SWA to SWE) were identified during previous phases of assessment at the Site. Sampling will involve the collection of water samples from these locations, using disposable low-flow High Density Polyethylene (HDPE) tubing attached to a peristaltic pump, from a suitably safe location on the watercourse bank.

Samples of the storm water discharge from the Site will also be collected from each of the discharge points, referenced as ‘Northern’ and ‘Southern’. The samples were collected directly from the non-return gates at the discharge points to the Afon Lwyd.

7.3 Field Methods and Procedures – Water Sampling

7.3.1 Groundwater Sampling

If well heads are accessible, the on-Site and off-Site wells will be inspected for NPAL and water from top of casing and total well depth prior to purging.

An oil-water interface probe, accurate to the nearest +/- 0. 1 m, will be used to measure depth to NAPL and water in each well. Groundwater elevation data will be used in combination with topographic data previously obtained for the site to infer the relative rest level of groundwater across the Site. This information will be used to determine that the groundwater flow direction in the underlying Alluvium and Raglan Marl Group strata.

The oil-water interface probe will be decontaminated before and after use in each well. Water levels will be measured in wells which have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

High levels of dissolved hydrocarbons and solvents may be erroneously identified in groundwater, caused by particulates in the sample or by a product sheen, which is strongly influenced by the sampling methodology. It is therefore proposed that where possible, low-flow sampling is used to collect groundwater samples. It is anticipated that this will provide a better representation of groundwater concentrations by reducing the particulates in the samples. Low-flow sampling is a specific water delivery technique that is designed to produce a sample that most closely resembles the water quality in the aquifer adjacent to the screened zone of a well by reducing sample turbidity, which in turn reduces the variability in the sampling results. A length of High Density Polyethylene (HDPE) tubing, will be lowered down the well casing to approximately the mid point of the screened section of the well to collect the sample from the water column. The water was drawn up the tubing using a peristaltic pump. During low-flow sampling, purge water is passed through a flow cell and water quality parameters are measured using a multi-parameter meter. Dissolved Oxygen (DO), Oxidation-Reduction Potential (ORP), electrical conductivity and pH are measured at regular intervals until the DO and ORP readings stabilise to within 10% of the previous reading, or three saturated well volumes of groundwater has been removed from the well. A sample of the groundwater was subsequently collected.

Dedicated tubing will be used for each location and will be disposed of after use in each well. Samples will be collected from wells which have the least amount of known contamination first. Wells with known or suspected contamination will be sampled last.

7.3.2 Surface Water Sampling

Surface water grab samples will be collected at one time from five locations along the River Lwyd (SWA – SWE), were identified during previous phases of assessment at the Site. The samples should be taken from flowing, not stagnant water, and the sampler should be facing upstream and samples should be collected the middle of the stream, where possible, to reduce the sediment or organic debris trapped in the sample.

Sampling will involve the collection of water samples from these locations, using disposable low-flow HDPE tubing attached to a peristaltic pump, from a suitably safe location on the watercourse bank. Two samples were collected upstream of the discharge locations, one sample level with site and two samples downstream.

Samples of the storm water discharge from the Site will also be collected from each of the discharge points, referenced as ‘Northern’ and ‘Southern’. The samples were collected directly from the non-return gates at the discharge points to the Afon Lwyd.

7.4 Decontamination Procedures

The decontamination procedures that will be followed are in accordance with ARCADIS’ Standard Operating Procedures (SOPs). Decontamination of sampling equipment will be conducted consistently, to ensure the quality of samples collected.

Equipment that comes into contact with potentially contaminated water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment.

The following, decontamination procedure will be followed, where disposable one-time use equipment is not used:

- Washing down of equipment using non-phosphate detergent and tap water wash, using a brush if necessary;
- Tap water rinse; and,
- Deionised/ distilled water rinse (twice).

7.5 Sample Containers, Preservation and Storage

The number of sample containers, volumes, and materials required for the analysis required will be determined with the laboratory prior to the monitoring visits. The containers will be supplied by the laboratory new or pre-cleaned and will not be rinsed prior to sample collection.

Preservatives, if required, will be added by the field engineer to the containers prior to shipment of the samples to the laboratory.

7.5.1 Groundwater Samples

During each monitoring visit the groundwater samples will be submitted for analysis for:

- VOCs *via* GC-MS methods.

During the annual monitoring visits in addition to VOCs, selected groundwater samples will be submitted for analysis for:

- Total Petroleum Hydrocarbons (TPH) Criteria Working Group (CWG) *via* Gas Chromatography - Flame Ionisation Detector (GC-FID) methods;
- pH *via* meter;
- Selected Metals *via* Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES);
- Free Cyanide *via* spectrophotometric methods; and,
- Total Cyanide *via* spectrophotometric methods.

During the annual monitoring visits in addition to the above, selected groundwater samples will be submitted for analysis for biogeochemical indicator parameters:

- Nitrate *via* methods photometric analyser;
- Nitrite *via* photometric analyser;
- Sulphate *via* photometric analyser;
- Sulphide *via* photometric analyser;
- Manganese *via* ICP-OES;
- Total Organic Carbon *via* ICP-OES;
- Dissolved Carbon Dioxide *via* GC-FID; and,
- Dissolved Methane *via* GC-FID.

Collection
Groundwater samples will b placed into appropriate glass bottles and glass *via*ls supplied by the laboratory. Glass bottles and *via*ls were used for the transport of groundwater samples to the laboratory for analyses of volatile and semi-volatile contaminants.

Preservation
Samples will be stored in dedicated sample boxes with cooling aids to reduce microbial degradation and the containers for volatile analysis were filled so that no headspace remained prior to sealing the container. This, in combination with a low storage temperature, reduced the potential for volatile loss.

No additional sample preservation is required for the proposed analysis.

Transport
Samples and analytical requests were recorded on the laboratory chain of custody form, prior to dispatching for analysis, on the day of sampling, where possible.

7.5.2 Surface Water Samples

During the annual monitoring visits, surface water samples will be submitted for analysis for:

- VOCs *via* GC-MS methods.

Collection
Groundwater samples will be placed into appropriate glass bottles and glass *via*ls supplied by the laboratory. Glass bottles and *via*ls were used for the transport of groundwater samples to the laboratory for analyses of volatile and semi-volatile contaminants.

Preservation
Samples will be stored in dedicated sample boxes with cooling aids to reduce microbial degradation and the containers for volatile analysis were filled so that no headspace remained prior to sealing the container. This, in combination with a low storage temperature, reduced the potential for volatile loss.

No additional sample preservation is required for the proposed analysis.

Transport
Samples and analytical requests were recorded on the laboratory chain of custody form, prior to dispatching for analysis, on the day of sampling, where possible.

7.5.3 Disposal of Waste

During the process of collecting environmental samples at the Site, the sampling team will generate different types of potentially contaminated investigation-derived wastes (IDWs) that include the following:

- Purged groundwater and excess groundwater collected for sample container filling;
- Used personal protective equipment (PPE);
- Disposable sampling equipment; and,
- Decontamination fluids.

Listed below are the procedures that should be followed for handling the IDWs.

Used PPE and disposable equipment will be double bagged and removed from Site by the sampling team. These wastes are not considered hazardous and can be disposed of to a permitted non-hazardous skip at an ARCADIS premises and subsequently disposed of.

Decontamination fluids that will be generated in the sampling event will consist of deionised water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the Site. The water (and water with detergent) will be disposed of to the Site's trade effluent drainage system.

The low volume of purged water will also be disposed of to the Site's trade effluent drainage system.

7.6 Sample Chain-Of-Custody Forms and Custody Seals

Sample shipments for analyses will be accompanied by a chain-of-custody record. Form(s) will be completed and sent with the samples for each shipment (*i.e*., each day).

The chain-of-custody form will identify the contents of each shipment and will identify ARCADIS as the client, the ARCADIS project reference, the sampling team and Project Manager, the nature of the sample (*i.e.* water) and the parameters to be tested.

The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time prior to shipment. The original form will be sent to the laboratory when the samples are shipped. Duplicate copies will kept by the sampling team leader and the ARCADIS Project Manager's master files.

7.7 Quality Control

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals, assessment of field contamination and assessment of sampling variability.

7.7.1 Trip Blanks

Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks are 40mL vials that have been filled with organic-free water that has been purged so it is VOC free and shipped with the empty sampling containers to the Site prior to sampling.

The sealed trip blanks are not opened in the field and are shipped to the laboratory in the same cooler with the samples collected for VOC analysis. The trip blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and location identity will be assigned to each trip sample and it will be submitted blind to the laboratory.

7.7.2 Assessment of Sample Variability

Double volume groundwater samples collected at the following sample locations will be identified for use as an assessment of sample varaibility. During each visit, duplicate groundwater samples will be collected at the following sample locations:

- BH114A
- BH204AD
- BH919
- EX10
- EX23

Duplicate samples will be collected from these locations because the locations have previously exhibited a range of concentrations of contaminants in the groundwater samples collected, from moderate to high.

When collecting duplicate water samples, bottles with the two different sample identification numbers will alternate in the filling sequence. Bottles for one type of analysis will be filled before bottles for the next analysis are filled. Volatiles will always be filled first.

Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separates ample number and location identity will be assigned to each duplicate, and it will be submitted blind to the laboratory.

7.7.3 Quality Control

Quality Assurance/ QC at the laboratory will be carried out as part of their standard procedures.

7.8 Field Variances

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. Modifications to the approved plan will be documented in the sampling project report.

7.9 Health and Safety Procedures

ARCADIS will prepare task-specific method statements and risk assessments specific to the Site, to supplement the existing ARCADIS Site-specific health and safety plan.

The method statements and health & safety plan will specify, among other issues, PPE requirements and the means personnel decontamination. The health and safety plan will specifically include a Hazard Safety Assessment (HSA) that clearly defines potential hazards and mitigation measures by work step.

7.10 Recommendations for Implementation

In order to implement the groundwater monitoring programme, ARCADIS recommends the following steps:

- Discussion and Review of Strategy – agreement of monitoring schedule with EA and Torfaen County Borough Council.
- Implementation of the Year 1 groundwater monitoring programme. Recommendations for following years will be made after evaluation of the first year results.

8 CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

ARCADIS was commissioned by Meritor to undertake a Site-wide baseline groundwater monitoring visit at the Site. A one-off groundwater monitoring visit was undertaken to establish groundwater conditions across the Site, prior to the proposed remediation works. In addition, laboratory analysis was performed for biogeochemical parameters to assess the potential for natural attenuation processes to be occurring beneath the Site.

The data obtained during this baseline groundwater monitoring visit has been used to determine a future periodic groundwater monitoring programme for the Site.

The future monitoring and remediation works at the Site will be focused on Zone 3 and the driver for remediation in Zone 3 is considered to be the protection of water resource receptors associated with the Site. However, the remediation of the Site will also be beneficial for the associated human health receptors, and the CSM should be revisited, and refined if appropriate, as remediation works are implemented.

8.2 Recommendations

ARCADIS recommend the following:

- A theoretical LNAPL assessment is undertake to further assess the suitability of the proposed extraction techniques for addressing the LNAPL beneath the Zone 3 (*e.g.* potential recoverability, mobility in the sub-surface).

- Pilot testing of appropriate remediation techniques in the southern yard to begin to recover LNAPL from the sub-surface and to obtain data to enable the full-scale system design of an oil recovery and hydraulic containment system for Zone 3.

- Revisiting and updating of the DQRA, if appropriate, based on the findings of the next stages of data collection, to support the development of the risk management strategy for the Site. This may result in a need to revisit and update the ROA.

9 STUDY LIMITATIONS

IMPORTANT. This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report

1. This report has been prepared by ARCADIS(UK) Limited (ARCADIS), with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with Meritor Heavy Vehicle Braking Systems (UK) Limited (the 'Client') and Meritor, Inc. ARCADIS does not accept responsibility for any matters outside the agreed scope.

2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.

3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. ARCADIS are unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have unpublished, more stringent objectives. Further work may be required by these parties.

4. All work carried out in preparing this report has used, and is based on, ARCADIS' professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice, pending changes in legislation, of which ARCADIS is aware, have been considered. Following delivery of the report, ARCADIS have no obligation to advise the Client or any other party of such changes or their repercussions.

5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6. Whilst this report and the opinions made are correct to the best of ARCADIS' belief, ARCADIS cannot guarantee the accuracy or completeness of any information provided by third parties.

7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have been received.

8. This report refers, within the limitations stated, to the condition of the Site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the Site since the time of the investigation.

9. The content of this report represents the professional opinion of experienced environmental consultants. ARCADIS does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by Site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the Site have not been investigated.

11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on Site.

12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issues.

13. Unless otherwise stated, samples from the Site (soil, groundwater, building fabric or other samples) have NOT been analysed or assessed for waste classification purposes.

TABLES

Table 1
Summary of the Measured Concentrations of CoC in Groundwater Exceeding the SSAC Protective of Human Health Receptors

Zone	Contaminant	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Zone 1	-	None of the measured concentrations of CoC exceeded the SSAC protective of human health in Zones 1 & 2
Zone 2	-	
Zone 3	Vinyl chloride	**Alluvium:** BH118, BH119, BH204AS, BH400, BH912, BH919, BH919 Duplicate, BH921, EX3, EX4, EX6 and EX7
Zone 3		**Raglan Marl Group:** BH204AD, BH305, EX1 and EX2
Off-Site	-	None of the measured concentrations of CoC exceeded the SSAC protective of human health in the Off-Site locations

Notes

CoC	Contaminant of Concern
SSAC	Site-Specific Assessment Criteria
-	None of the measured concentrations of CoC exceeded the SSAC

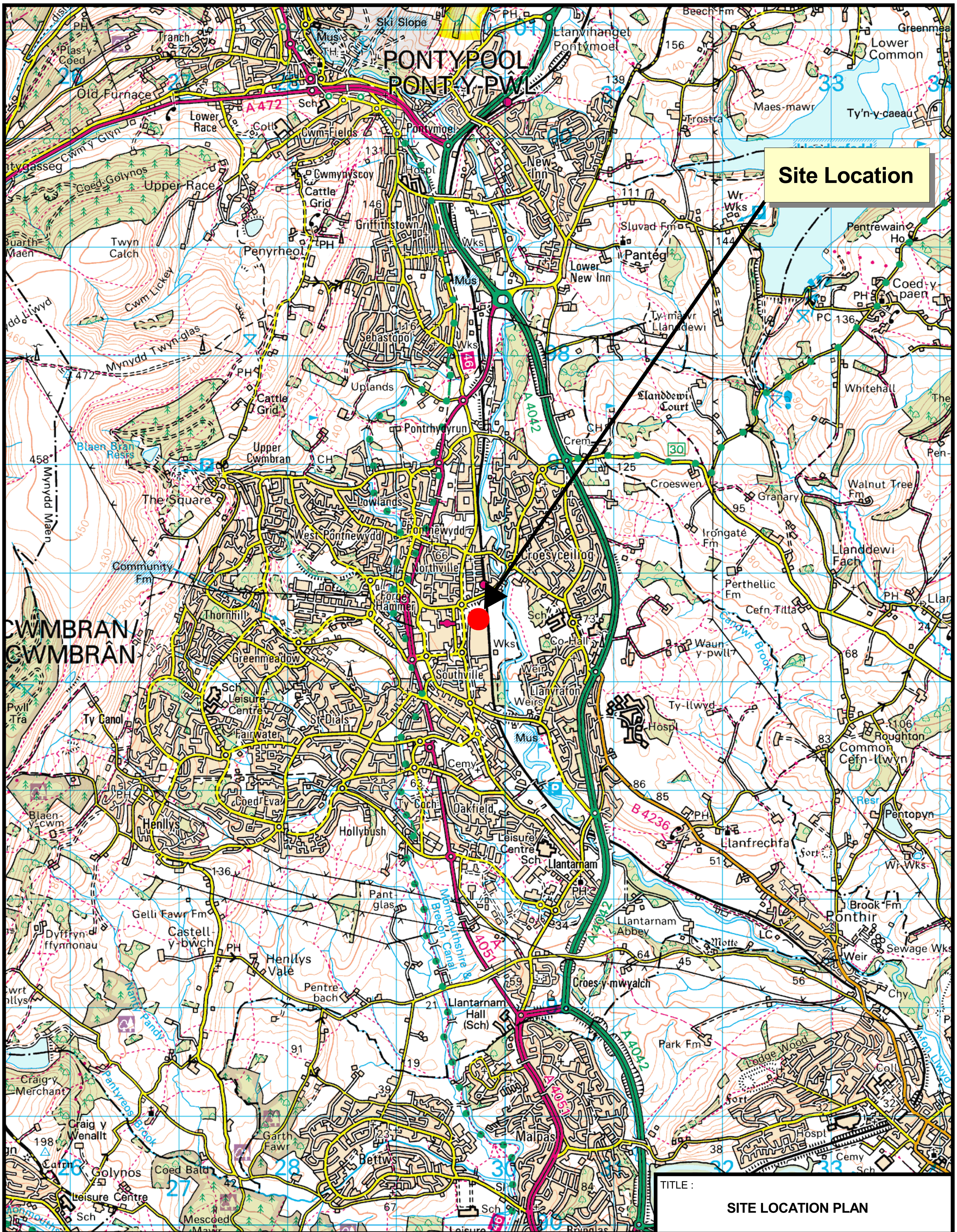
Table 2
Summary of the Measured Concentrations of CoC in Groundwater Exceeding the SSAC Protective of Water Resource Receptors

Zone	Source Area	Contaminant	Monitoring Wells where Measured Concentrations of CoC Exceed SSAC
Zone 1	NA	-	None of the measured concentrations of CoC exceeded the SSAC protective of water resource in Zone 1
Zone 2	2	*cis*-DCE	**Alluvium:** BH104 and BH203S
		TCE	**Alluvium:** BH104 and BH203S
	3R	Vinyl chloride	**Alluvium:** BH926
		cis-DCE	**Alluvium:** BH926
		TCE	**Alluvium:** BH926 & BH927
Zone 3	3R	Vinyl chloride	**Alluvium:** BH131, BH301S, BH912 and BH925
			Raglan Marl Group: BH301D
		cis-DCE	**Alluvium:** BH131, BH301S, BH912 and BH925
			Raglan Marl Group: BH301D
		TCE	**Alluvium:** BH131, BH132, BH301S and BH925
			Raglan Marl Group: BH301D
	4R	Vinyl chloride	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH904, BH917, BH919, BH919 Duplicate, BH921, BH922, BH923, EX12, EX13, EX14 and EX15
			Raglan Marl Group: BH302D
		trans-DCE	**Alluvium:** BH919, BH919 Duplicate and BH921
		cis-DCE	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH919, BH919 Duplicate, BH921, BH922, EX12, EX13, EX14 and EX15
			Raglan Marl Group: BH302D
		TCE	**Alluvium:** BH122, BH135, BH136, BH402, BH901, BH903, BH904, BH917, BH919, BH919 Duplicate, BH921, BH922, EX12, EX13 and EX14
			Raglan Marl Group: BH302D
		PCE	**Alluvium:** BH402, EX12, EX13 and EX14
			Raglan Marl Group: BH302D
	5	Vinyl chloride	**Alluvium:** BH102, BH103, BH107, BH303S, EX20 and EX21
			Raglan Marl Group: BH303D
		cis-DCE	**Alluvium:** BH102, BH103, BH107, BH303S, EX20 and EX21
			Raglan Marl Group: BH303D
		TCE	**Alluvium:** BH107 and EX21
	6R	*cis*-DCE	**Raglan Marl Group:** BH205AD
		TCE	**Raglan Marl Group:** BH205AD
	7R	Vinyl chloride	**Alluvium:** BH109, BH118, BH119, BH204AS, BH400, EX3, EX4, EX6, EX7 and EX8
			Raglan Marl Group: BH204AD, BH304S, BH304D, BH305, EX1, EX2 and EX5
		trans-DCE	**Alluvium:** BH119, BH204AS, BH400, EX3 and EX6
			Raglan Marl Group: BH204AD, BH304D and BH305
		cis-DCE	**Alluvium:** BH109, BH118, EX4, EX7 and EX8
			Raglan Marl Group: BH304S, BH304D, EX1 and EX5
		TCE	**Alluvium:** BH109, BH119, BH204AS, EX03, EX6, EX7 and EX8
			Raglan Marl Group: Raglan Marl Group: BH304S, BH304D, EX1, EX2 and EX5
		PCE	**Alluvium:** , BH400 and EX8
			Raglan Marl Group: BH204AD, BH304S, BH304D and BH305
	8R	-	None of the measured concentrations of CoC exceeded the SSAC protective of water resources in Source Area 8R.
	9R	*p/m*-xylene	**Alluvium:** BH921
	10R	-	None of the measured concentrations of CoC exceeded the SSAC protective of water resources in Source Area 10R.
Off-Site	7R	Vinyl chloride	**Alluvium:** BHOS411
			Raglan Marl Group: BHOS306S & BHOS306D
		cis-DCE	**Alluvium:** BHOS411
			Raglan Marl Group: BHOS306S & BHOS306D
		TCE	**Alluvium:** BHOS411
			Raglan Marl Group: BHOS306S & BHOS306D

Notes

CoC	Contaminant of Concern
SSAC	Site-Specific Assessment Criteria
-	None of the measured concentrations of CoC exceeded the SSAC
NA	No SSAC were derived in relation to Zone 1, as the results of risk assessment demonstrated the concentrations of CoC do not present significant level of risk to water resource receptors associated with the Site.
TCE	Trichloroethene
cis-DCE	*cis*- dichloroethene
trans-DCE	*trans*-dichloroethene
PCE	Tetrachloroethene

FIGURES



LEGEND	NOTES
● SITE LOCATION	

TITLE : SITE LOCATION PLAN

SITE : CWMBRAN

CLIENT : MERITOR HVBS (UK) LTD

PROJECT :	90936.29	FIGURE 1	
DATE :	25/03/11	DRAWN BY :	RJM
DRG No :	909362906.apr / SLP		
SCALE :	1 : 50,000	PRINT :	A4

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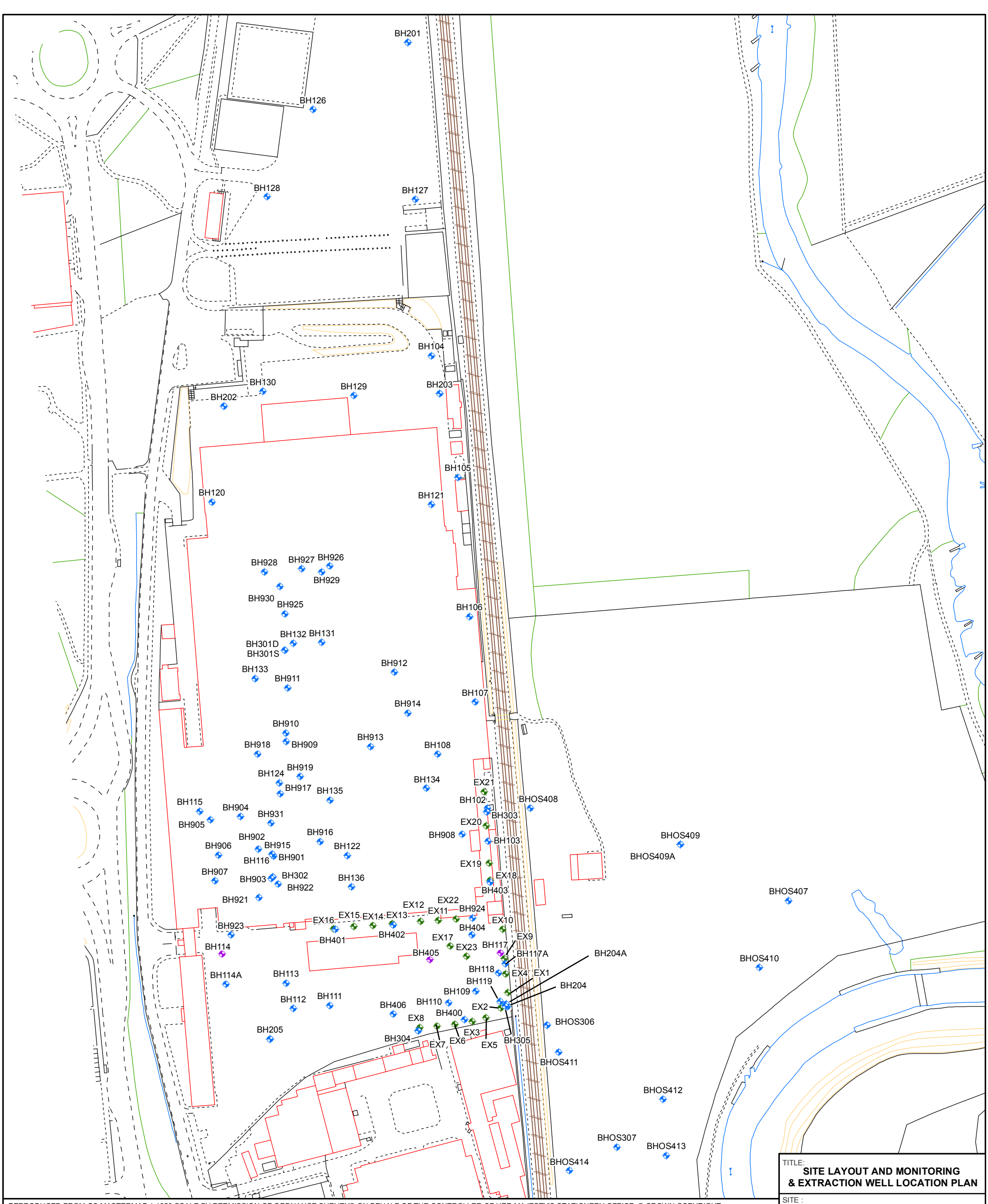

LEGEND

- BOREHOLE, NO MONITORING WELL INSTALLED
- MONITORING WELL
- EXTRACTION WELL

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 10 20 40 60 80 100 Metres

N

TITLE:
SITE LAYOUT AND MONITORING & EXTRACTION WELL LOCATION PLAN

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 2**	
DATE :	04/03/11	DRAWN BY :	RJM
DRG No. :	909362904 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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LEGEND

- SITE BOUNDARY
- ZONE 1: REDEVELOPMENT FOR SUPERMARKET AND PETROL FILLING STATION
- ZONE 2: REDEVELOPMENT FOR MIXED COMMERCIAL END-USE
- ZONE 3: REFURBISHMENT OF MERITOR FACILITY (REDUCED FOOTPRINT)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 10 20 40 60 80 100 Metres

N

TITLE:
FUTURE REDEVELOPMENT AREAS

SITE :
CWMBRAN

CLIENT :
MERITOR HVBS (UK) LIMITED

PROJECT :	**90936.29**	**FIGURE 3**	
DATE :	25/05/11	DRAWN BY :	ASZ
DRG No. :	909362911 GIS		
SCALE :	**1 : 2,250**	PRINT :	**A3**

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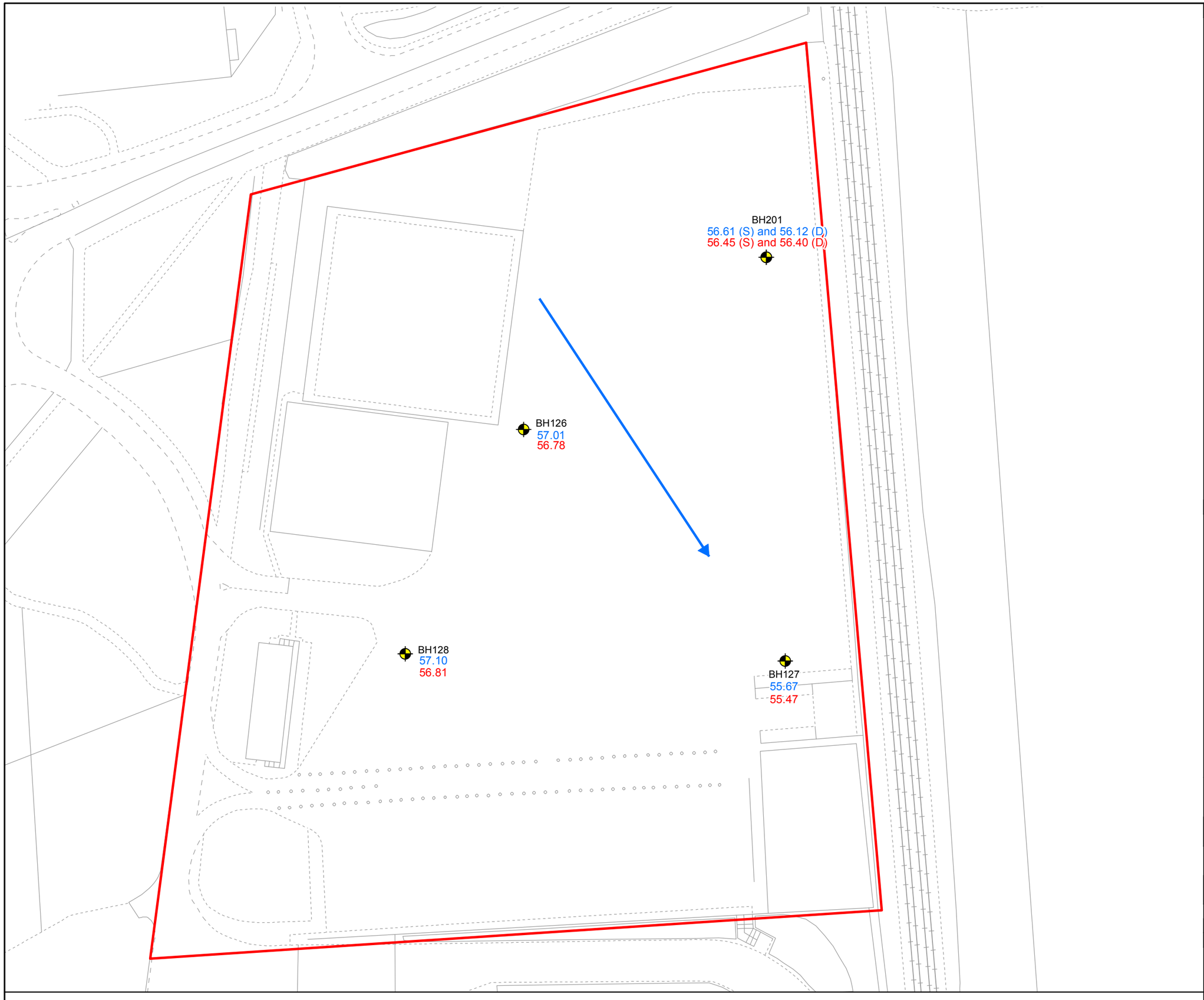

LEGEND

- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- APPROXIMATE ZONE 1 BOUNDARY
- 99.99 GROUNDWATER ELEVATION (11-12th JAN 2011)
- INFERRED GROUNDWATER FLOW DIRECTION
- 99.99 GROUNDWATER ELEVATION (FEB - MAR 2011)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

S = SHALLOW INSTALLATION
D = DEEP INSTALLATION

0 3 6 12 18 24 30 Metres

N

TITLE:
GROUNDWATER ELEVATION AND FLOW DIRECTION PLAN - ZONE 1

SITE :
CWMBRAN

CLIENT :
MERITOR HVBS (UK) LIMITED

PROJECT :	**90936.29**	**FIGURE 4**	
DATE :	01/10/10	DRAWN BY :	ASZ
DRG No. :	909362907 GIS		
SCALE :	**1 : 800**	PRINT :	**A3**

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LEGEND

- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- APPROXIMATE ZONE 2 BOUNDARY
- 99.99 GROUNDWATER ELEVATION (11-12th JAN 2011)
- INFERRED GROUNDWATER FLOW DIRECTION
- 99.99 GROUNDWATER ELEVATION (FEB - MAR 2011)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

NM = NOT MEASURED
S = SHALLOW INSTALLATION
D = DEEP INSTALLATION

0 2 4 8 12 16 20 Metres

N

TITLE:
GROUNDWATER ELEVATION AND FLOW DIRECTION PLAN - ZONE 2

SITE :
CWMBRAN

CLIENT :
MERITOR HVBS (UK) LIMITED

PROJECT :	**90936.29**	**FIGURE 5**	
DATE :	01/10/10	DRAWN BY :	ASZ
DRG No. :	909362908 GIS		
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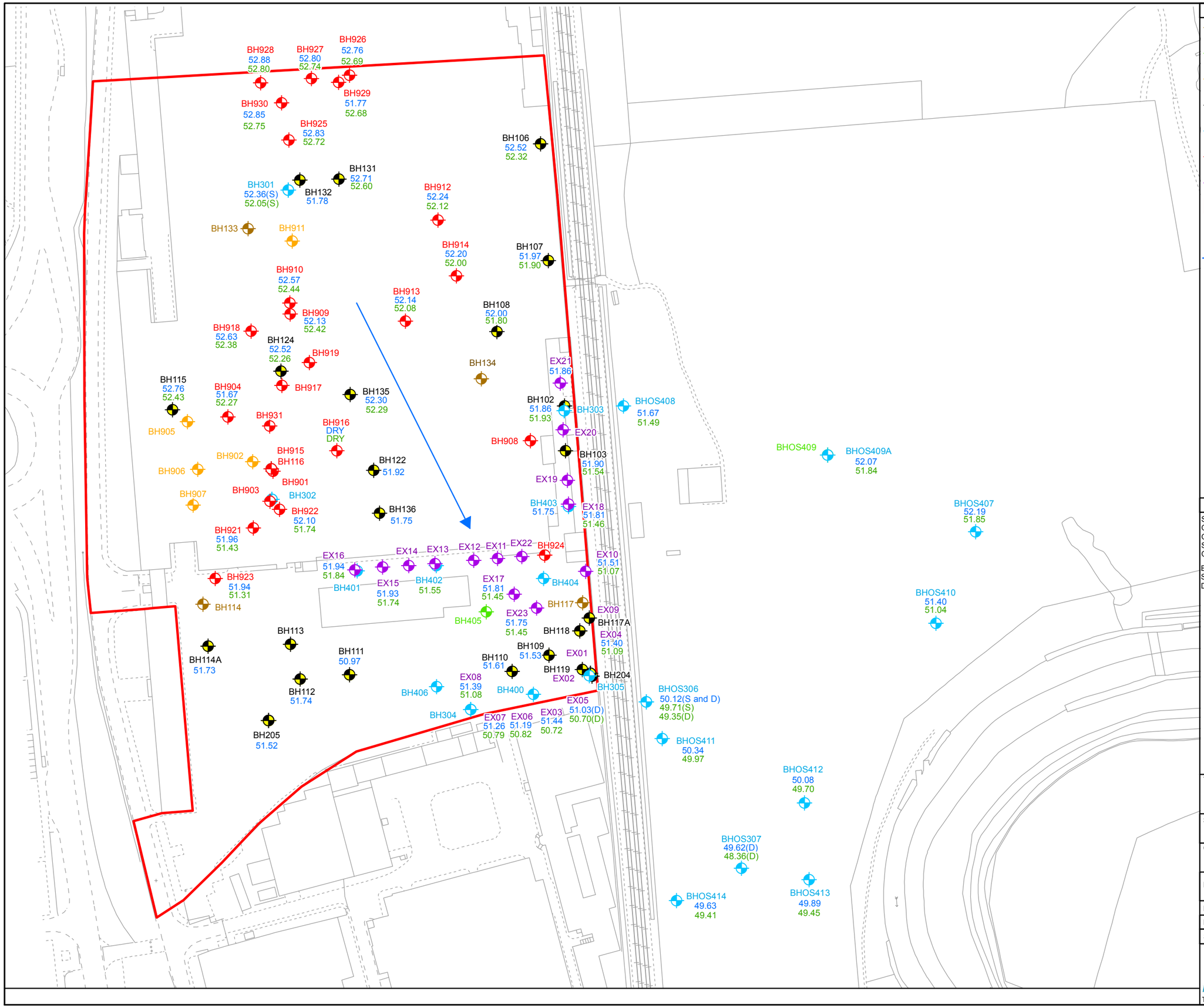

LEGEND

- BOREHOLE LOCATION PHASE II ESA
- BOREHOLE LOCATION PHASE IIB ESA
- BOREHOLE LOCATION SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION PHASE II ESA
- MONITORING WELL LOCATION PHASE IIB ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- ZONE 3 BOUNDARY
- 99.99 GROUNDWATER ELEVATION (11-12th JAN 2011)
- 99.99 GROUNDWATER ELEVATION (FEB-MAR 2011)
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED
S = SHALLOW INSTALLATION
D = DEEPER INSTALLATION

0 5 10 20 30 40 50 Metres

N

TITLE:
GROUNDWATER ELEVATION AND FLOW DIRECTION PLAN - ZONE 3

SITE :
CWMBRAN

CLIENT :
MERITOR HVBS (UK) LIMITED

PROJECT :	90936.29	FIGURE 6	
DATE :	25/05/11	DRAWN BY :	ASZ
DRG No. :	909362917 GIS		
SCALE :	1 : 1,500	PRINT :	A3

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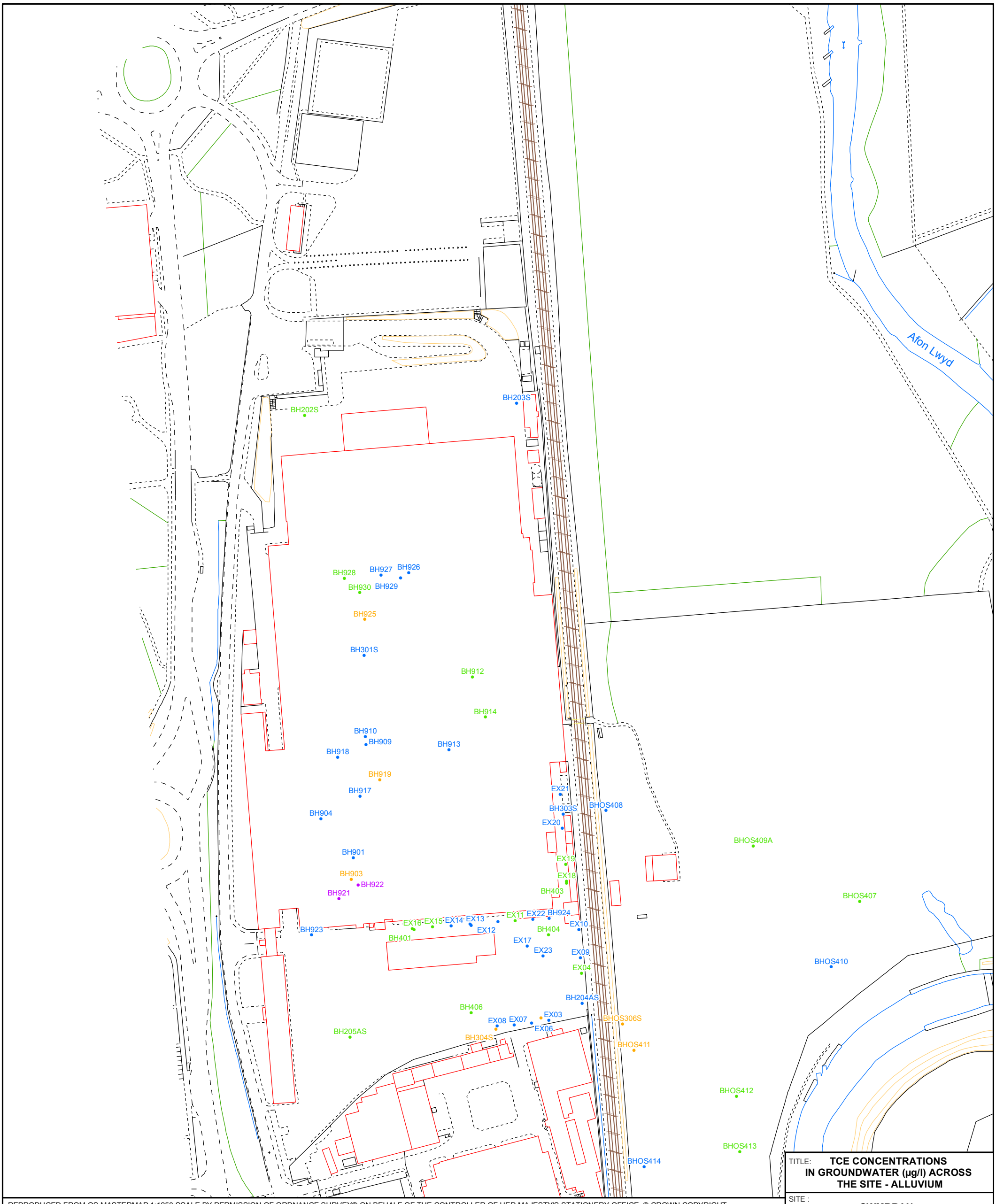

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LEGEND

- < 3 (µg/l)
- 3 - 10,000 (µg/l)
- 10,000 - 50,000 (µg/l)
- 50,000 - 100,000 (µg/l)
- > 100,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **TCE CONCENTRATIONS IN GROUNDWATER (µg/l) ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 7**	
DATE :	14/06/11	DRAWN BY :	RJM
DRG No. :	909362920 GIS		
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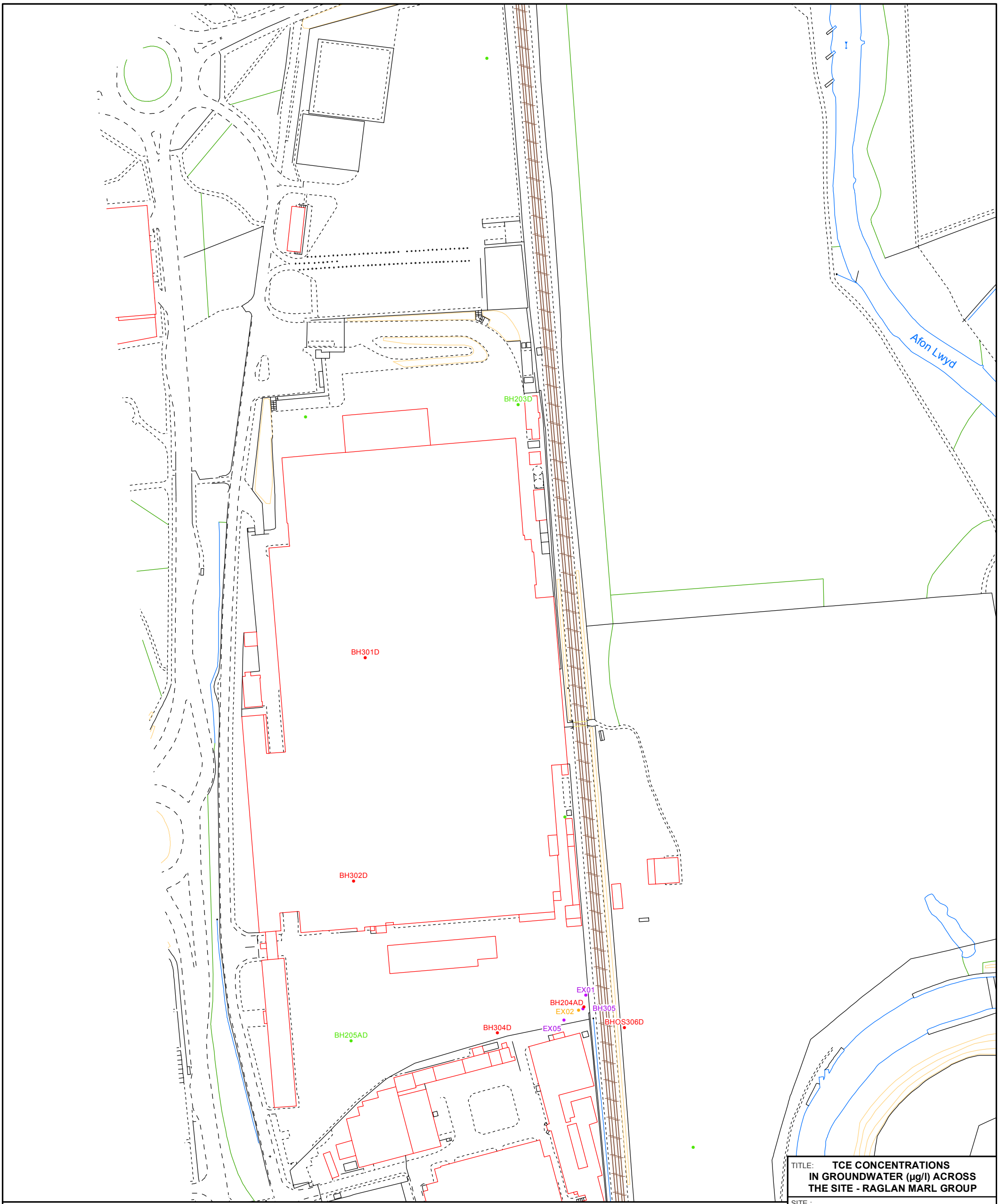

LEGEND

- 3 - 500 (µg/l)
- 500 - 1,000 (µg/l)
- 1,000 - 5,000 (µg/l)
- 5,000 - 20,000 (µg/l)
- > 20,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **TCE CONCENTRATIONS IN GROUNDWATER (µg/l) ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 8**	
DATE :	14/06/11	DRAWN BY :	RJM
DRG No. :	909362919 GIS		
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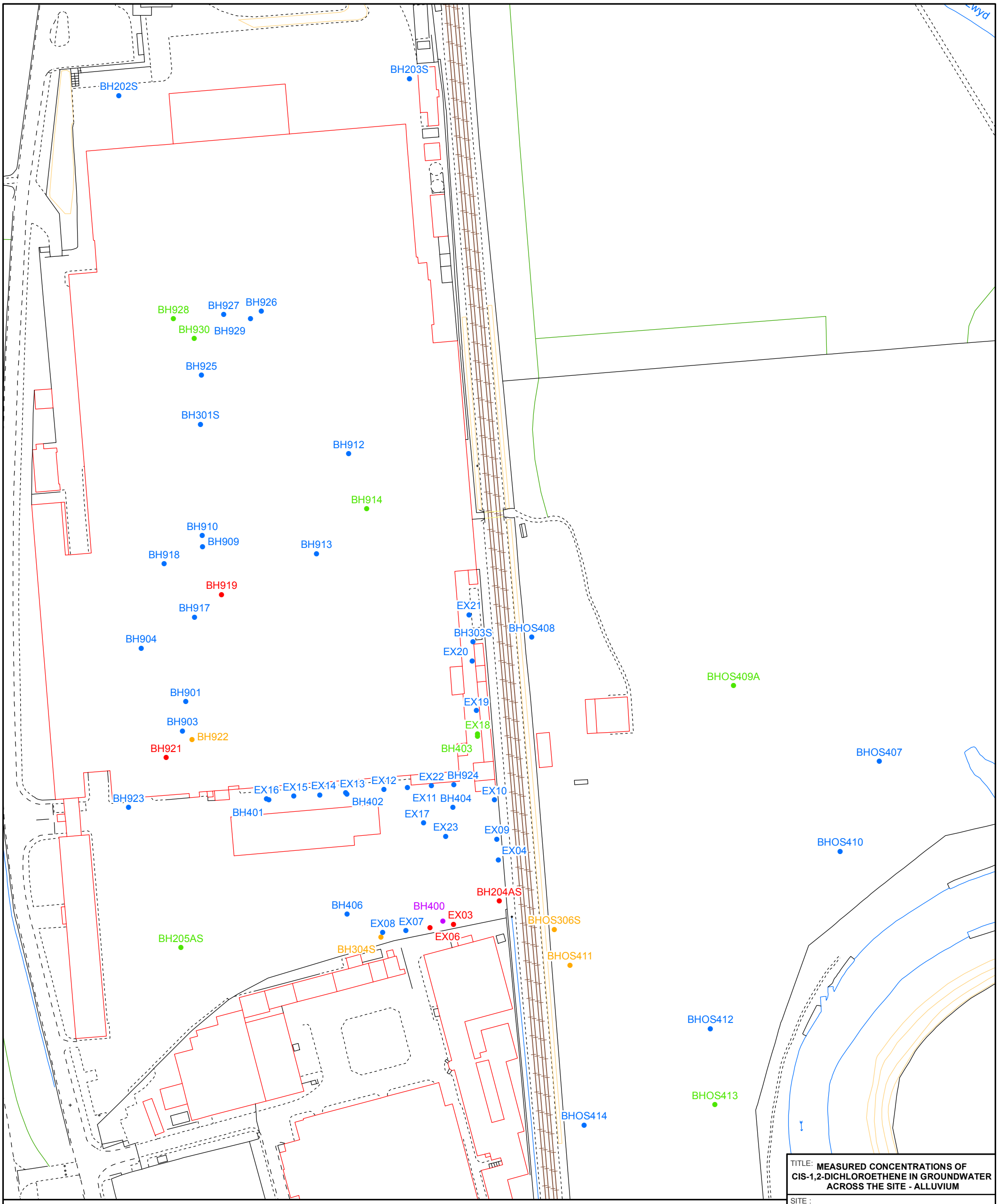

LEGEND

- < 3 (µg/l)
- 3 - 10,000 (µg/l)
- 10,000 - 50,000 (µg/l)
- 50,000 - 100,000 (µg/l)
- > 100,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF CIS-1,2-DICHLOROETHENE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 9**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362922 GIS		
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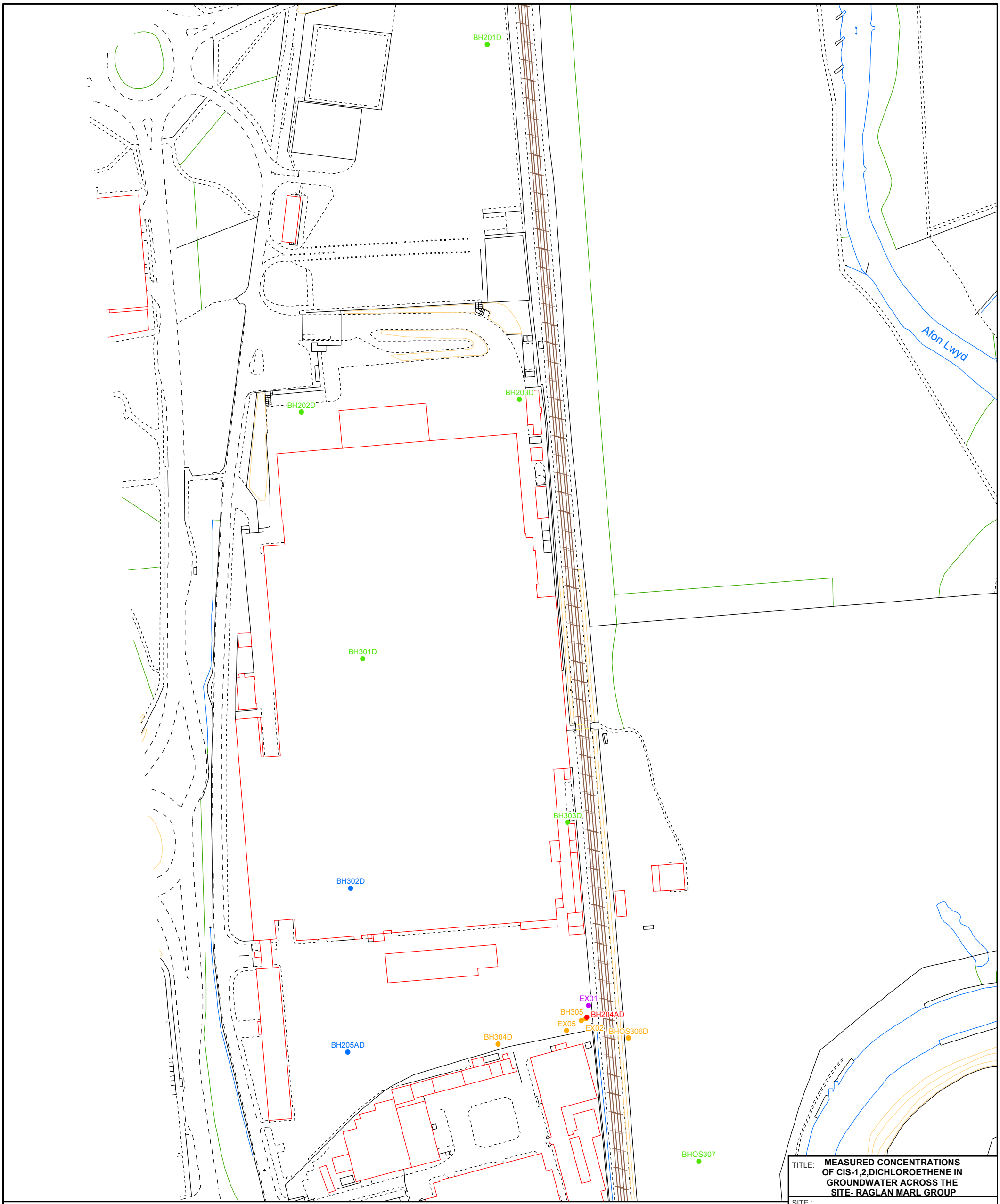

LEGEND

- < 1,000 (µg/l)
- 1,000 - 10,000 (µg/l)
- 10,000 - 50,000 (µg/l)
- 50,000 - 100,000 (µg/l)
- > 100,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF CIS-1,2,DICHLOROETHENE IN GROUNDWATER ACROSS THE SITE- RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 10**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362924 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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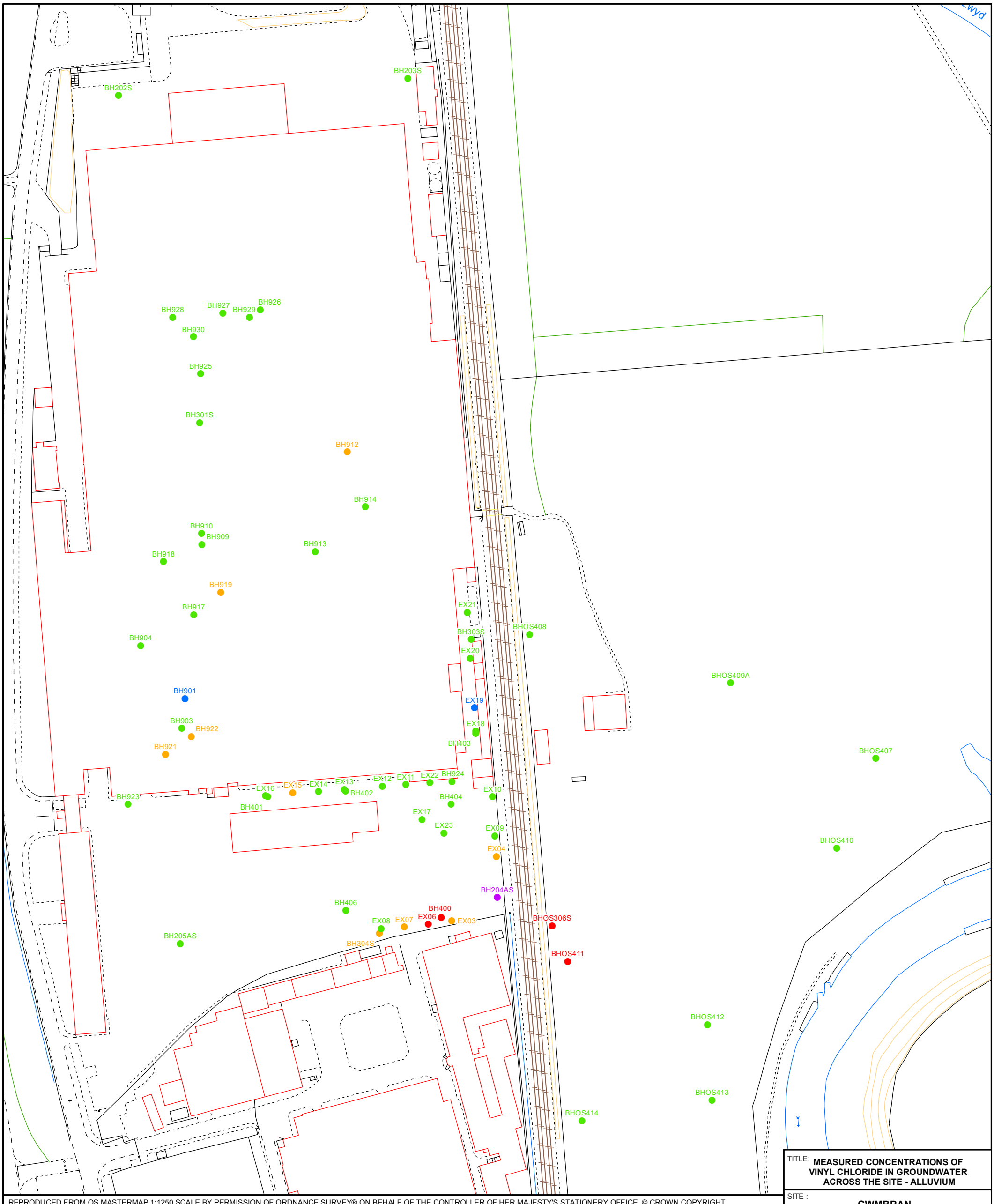

LEGEND

- < 500 (µg/l)
- 500 - 1,000 (µg/l)
- 1,000 - 5,000 (µg/l)
- 5,000 - 20,000 (µg/l)
- > 20,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 10 20 40 60 80 100 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF VINYL CHLORIDE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 11**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362929 GIS		
SCALE :	**1 : 1,500**	PRINT :	**A3**

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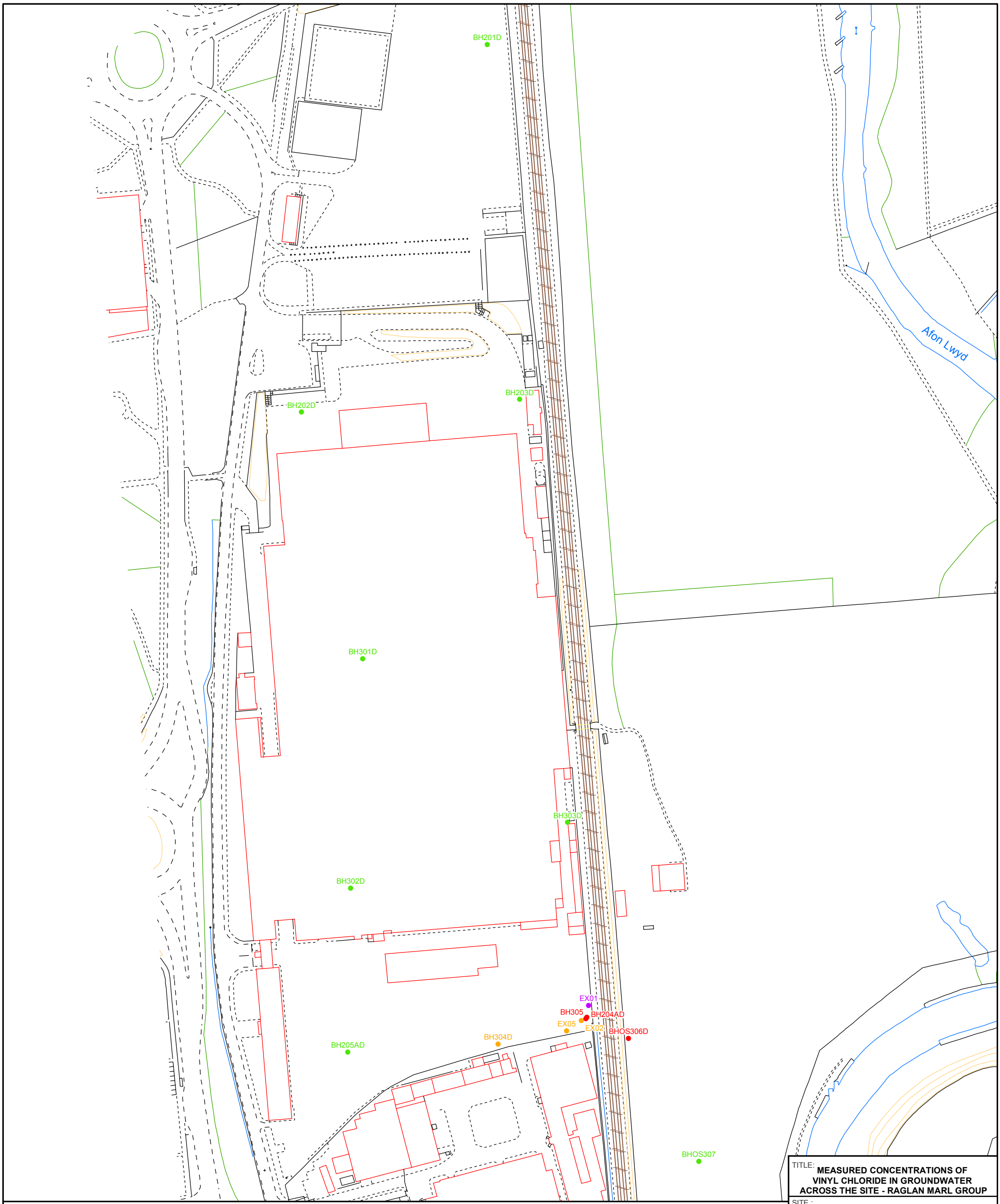

LEGEND

- < 500 (µg/l)
- 500 - 1,000 (µg/l)
- 1,000 - 10,000 (µg/l)
- 10,000 - 20,000 (µg/l)
- > 20,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF VINYL CHLORIDE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 12**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362927 GIS		
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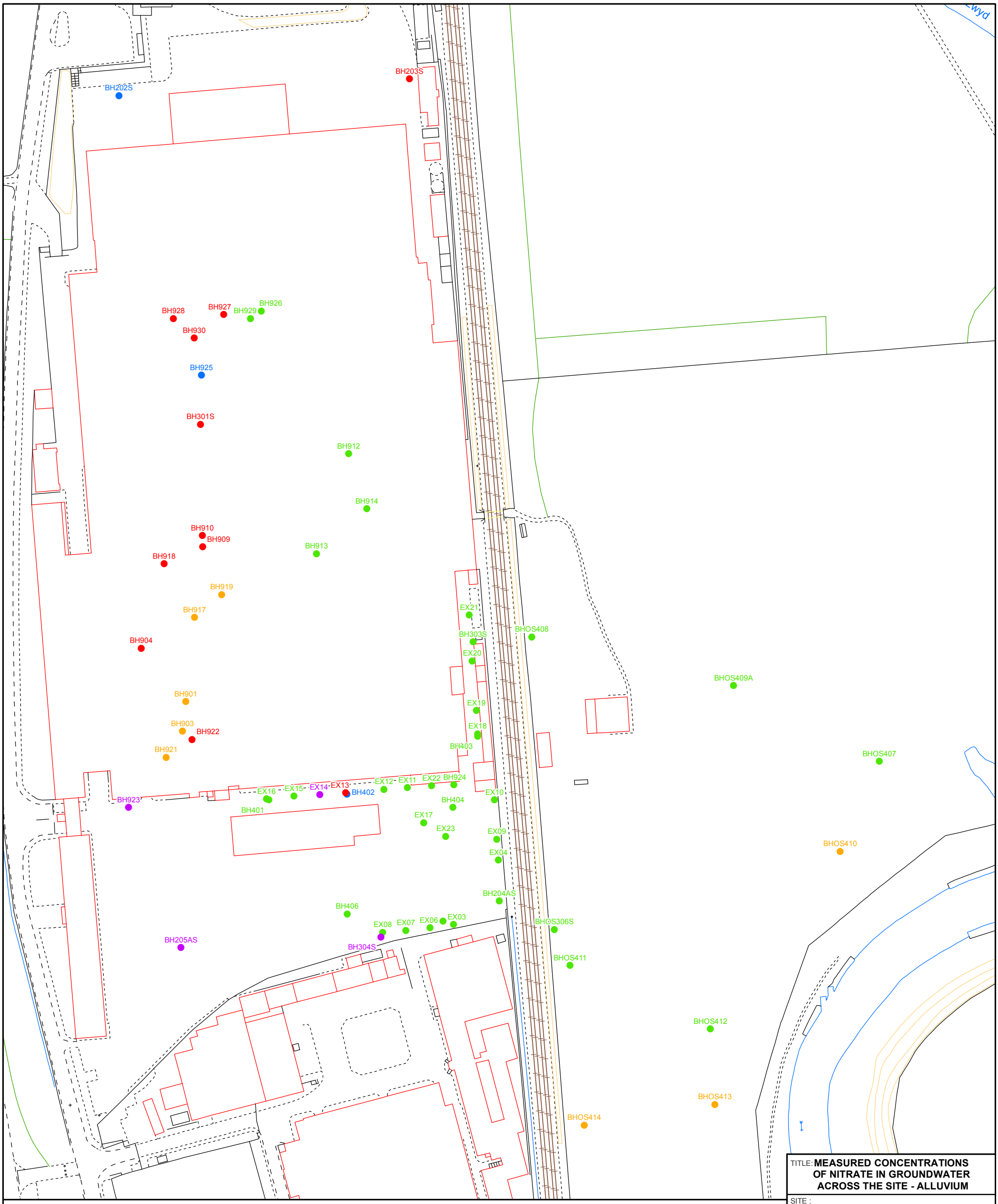

LEGEND

- < 500 (µg/l)
- 500 - 1,000 (µg/l)
- 1,000 - 5,000 (µg/l)
- 5,000 - 15,000 (µg/l)
- > 15,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF NITRATE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 13**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362931 GIS		
SCALE :	**1 : 1,500**	PRINT :	**A3**

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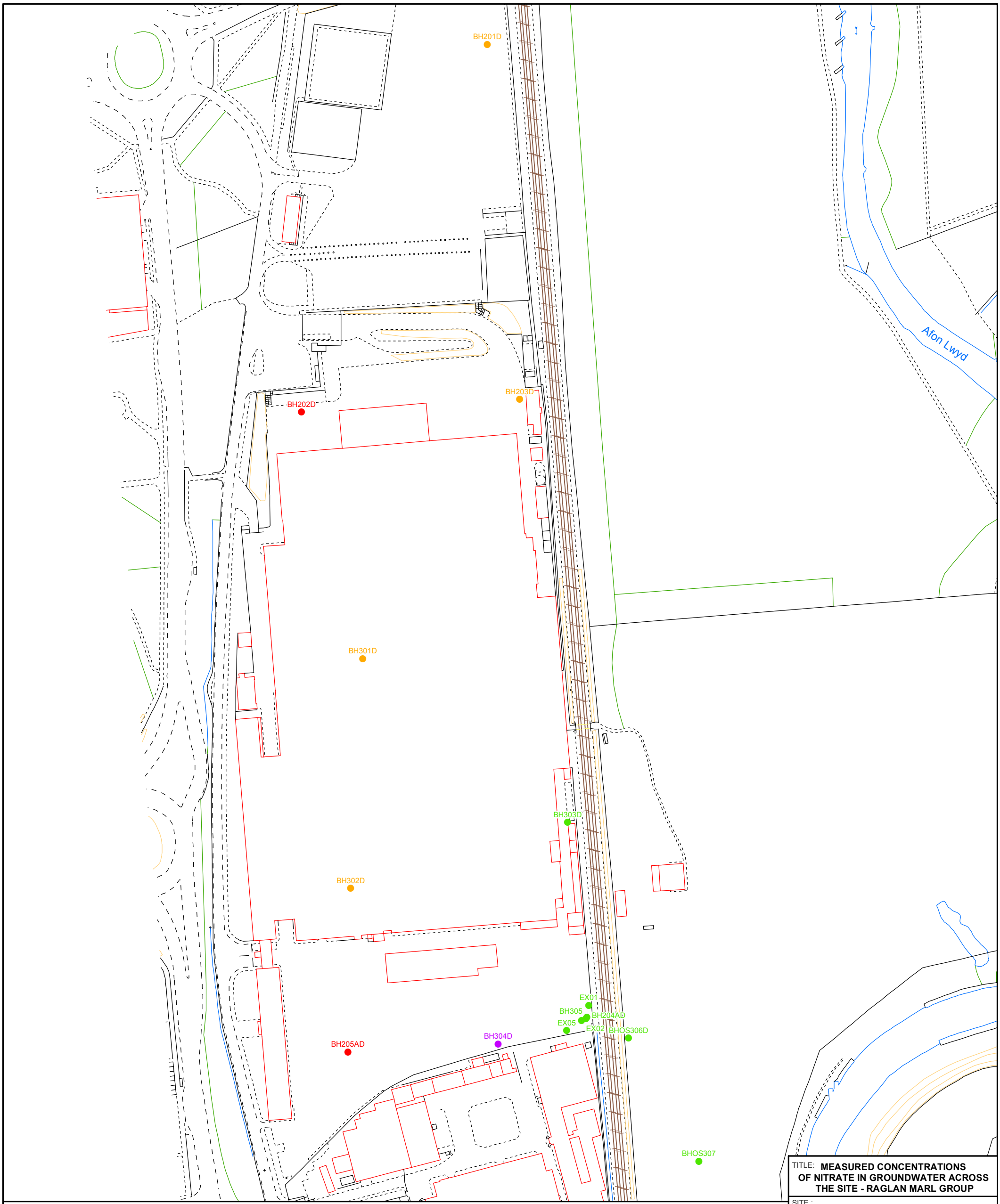

LEGEND

- < 500 (µg/l)
- 500 - 1,000 (µg/l)
- 1,000 - 5,000 (µg/l)
- 5,000 - 20,000 (µg/l)
- > 20,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF NITRATE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 14**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362934 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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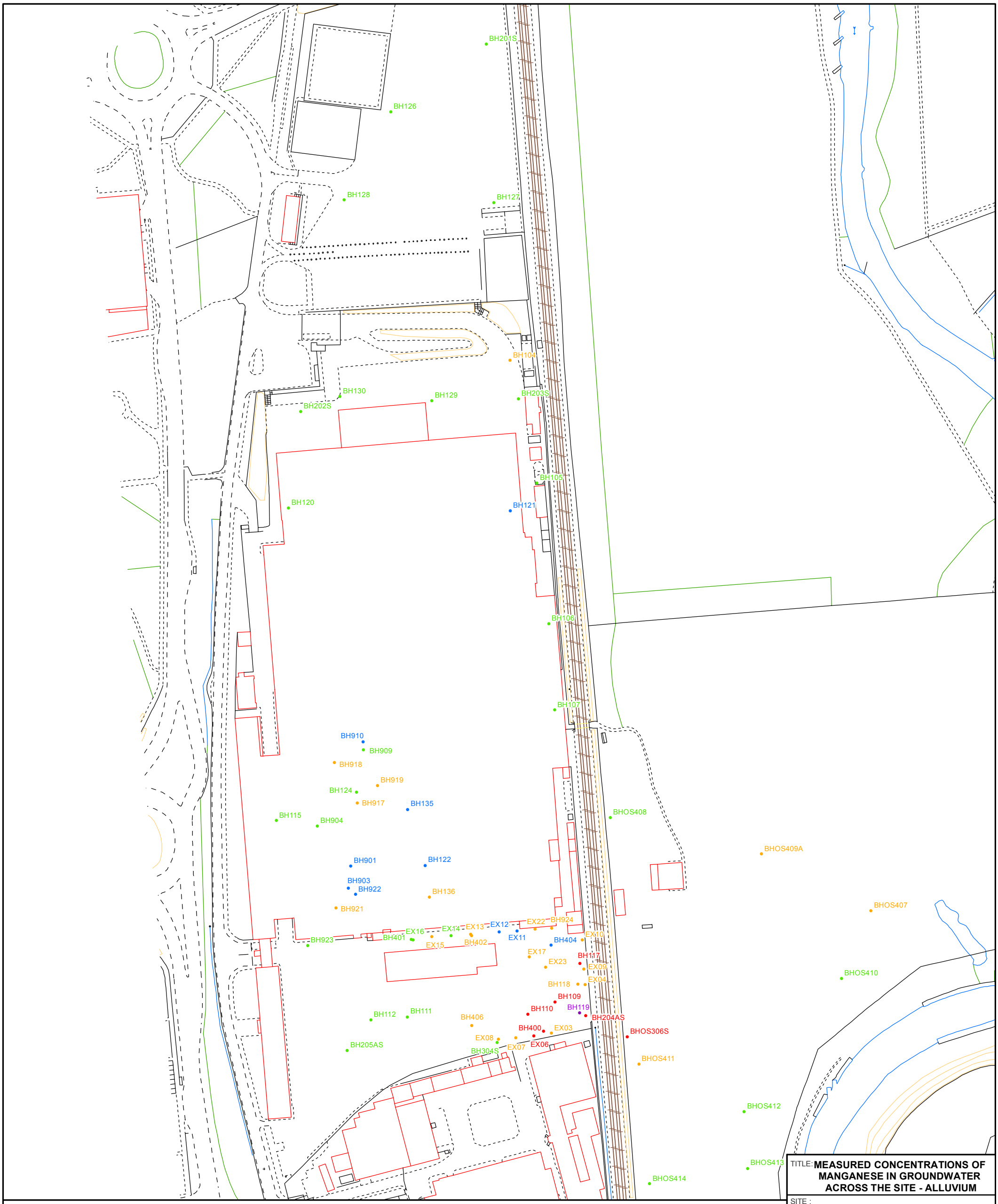

LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 5,000 µg/l
- 5,000 - 20,000 µg/l
- > 20,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: MEASURED CONCENTRATIONS OF MANGANESE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 15**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362930 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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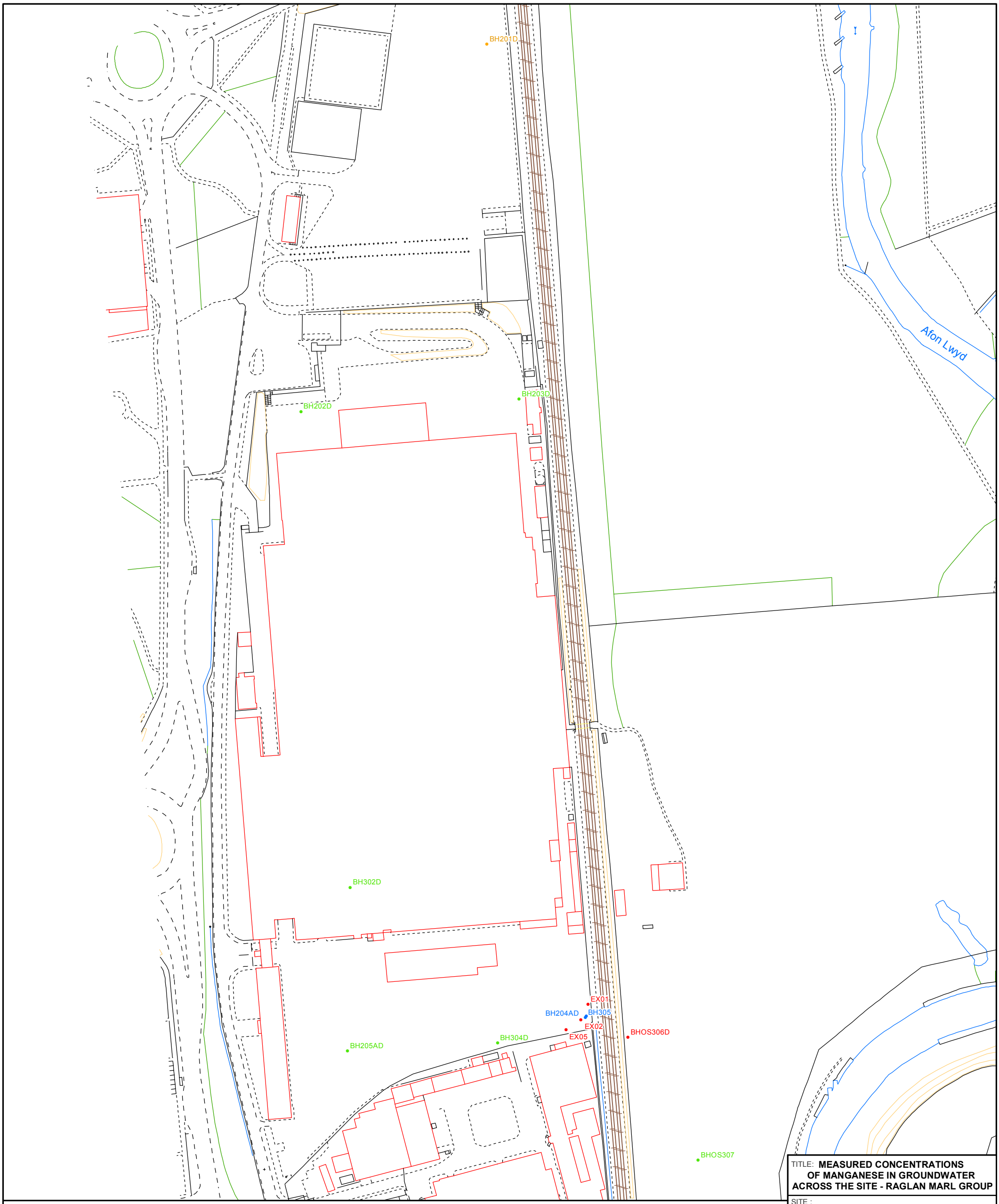

LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 5,000 µg/l
- 5,000 - 20,000 µg/l
- > 20,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF MANGANESE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 16**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362928 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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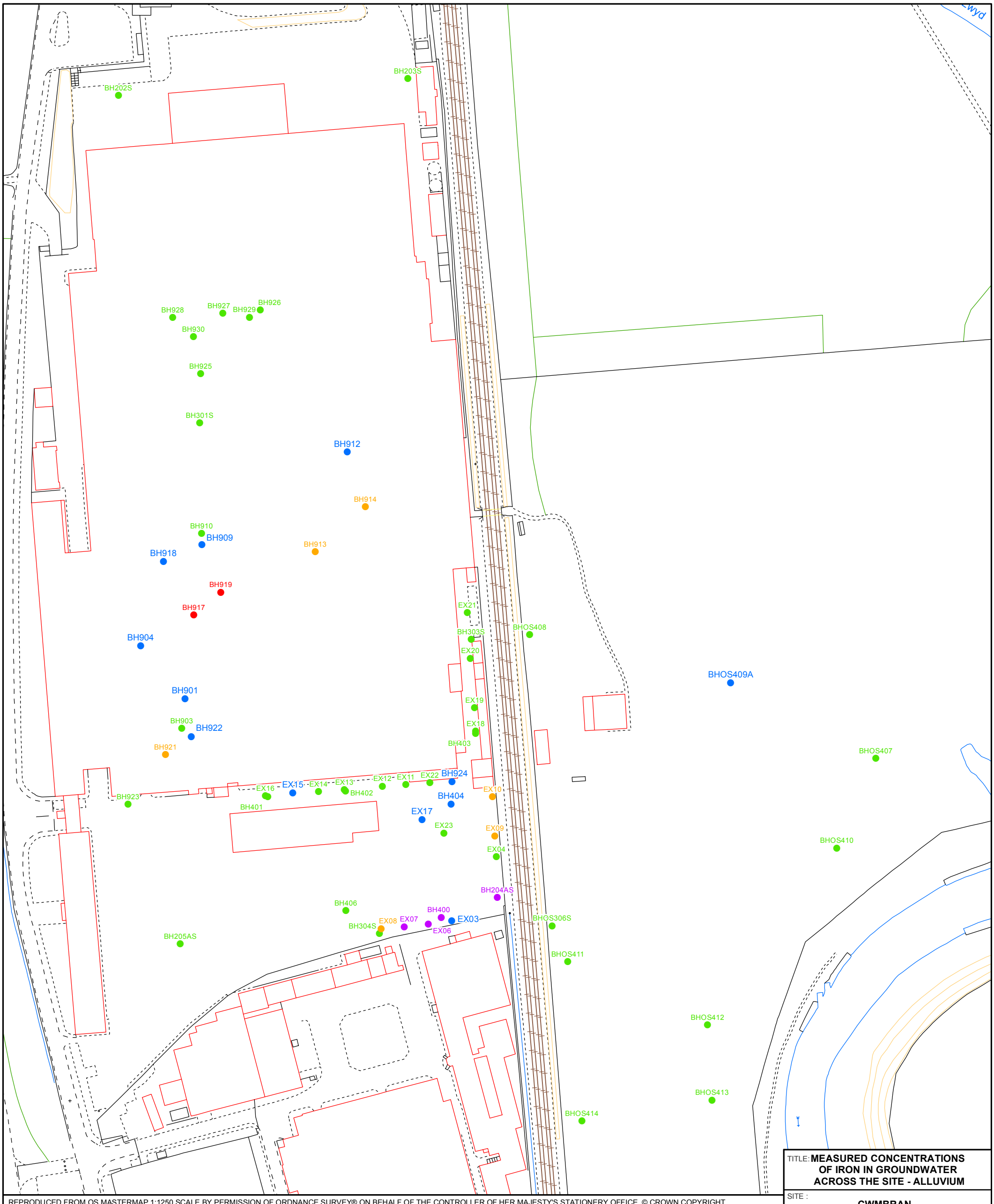

LEGEND

- < 100 (µg/l)
- 100 - 5,000 (µg/l)
- 5,000 - 10,000 (µg/l)
- 10,000 - 20,000 (µg/l)
- > 20,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF IRON IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT : **90936.29** | **FIGURE17**

DATE : 15/06/11 | DRAWN BY : RJM

DRG No. : 909362936 GIS

SCALE : **1 : 1,500** | PRINT : **A3**

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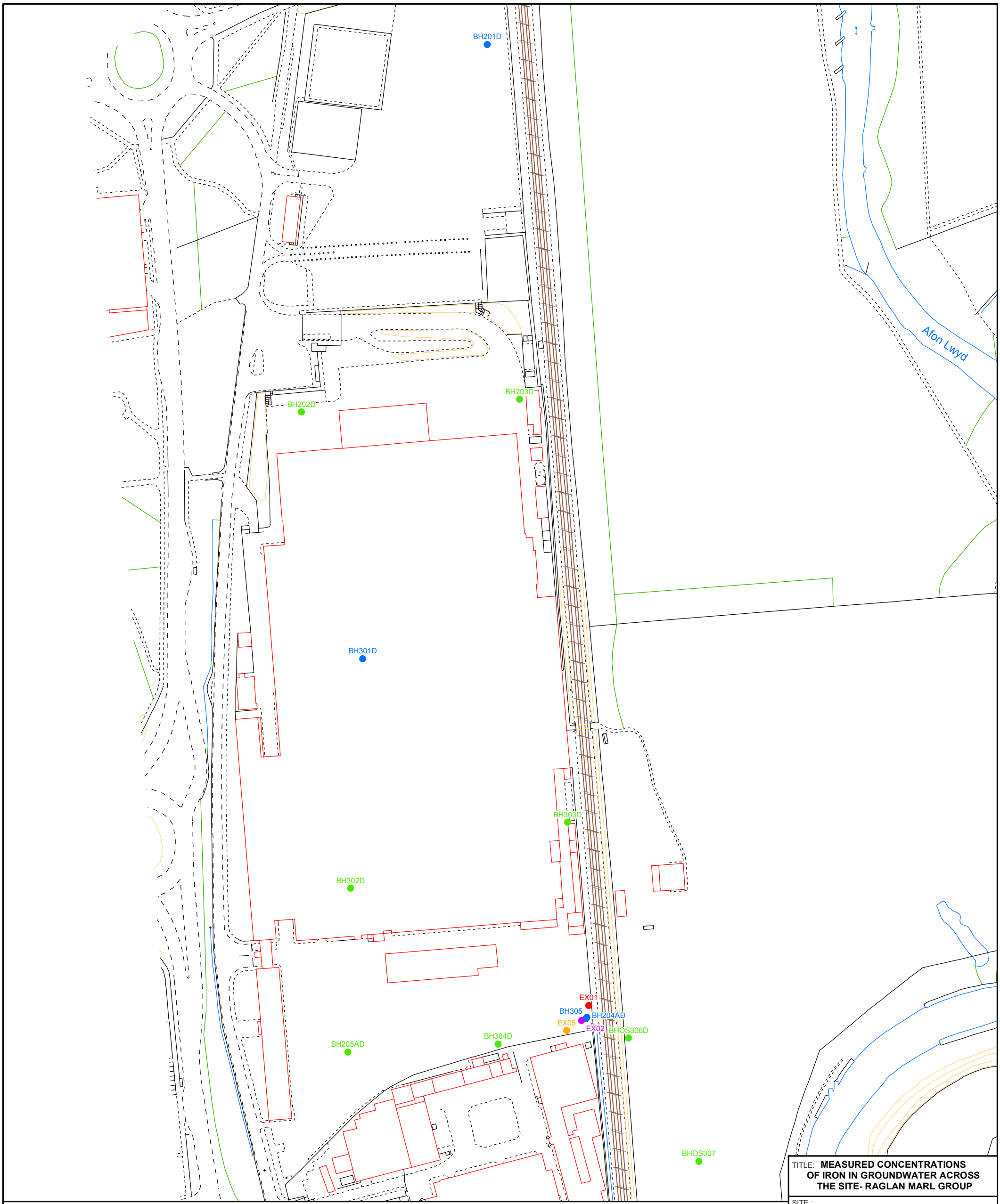

LEGEND

- < 100 (µg/l)
- 100 - 1,000 (µg/l)
- 1,000 - 2,500 (µg/l)
- 2,500 - 5,000 (µg/l)
- > 5,000 (µg/l)

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF IRON IN GROUNDWATER ACROSS THE SITE- RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 18**	
DATE :	15/06/11	DRAWN BY :	RJM
DRG No. :	909362935 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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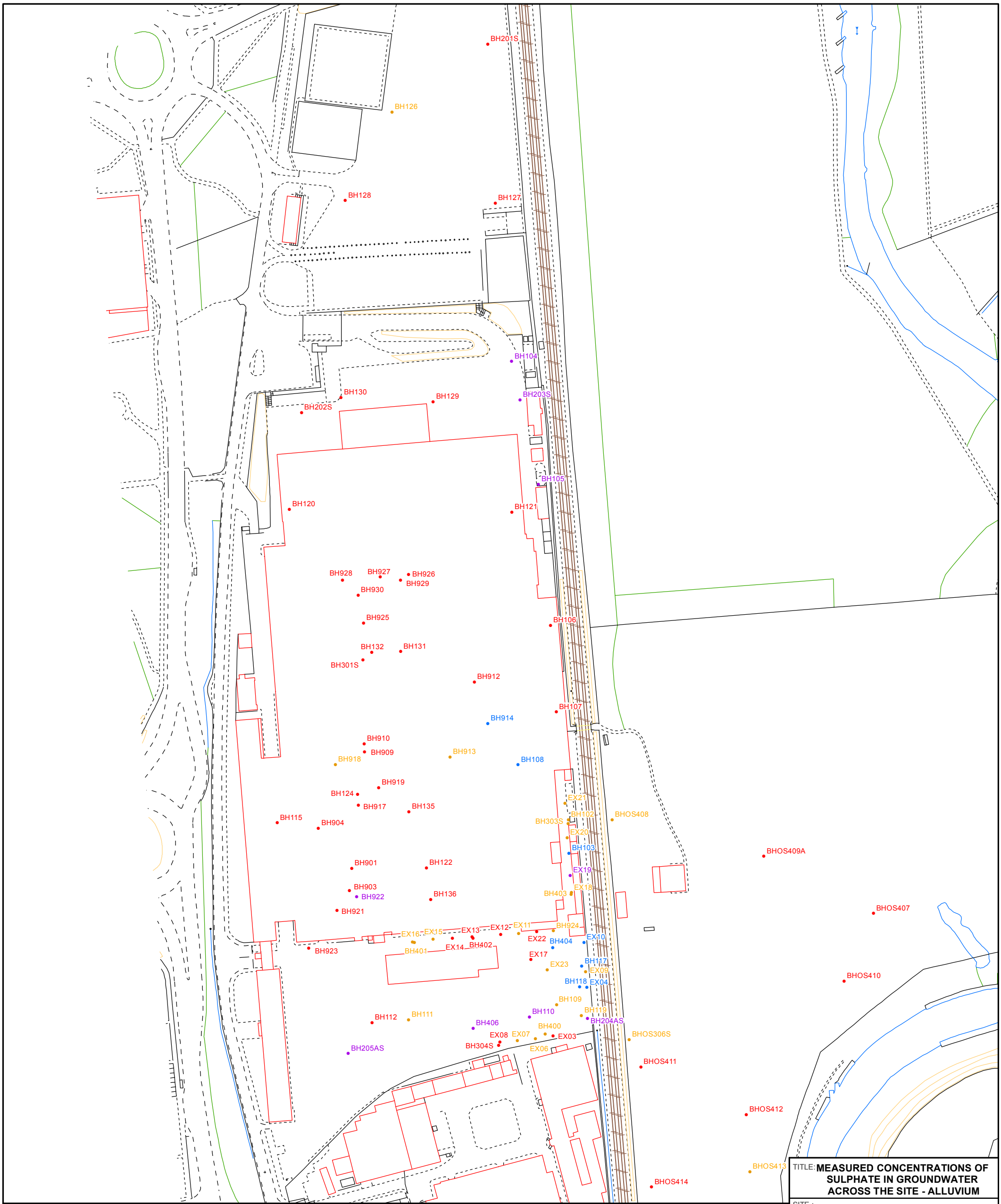

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LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 10,000
- 10,000 - 50,000
- > 50,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF SULPHATE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 19**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362933 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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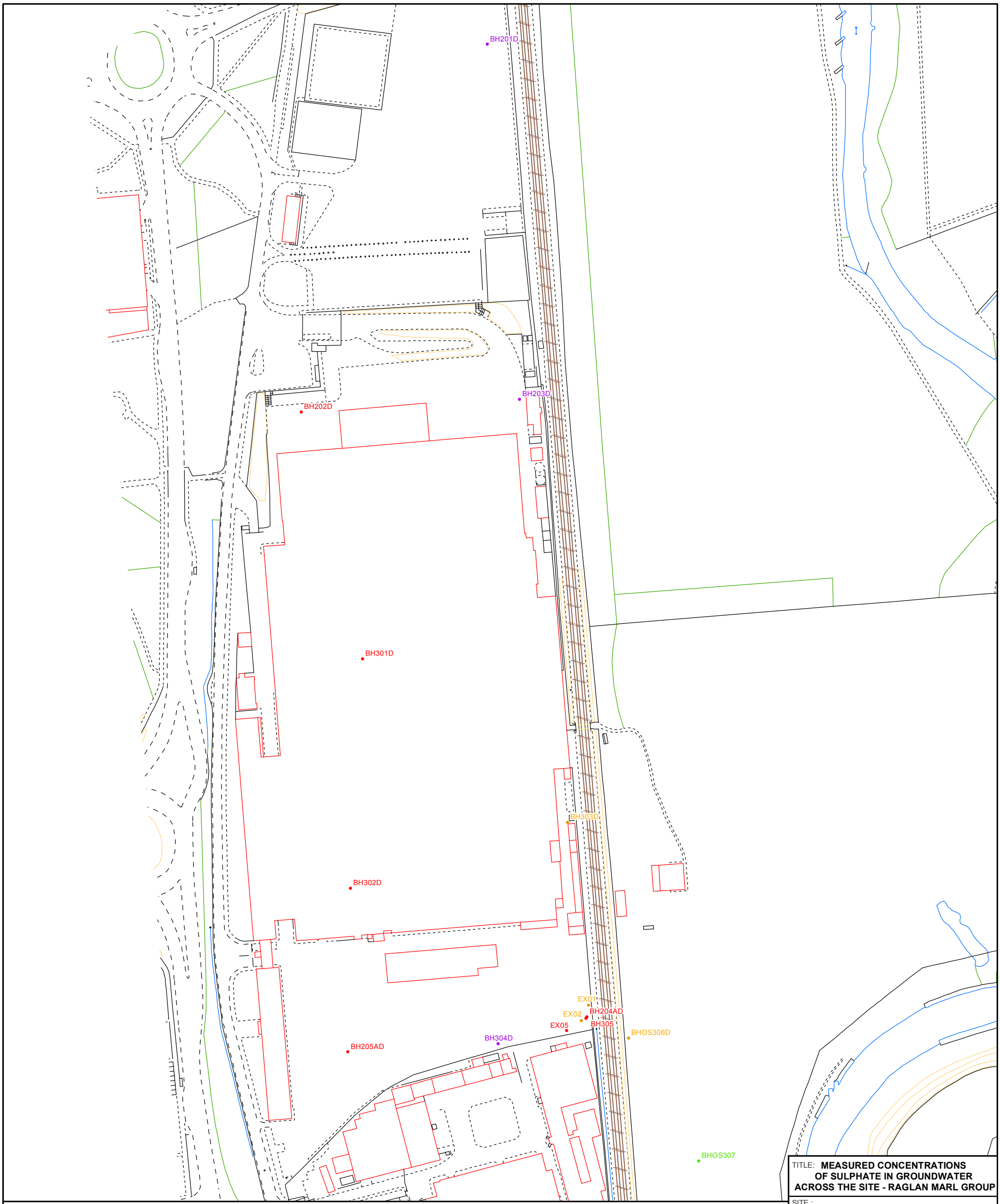

LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 10,000
- 10,000 - 50,000
- > 50,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF SULPHATE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 20**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362932 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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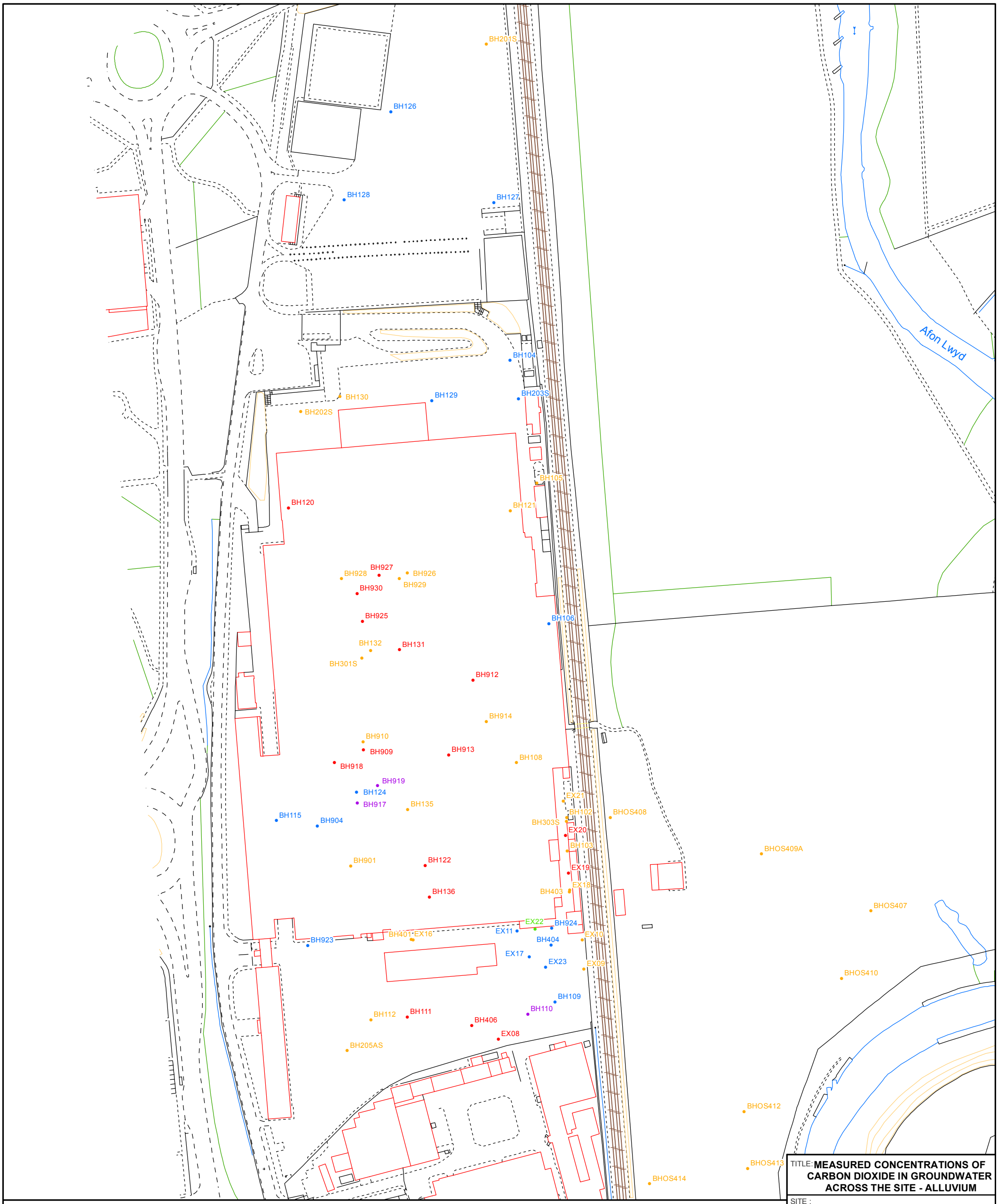

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LEGEND

- < 10,000 µg/l
- 10,000 - 50,000 µg/l
- 50,000 - 100,000 µg/l
- 100,000 - 200,000 µg/l
- > 200,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF CARBON DIOXIDE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 21**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362926 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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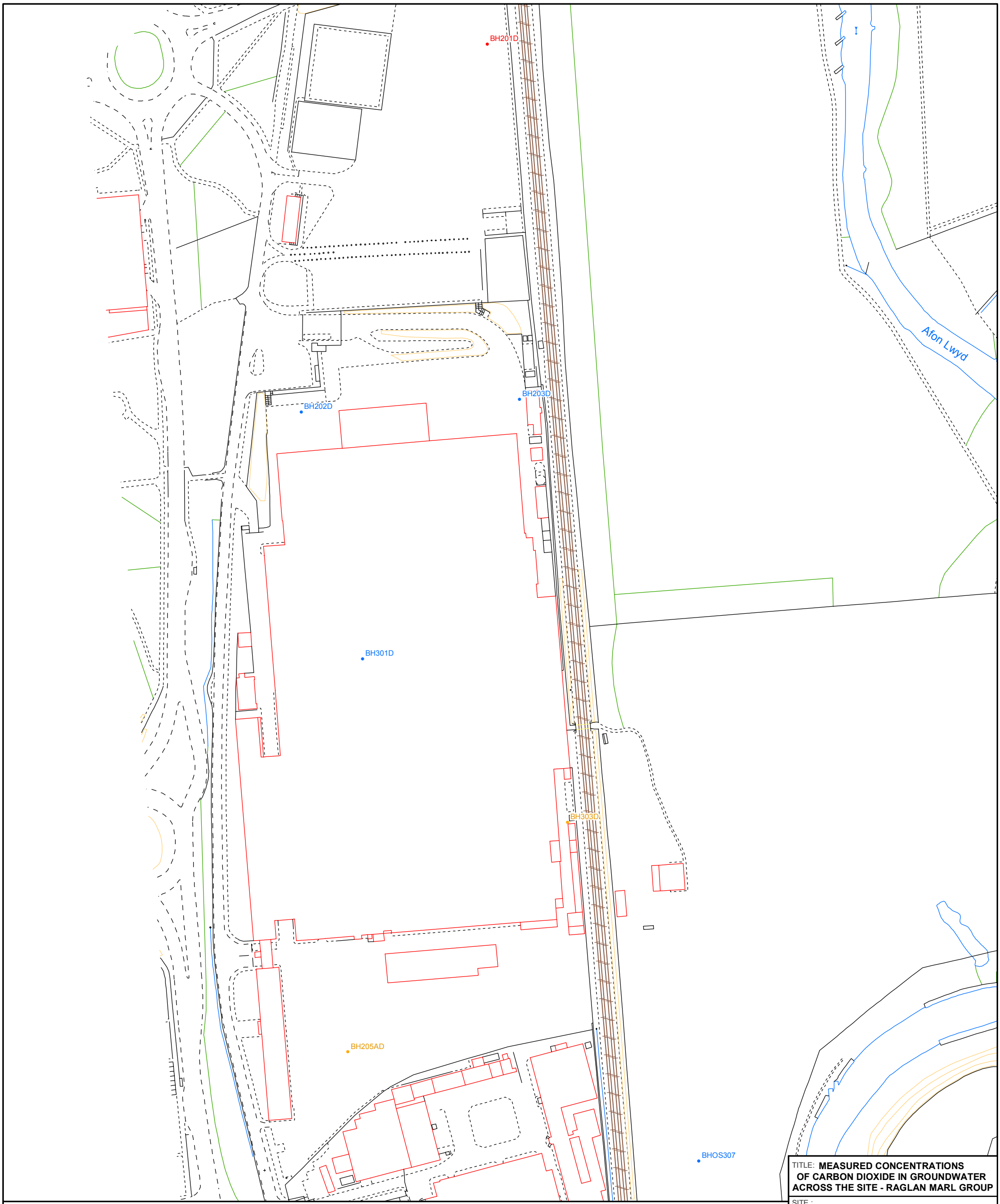

LEGEND

- < 10,000 µg/l
- 10,000 - 50,000 µg/l
- 50,000 - 100,000 µg/l
- 100,000 - 200,000 µg/l
- > 200,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF CARBON DIOXIDE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 22**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362925 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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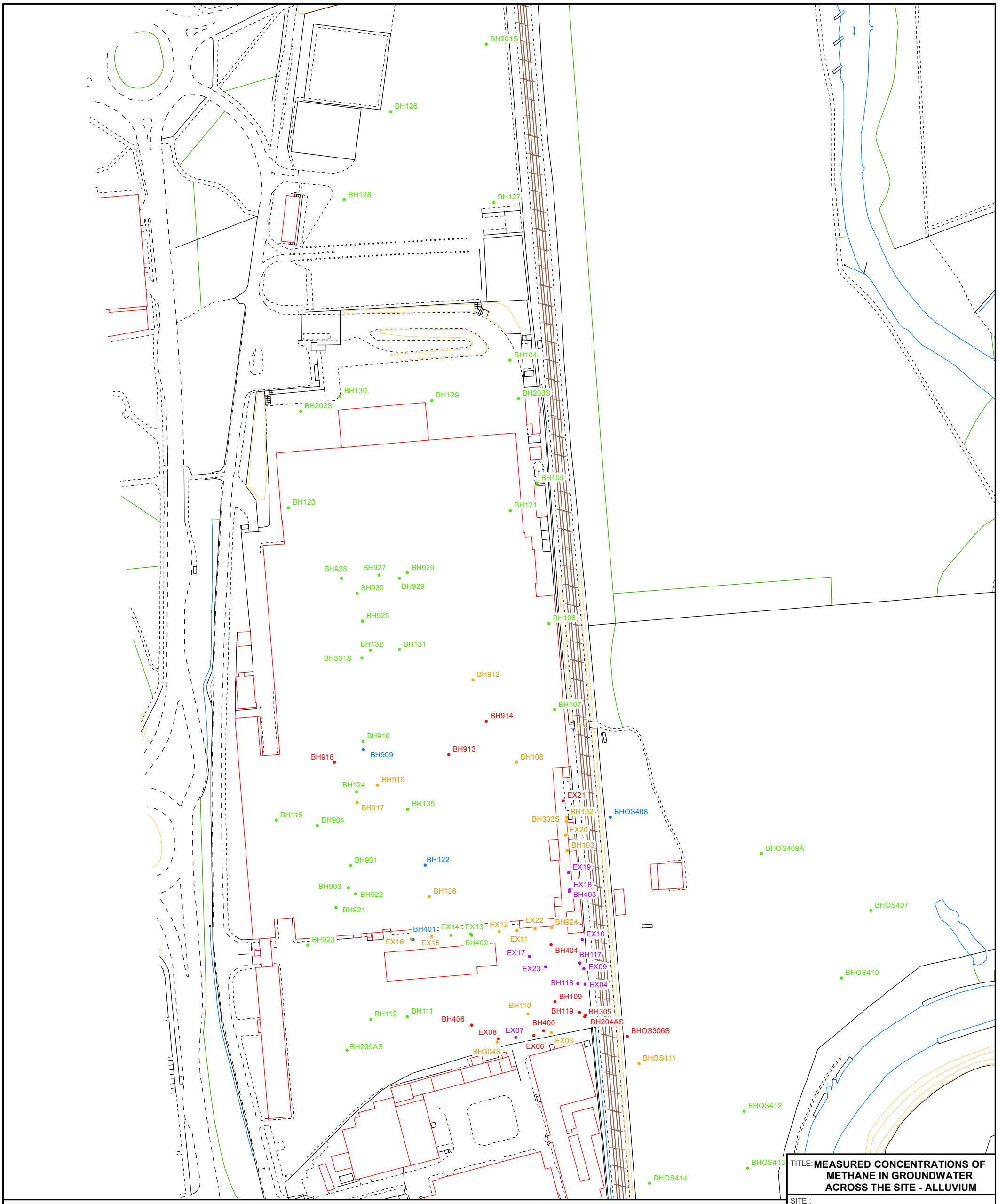

LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 5,000 µg/l
- 5,000 - 20,000 µg/l
- > 20,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF METHANE IN GROUNDWATER ACROSS THE SITE - ALLUVIUM**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 23**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362923 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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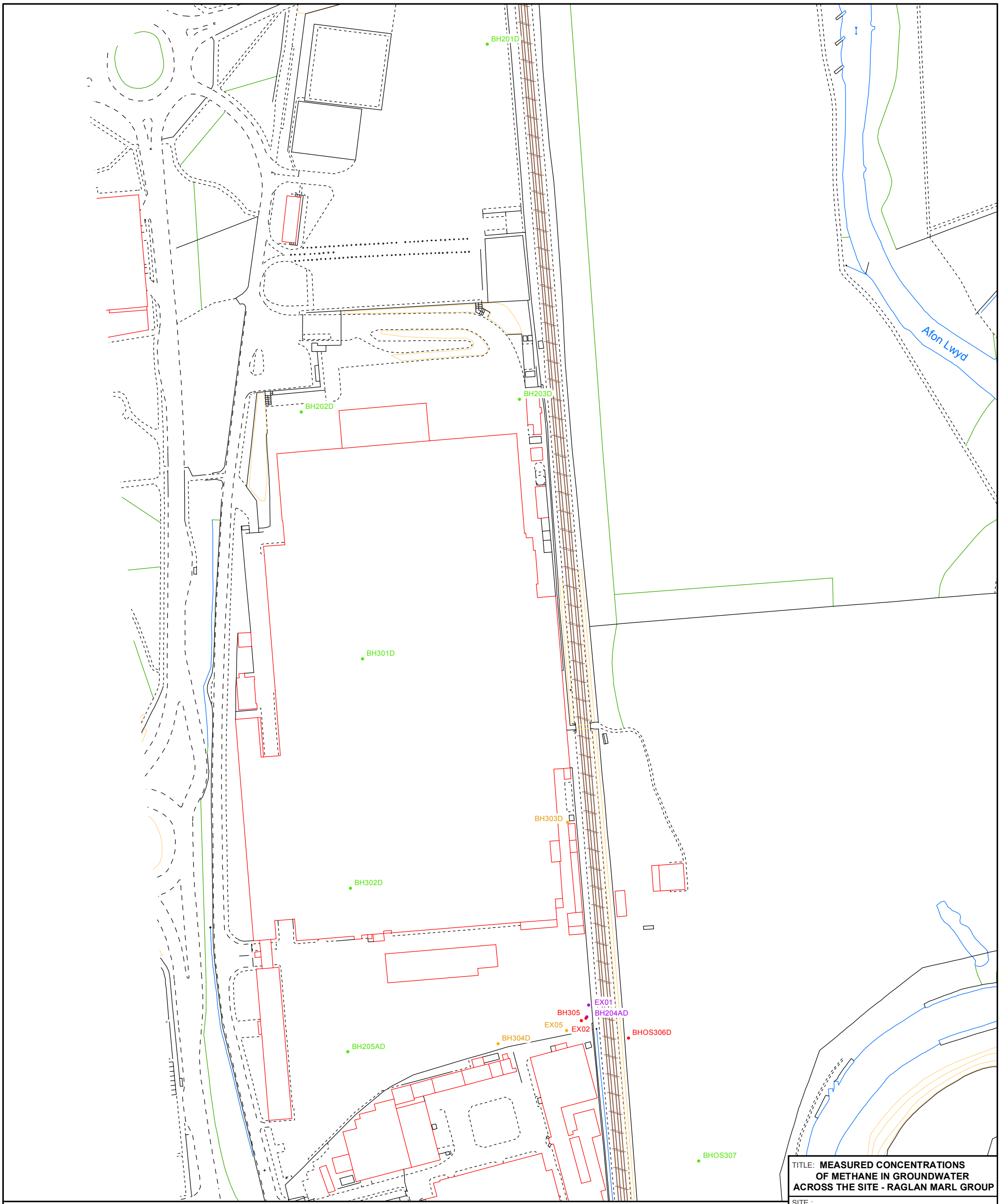

LEGEND

- < 500 µg/l
- 500 - 1,000 µg/l
- 1,000 - 5,000 µg/l
- 5,000 - 20,000 µg/l
- > 20,000 µg/l

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

0 5 10 20 30 40 50 Metres

N

TITLE: **MEASURED CONCENTRATIONS OF METHANE IN GROUNDWATER ACROSS THE SITE - RAGLAN MARL GROUP**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 24**	
DATE :	15/06/11	DRAWN BY :	ASZ
DRG No. :	909362921 GIS		
SCALE :	**1 : 2,000**	PRINT :	**A3**

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Figure 25
Comparison of Measured CoC Concentrations with Biogeochemical Parameters (Oxidised Forms) – Zone 3

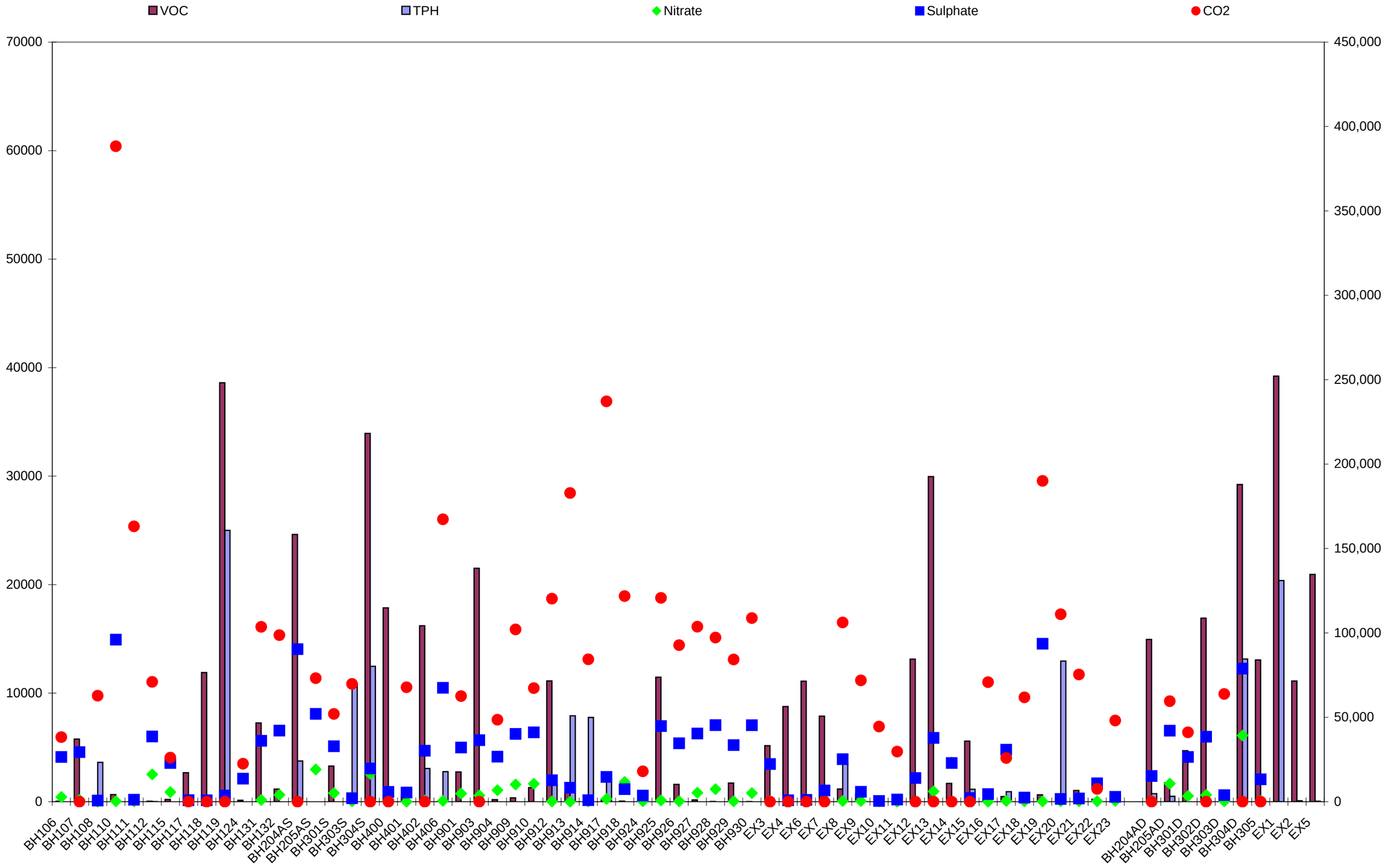


Figure 26
Comparison of Measured CoC Concentrations with Biogeochemical Parameters (Reduced Forms) – Zone 3

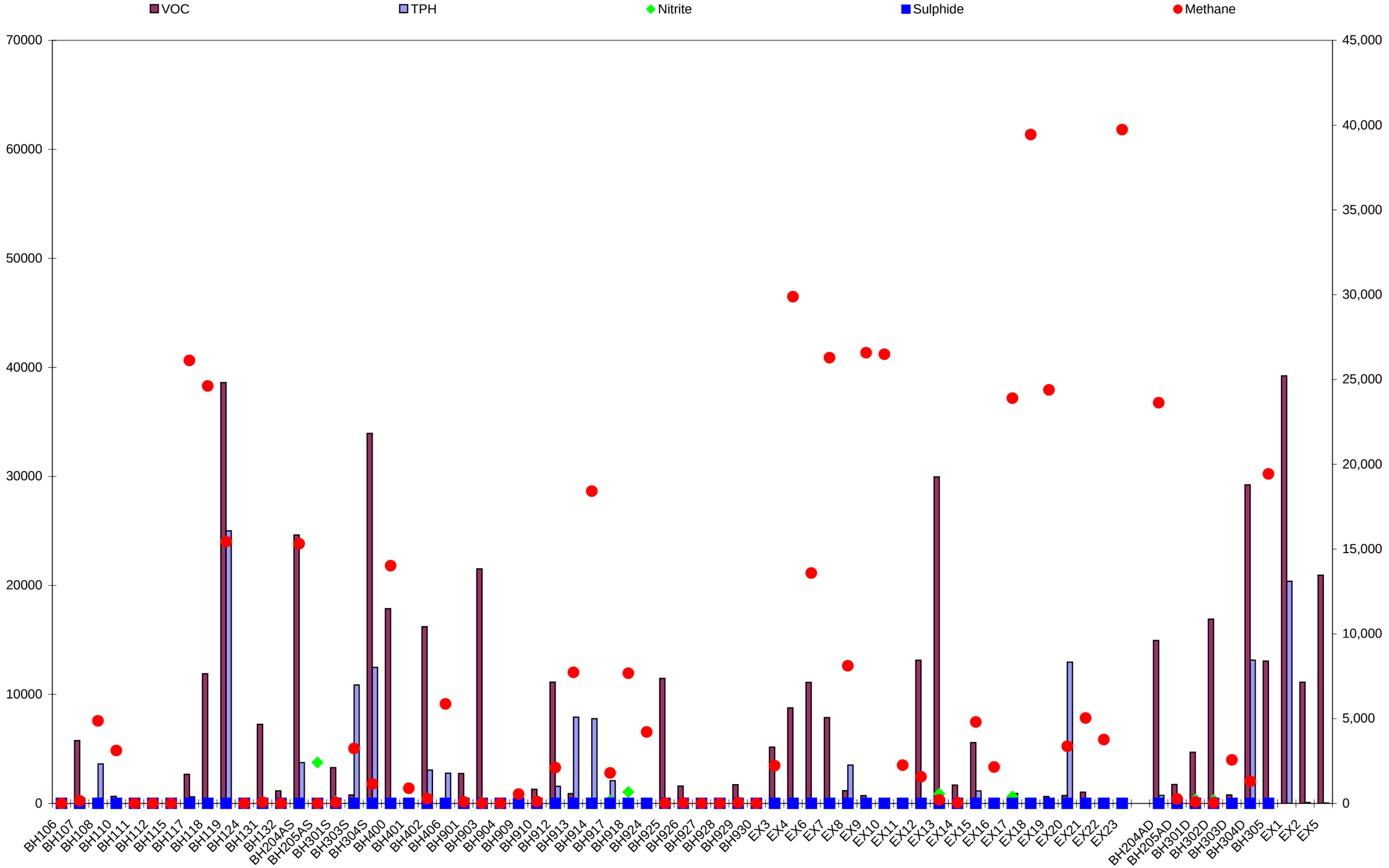


Figure 27
Comparison of Measured CoC Concentrations with Biogeochemical Parameters (Oxidised Forms) – Off-Site

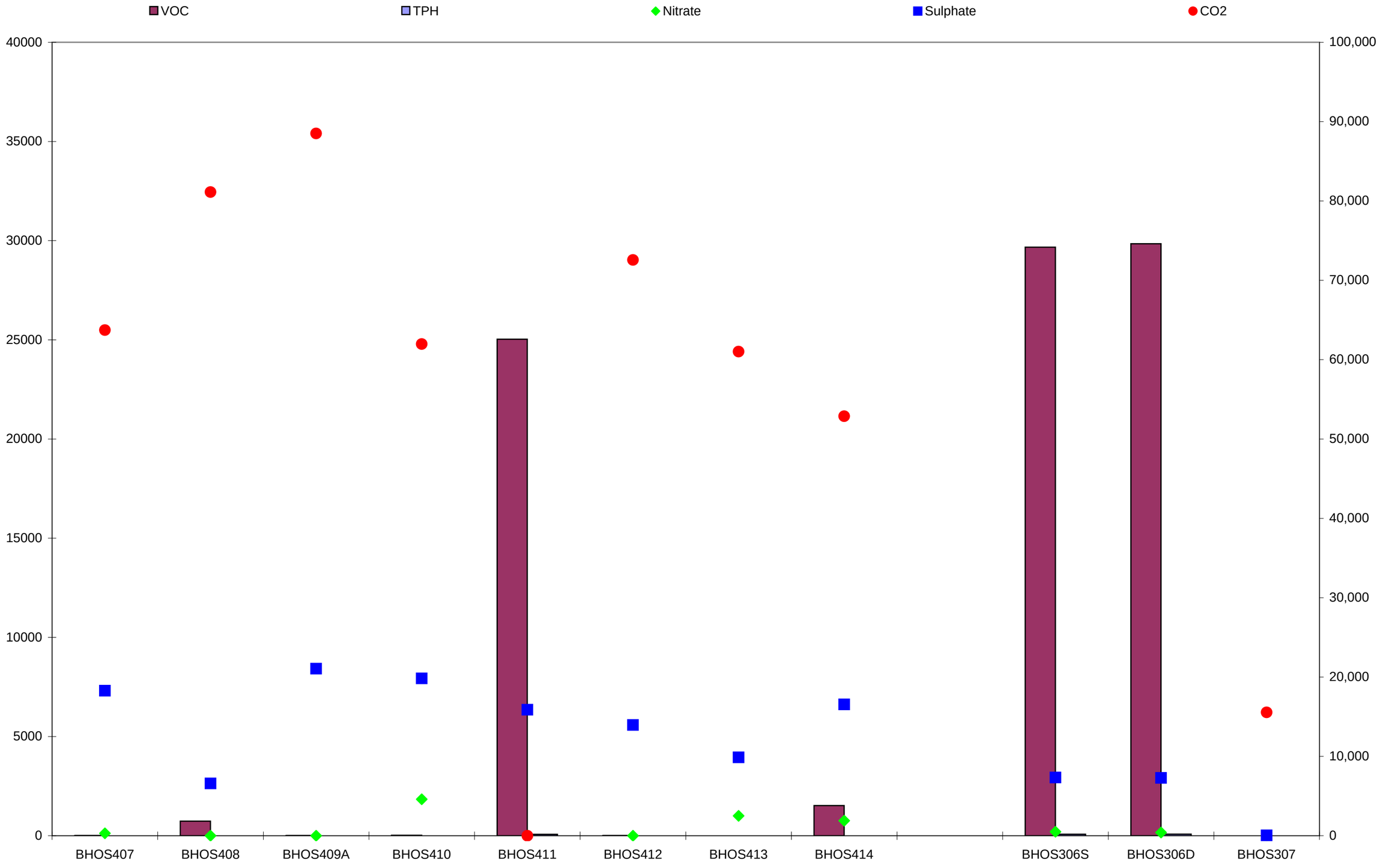


Figure 28
Comparison of Measured CoC Concentrations with Biogeochemical Parameters (Reduced Forms) – Off-Site

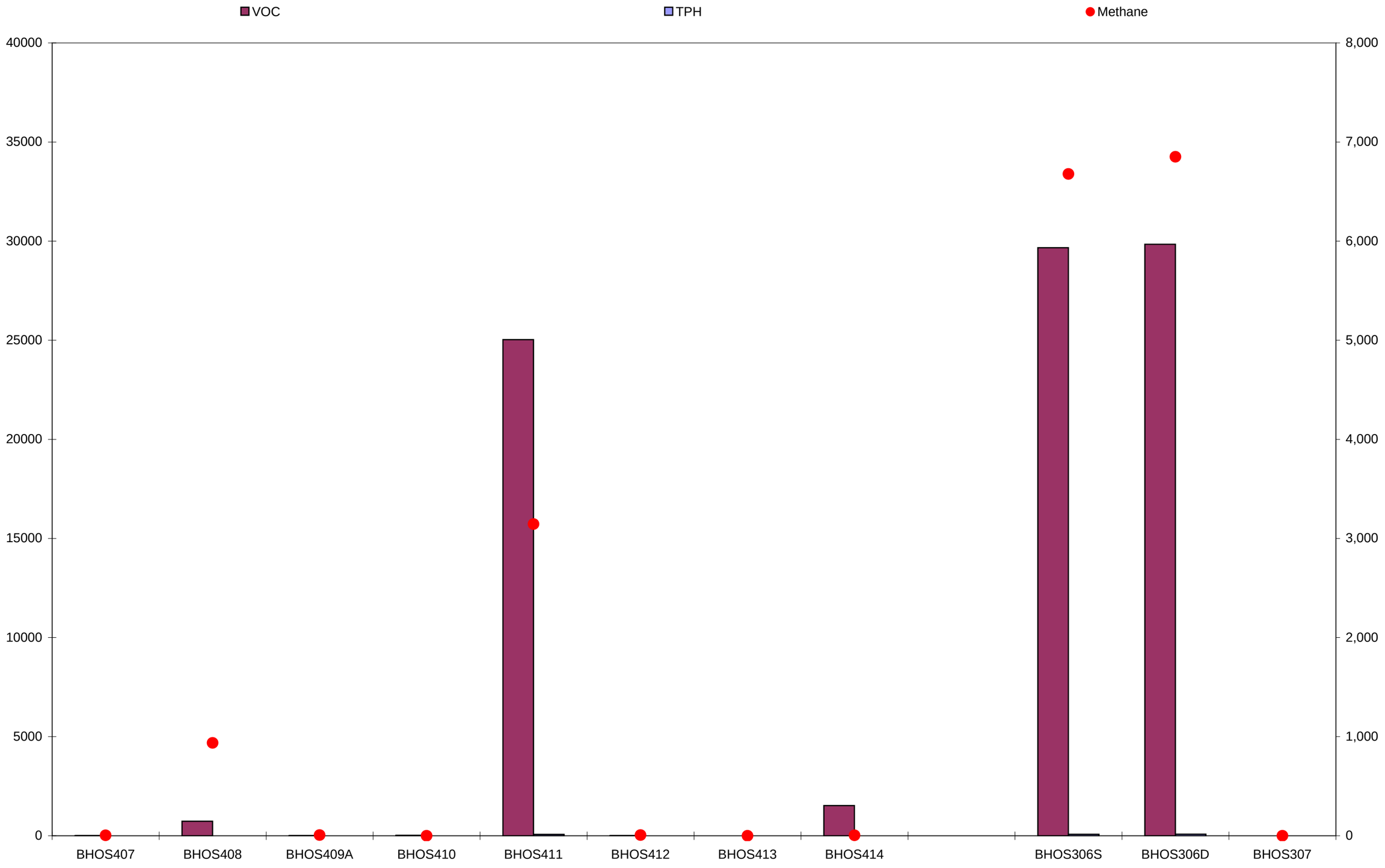


Figure 29
Comparison of Measured CoC Concentrations with Dissolved Oxygen Concentrations Recorded at the Well-Head

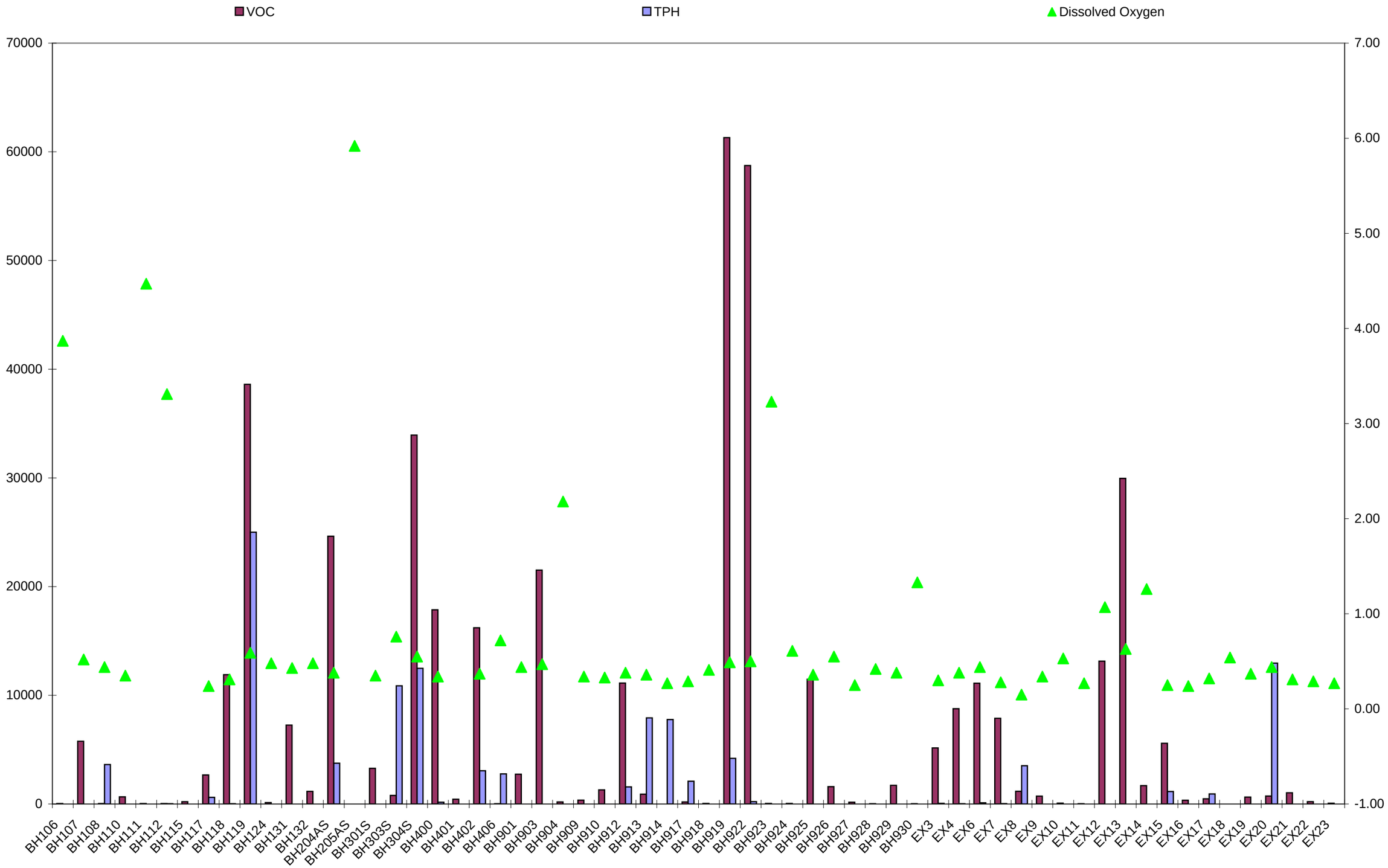
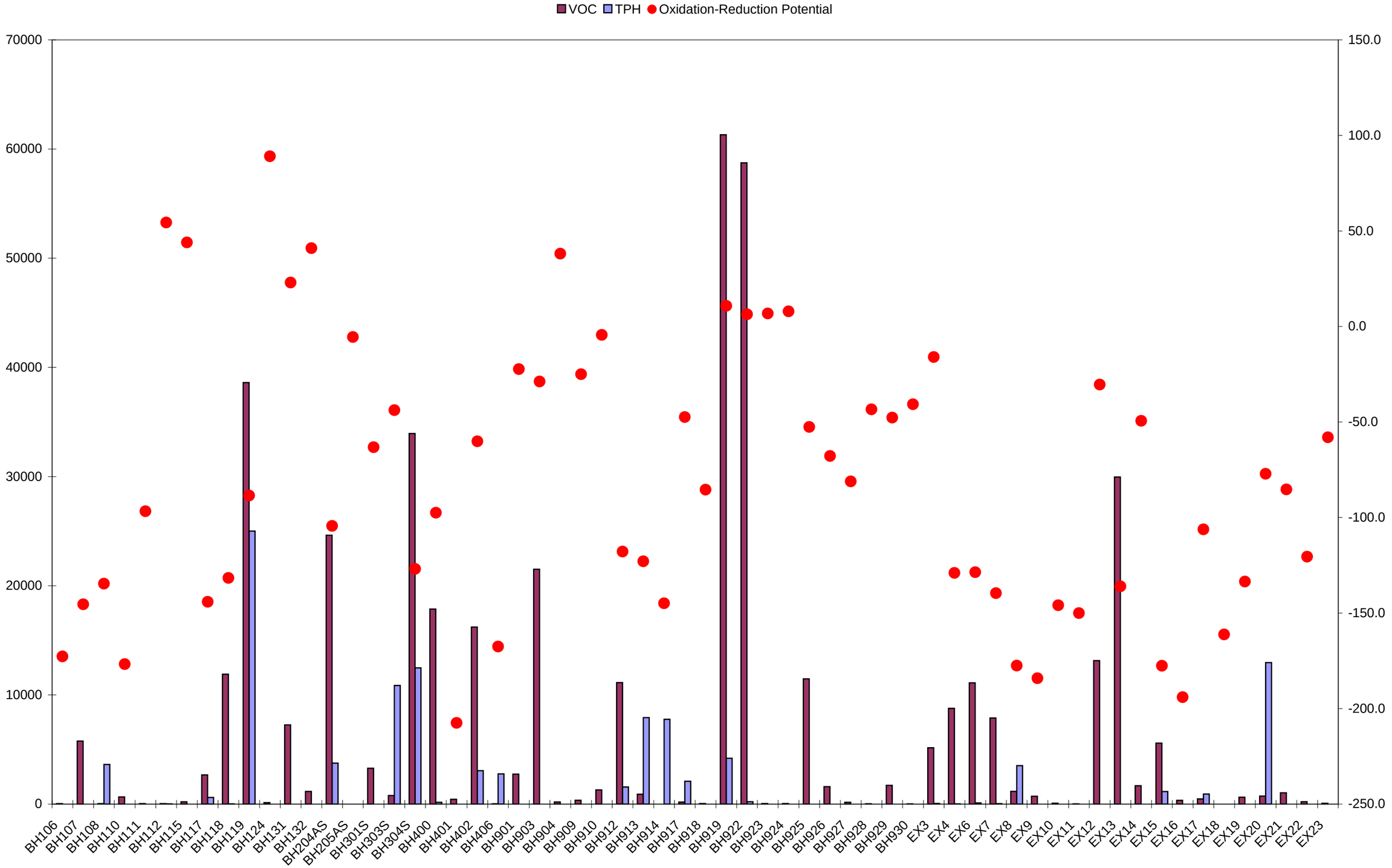


Figure 30
Comparison of Measured CoC Concentrations with Oxidation-Reduction Potentials Recorded at the Well-Head



ZONE 1

ZONE 2

ZONE 3

BH201 BH126 BH128 BH127 BH104 BH130 BH202 BH129 BH203D BH105 BH120 BH121 BH928 BH927 BH926 BH929 BH930 BH925 BH106 BH132 BH131 BH301 BH133 BH911 BH912 BH107 BH914 BH910 BH909 BH918 BH913 BH108 BH124 BH919 BH134 BH917 BH135 EX21 BH102 BHOS408 BH115 BH904 BH931 BH905 BH916 BH908 BH303 EX20 BH902 BH915 BH116 BH122 BH103 BH906 BH901 EX19 BH907 BH903 BH302 BH922 BH136 EX18 BH403 BHOS409A BHOS409 BH921 BHOS407 EX16 EX15 EX14 EX13 EX11 BH924 EX10 EX22 BH923 BH402 EX12 BH404 BH401 EX17 BH117 BH114 EX9 BH405 EX23 BH117A BHOS410 BH114A BH113 BH118 EX4 BH109 EX1 BH112 BH111 BH110 BH119 BH204 10 BH406 EX2 EX8 BH400 BH305 EX5 BH205 BH304 EX7 EX6 EX3 BHOS306 BHOS411 BHOS412 BHOS307 BHOS413 BHOS414

8

9

10

LEGEND

- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- SOURCE AREA
- NO CLAY RICH DEPOSIT
- ZONE 1 BOUNDARY
- ZONE 2 BOUNDARY
- ZONE 3 BOUNDARY

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

0 10 20 40 60 80 100 Metres

N

TITLE: **DISTRIBUTION OF PETROLEUM COMPOUNDS IN SOIL AND GROUNDWATER**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	90936.29	FIGURE 31	
DATE :	19/08/11	DRAWN BY :	ASZ
DRG No. :	909362913 GIS		
SCALE :	1 : 2,000	PRINT :	A3

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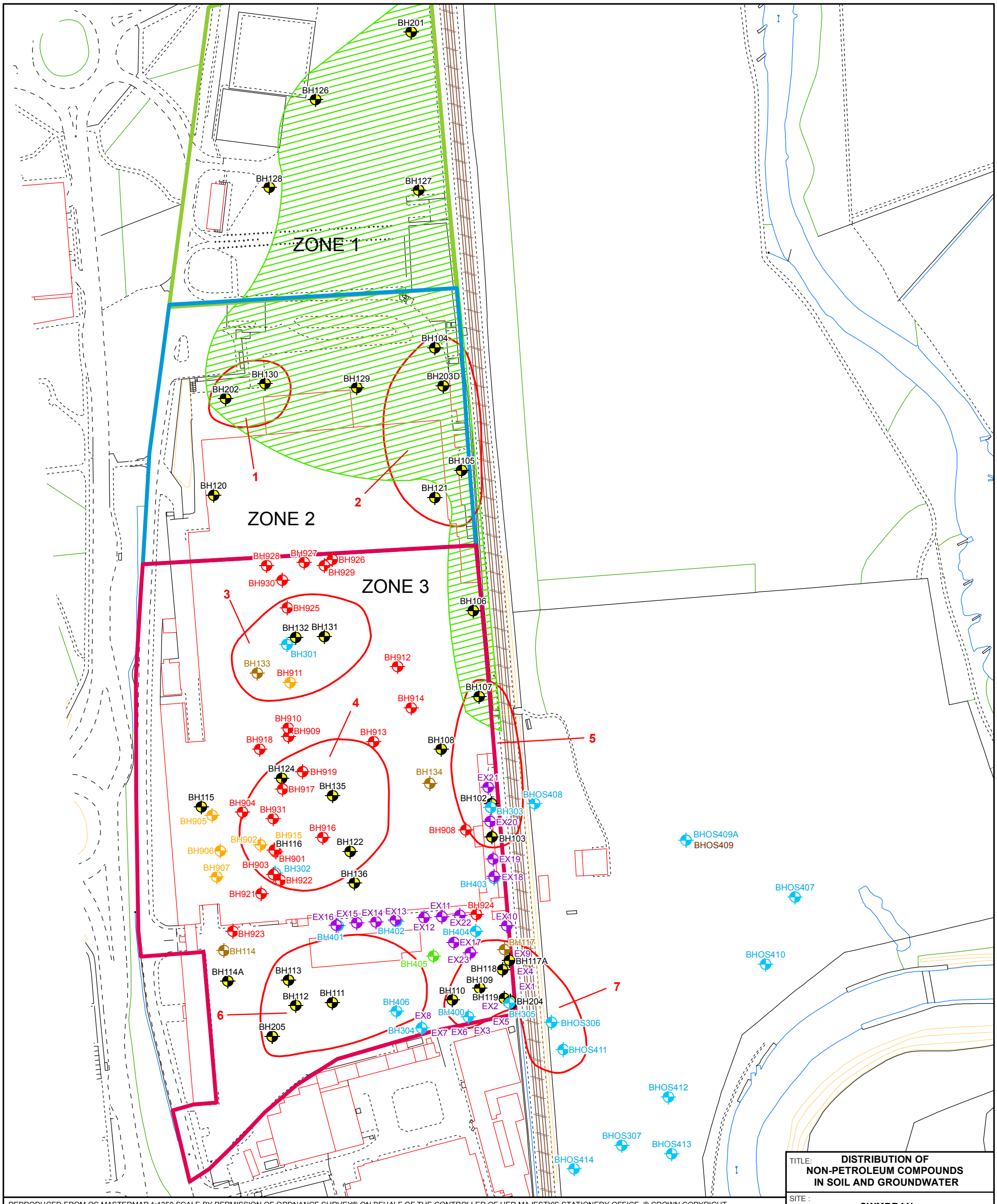

LEGEND

- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- SOURCE AREA
- NO CLAY RICH DEPOSIT
- ZONE 1 BOUNDARY
- ZONE 2 BOUNDARY
- ZONE 3 BOUNDARY

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

0 10 20 40 60 80 100 Metres

N

TITLE: **DISTRIBUTION OF NON-PETROLEUM COMPOUNDS IN SOIL AND GROUNDWATER**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	90936.29	FIGURE 32	
DATE :	08/03/11	DRAWN BY :	ASZ
DRG No. :	909362912 GIS		
SCALE :	1 : 2,000	PRINT :	A3

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Figure 33A
Concentration of TPH (µg/L) Over Time
Zone 1

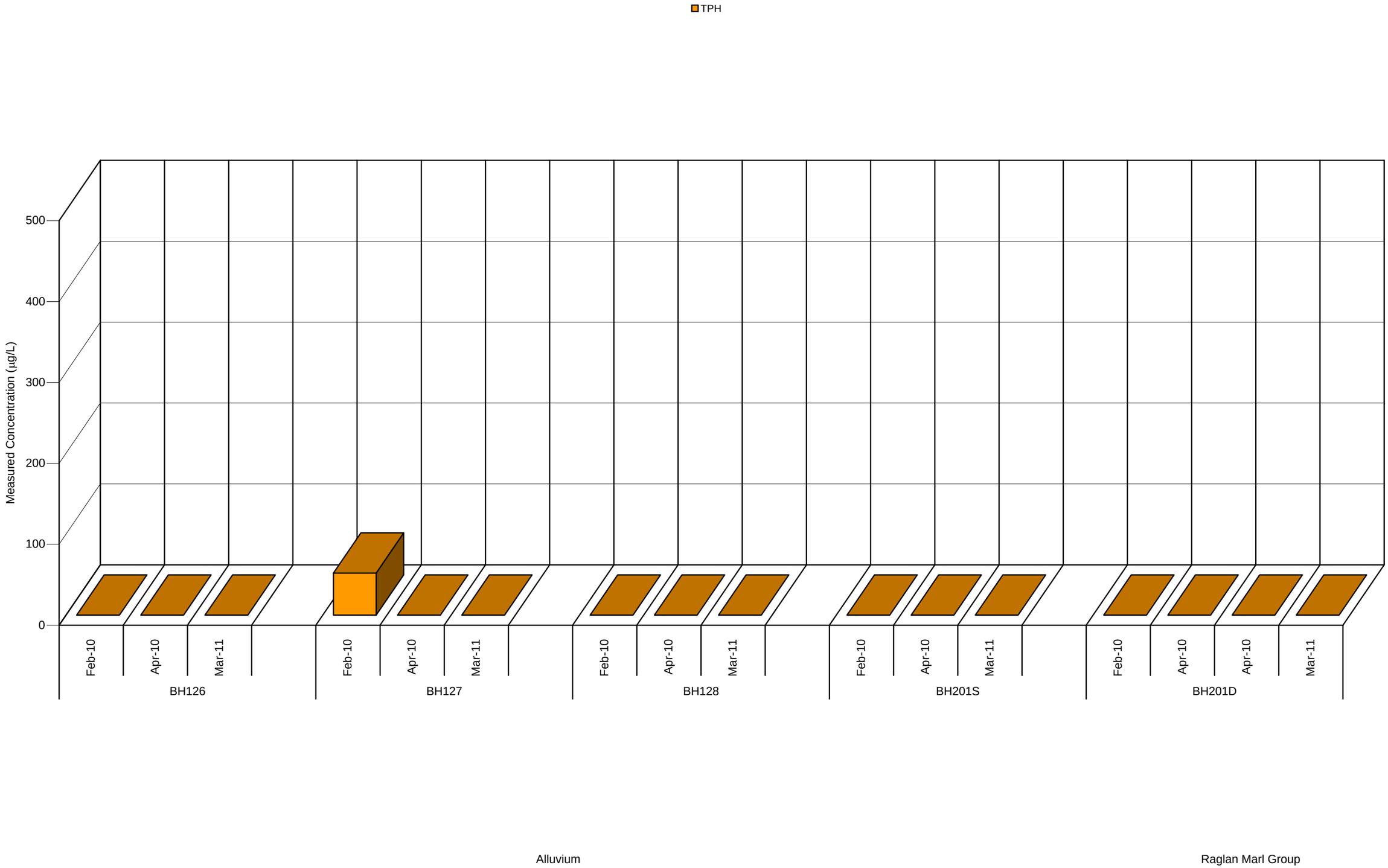


Figure 33B
Measured Concentration of TPH (µg/L) Over Time
Zone 2

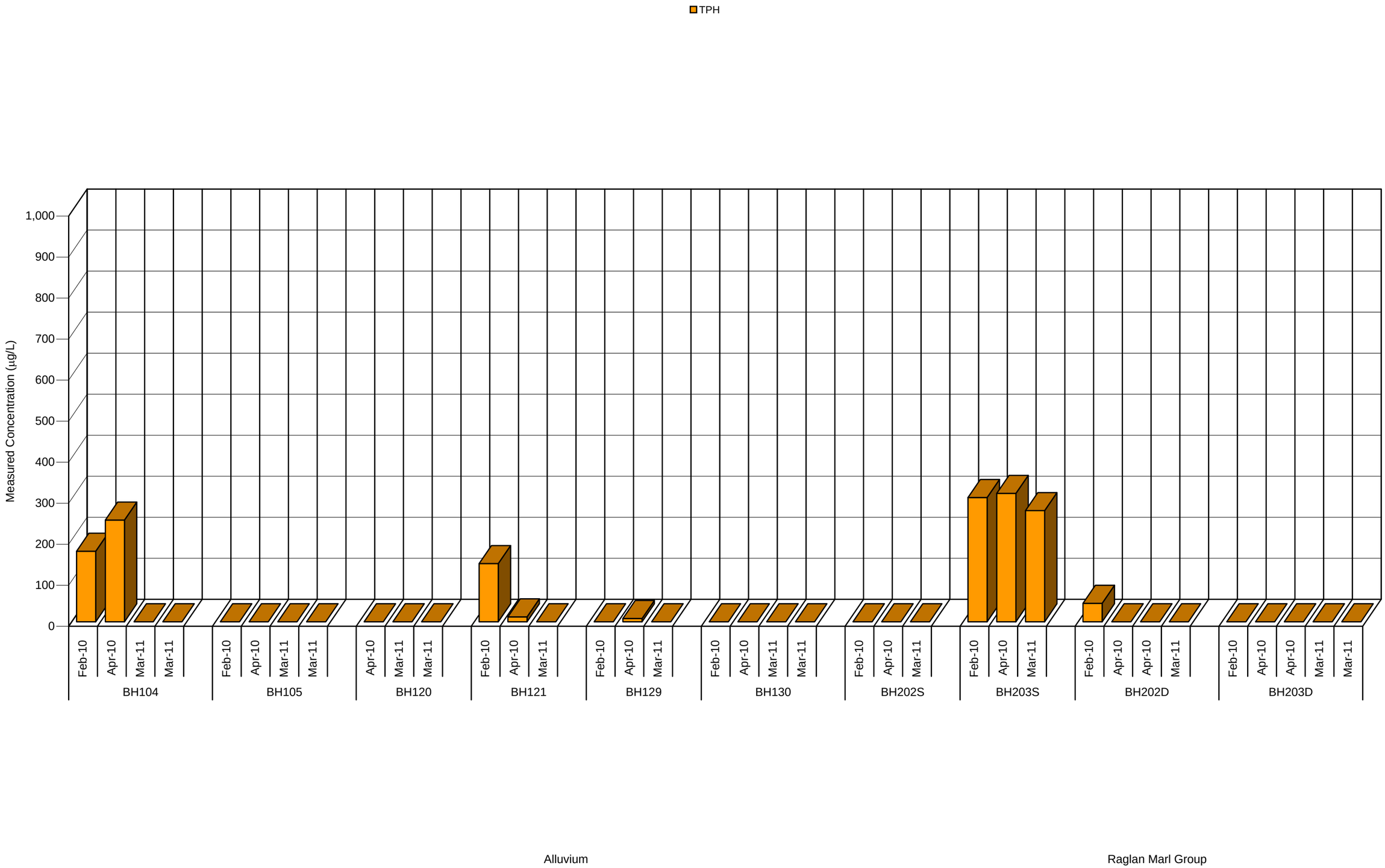


Figure 33C
Measured Concentration of TPH (mg/L) Over Time Zone 3 - Alluvium

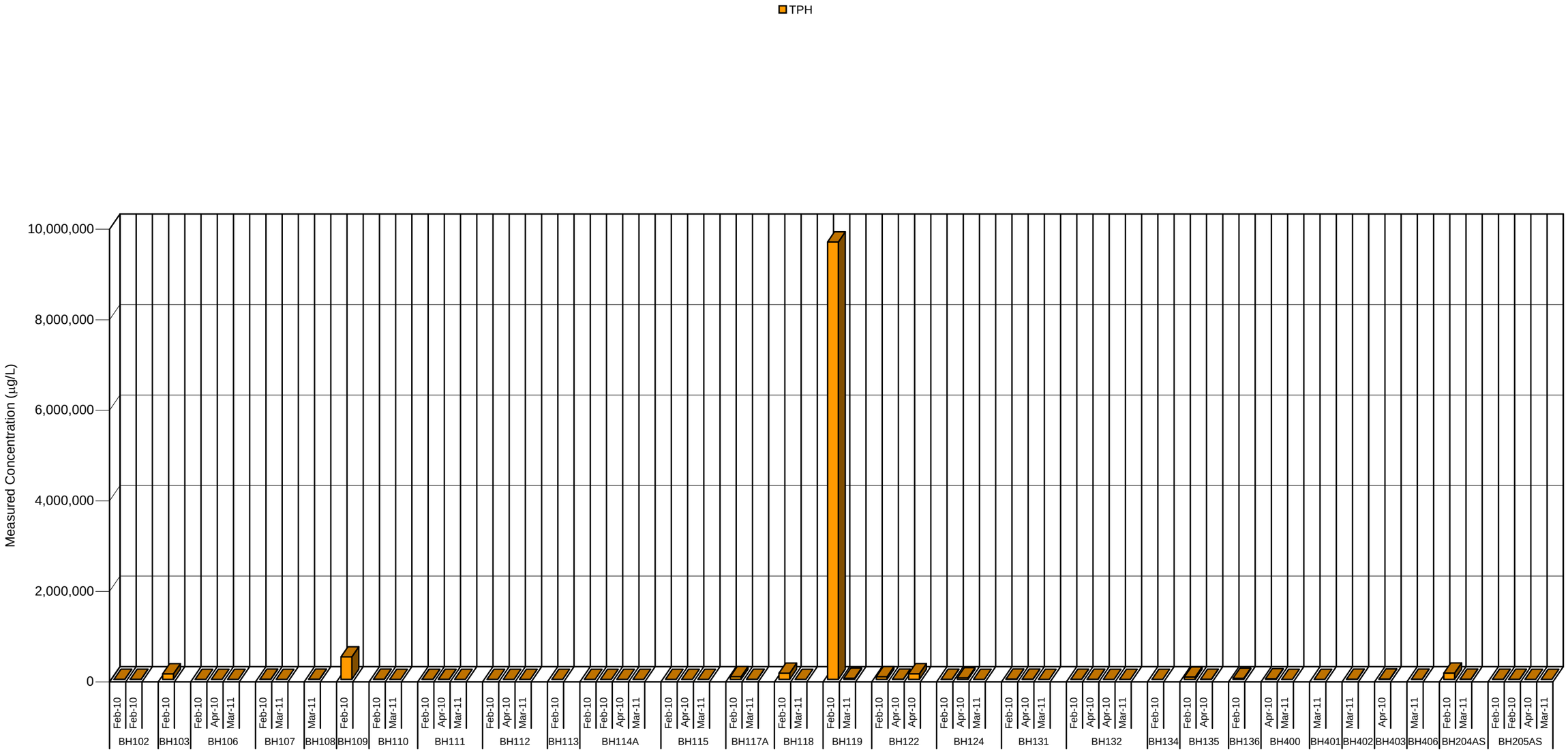


Figure 33D
Measured Concentration of TPH (µg/L) Over Time Zone 3 - Alluvium
(Reduced Axis)

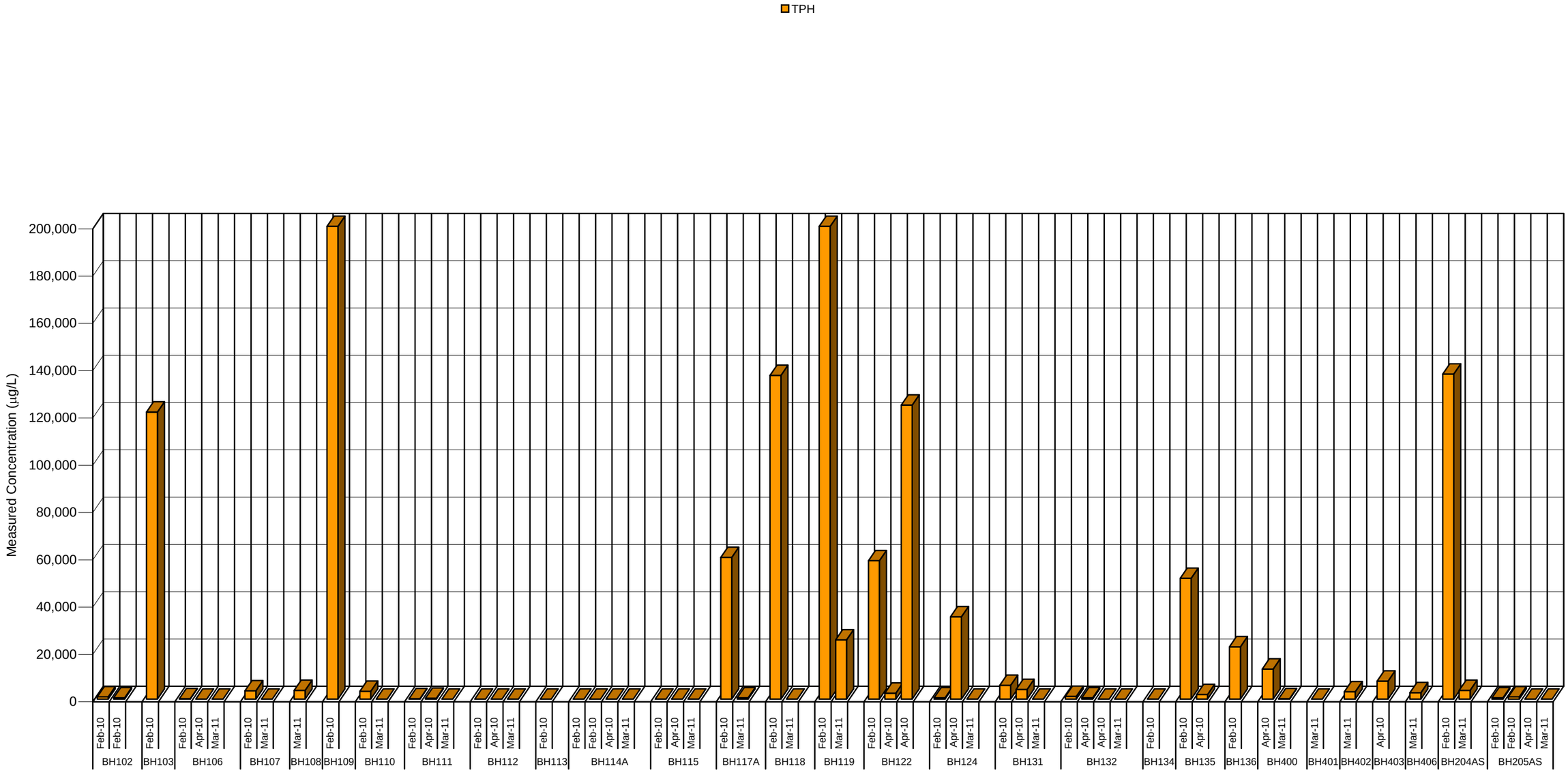


Figure 33E
Measured Concntration of TPH (µg/L) Over Time Zone 3 - Raglan Marl Group

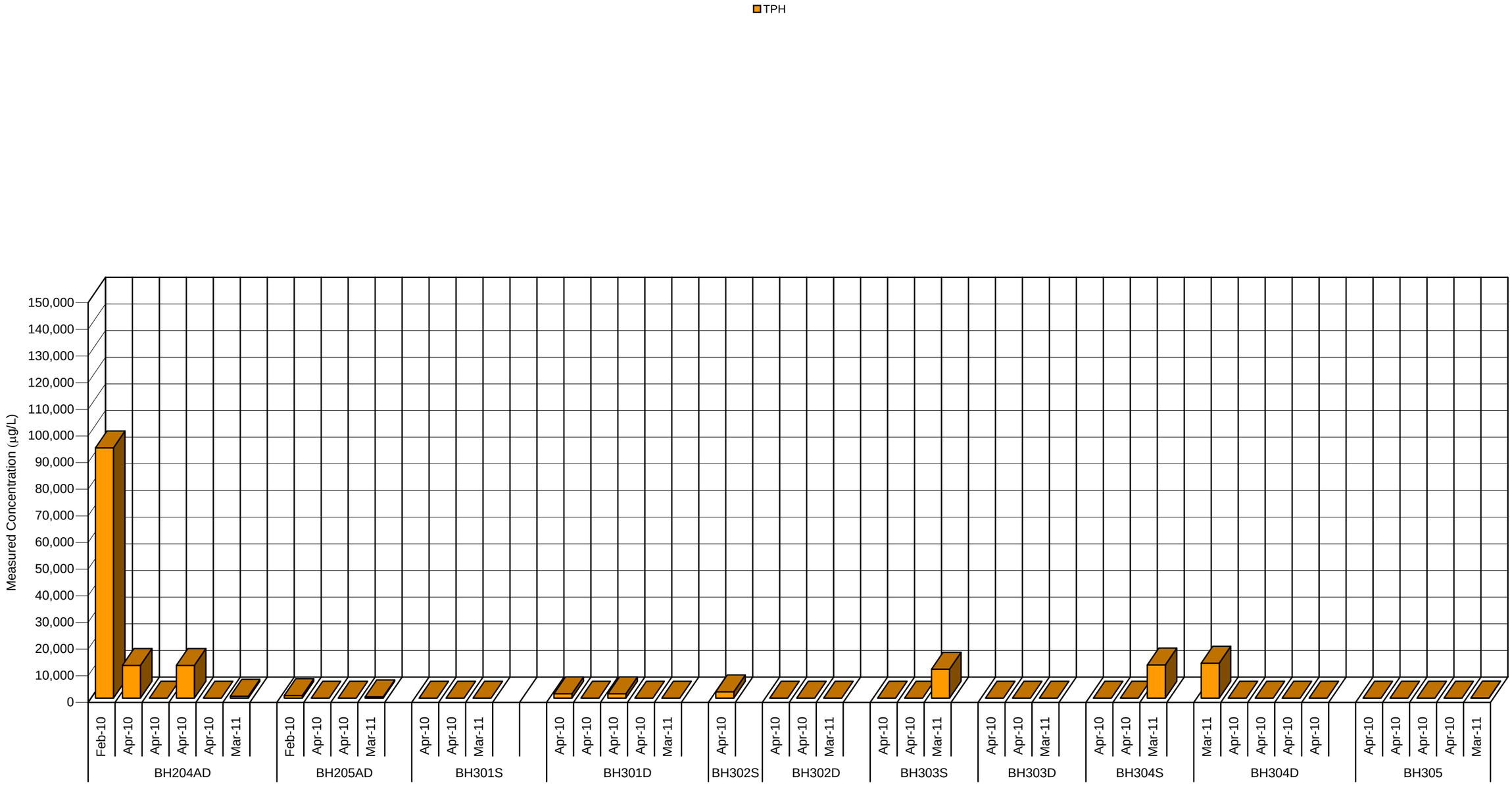
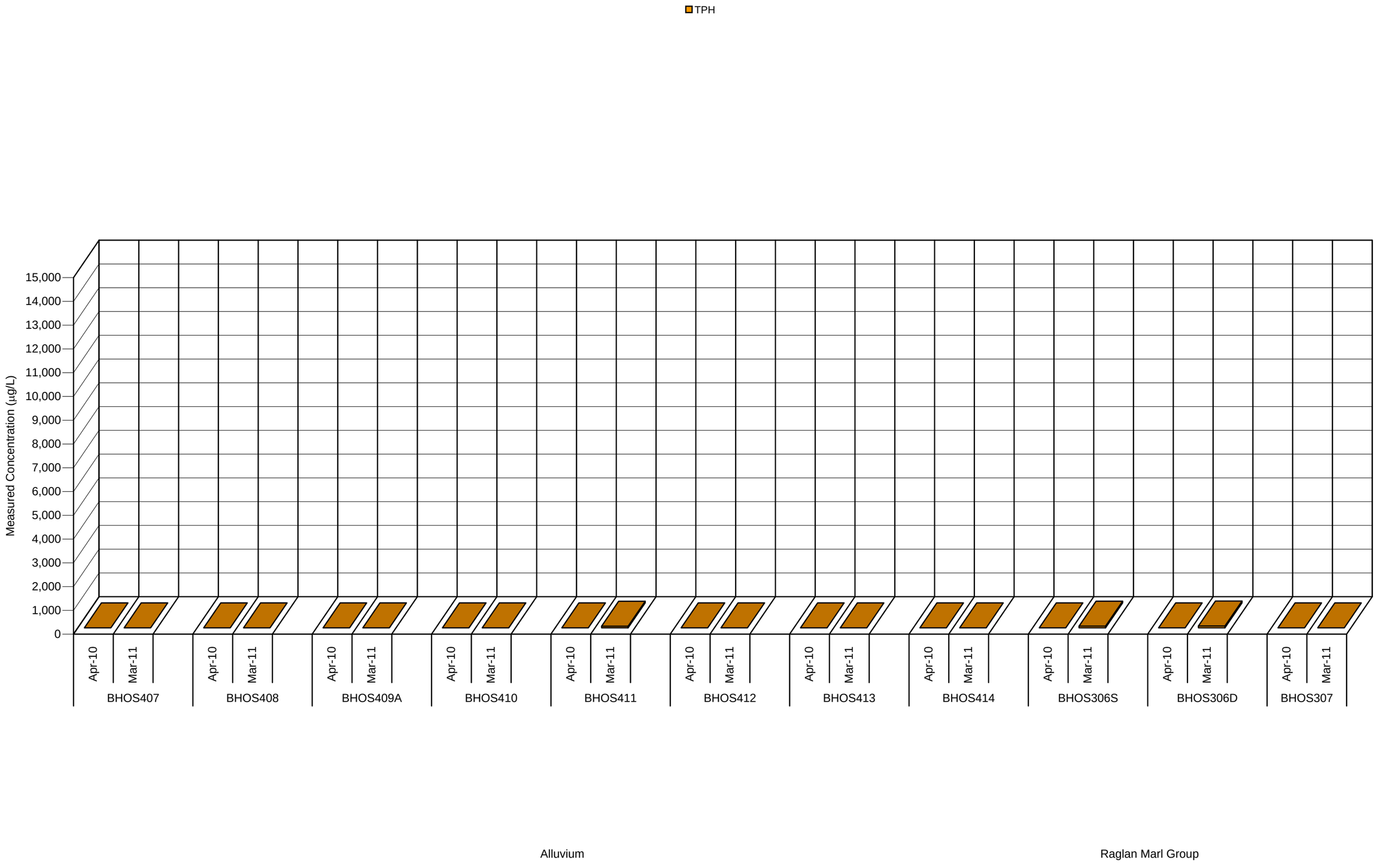
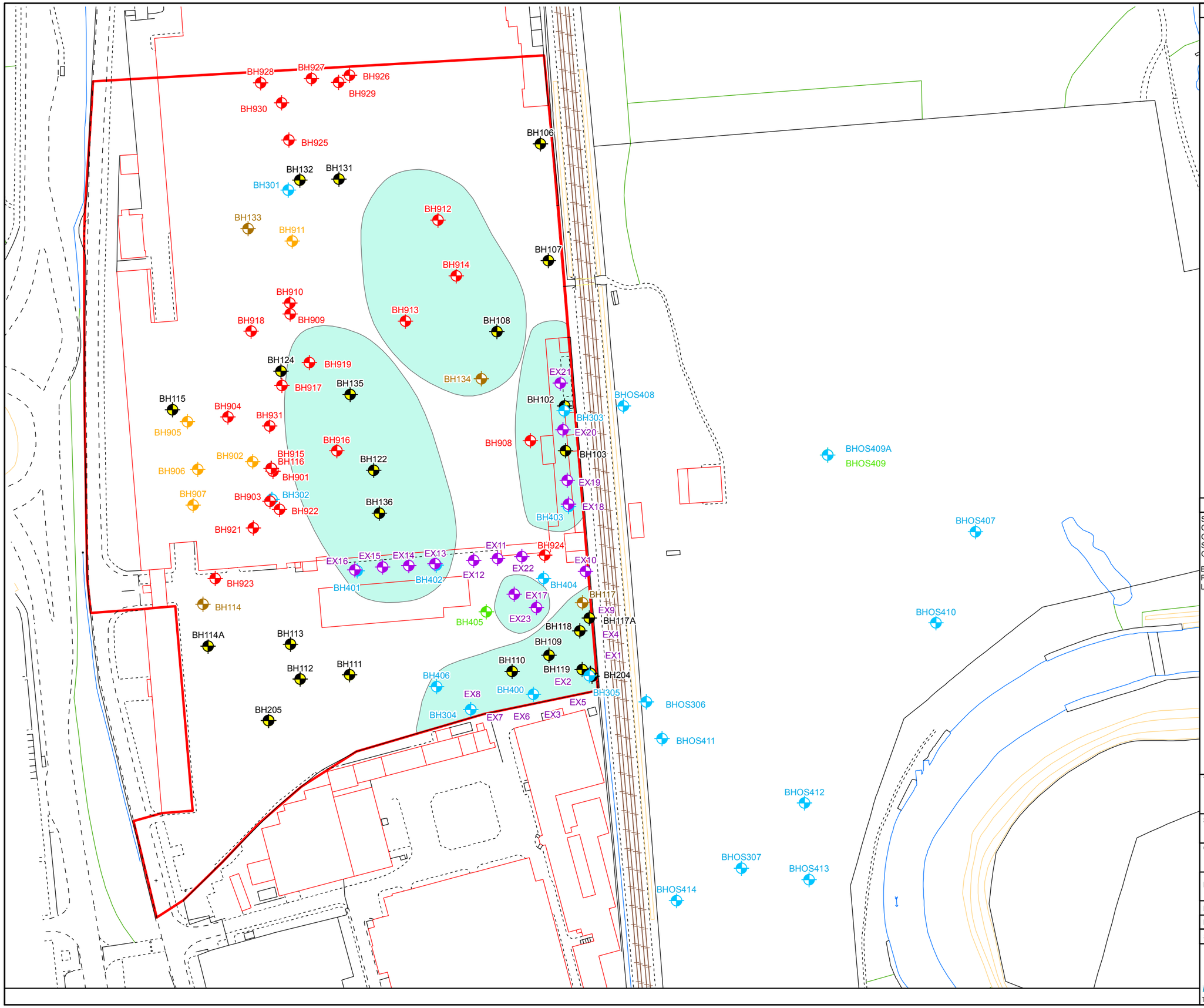


Figure 33F
Measured Concentration of TPH (mg/L) Over Time
Off-Site Wells





LEGEND

- BOREHOLE LOCATION PHASE II ESA
- BOREHOLE LOCATION PHASE IIB ESA
- BOREHOLE LOCATION SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION PHASE II ESA
- MONITORING WELL LOCATION PHASE IIB ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- ZONE 3 BOUNDARY
- ANTICIPATED EXTENT OF LNAPL

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED
PARTIALLY INFERRED FROM PREVIOUS LIF INVESTIGATION

0 5 10 20 30 40 50 Metres

N

TITLE:
ANTICIPATED EXTENT OF LNAPL IN THE SUB-SURFACE OF ZONE 3

SITE :
CWMBRAN

CLIENT :
MERITOR HVBS (UK) LIMITED

PROJECT :	**90936.29**	**FIGURE 34**	
DATE :	25/05/11	DRAWN BY :	RJM
DRG No. :	909362918 GIS		
SCALE :	**1 : 1,500**	PRINT :	**A3**

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Figure 35A
Measured Concentrations of PCE, TCE and its Associated Breakdown Products – Zone 3

Southern Yard Area & South-East Corner of Site

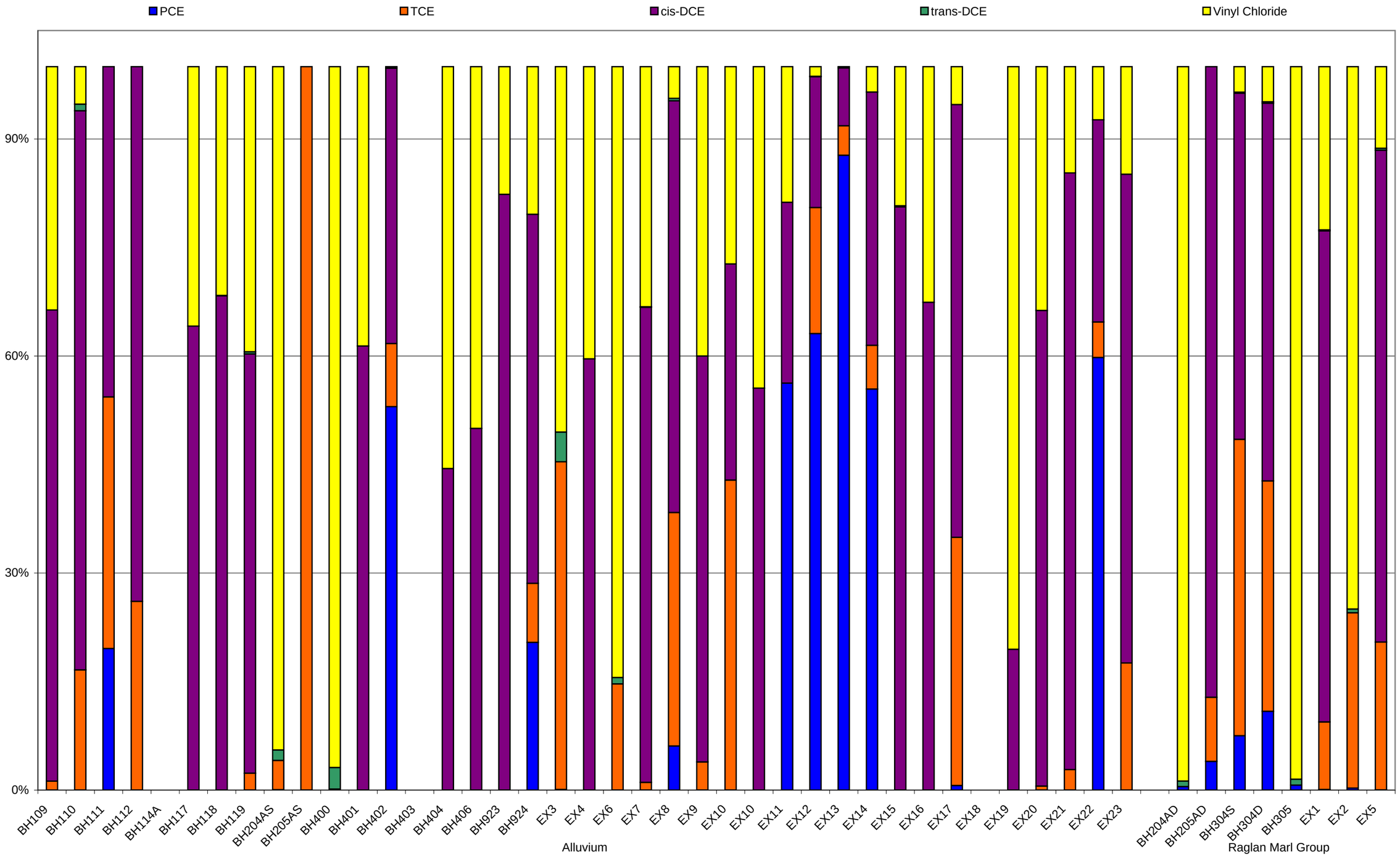


Figure 35B
Measured Concentrations of PCE, TCE and its Associated Breakdown Products – Zone 3

South-Western Corner of Main Production Building

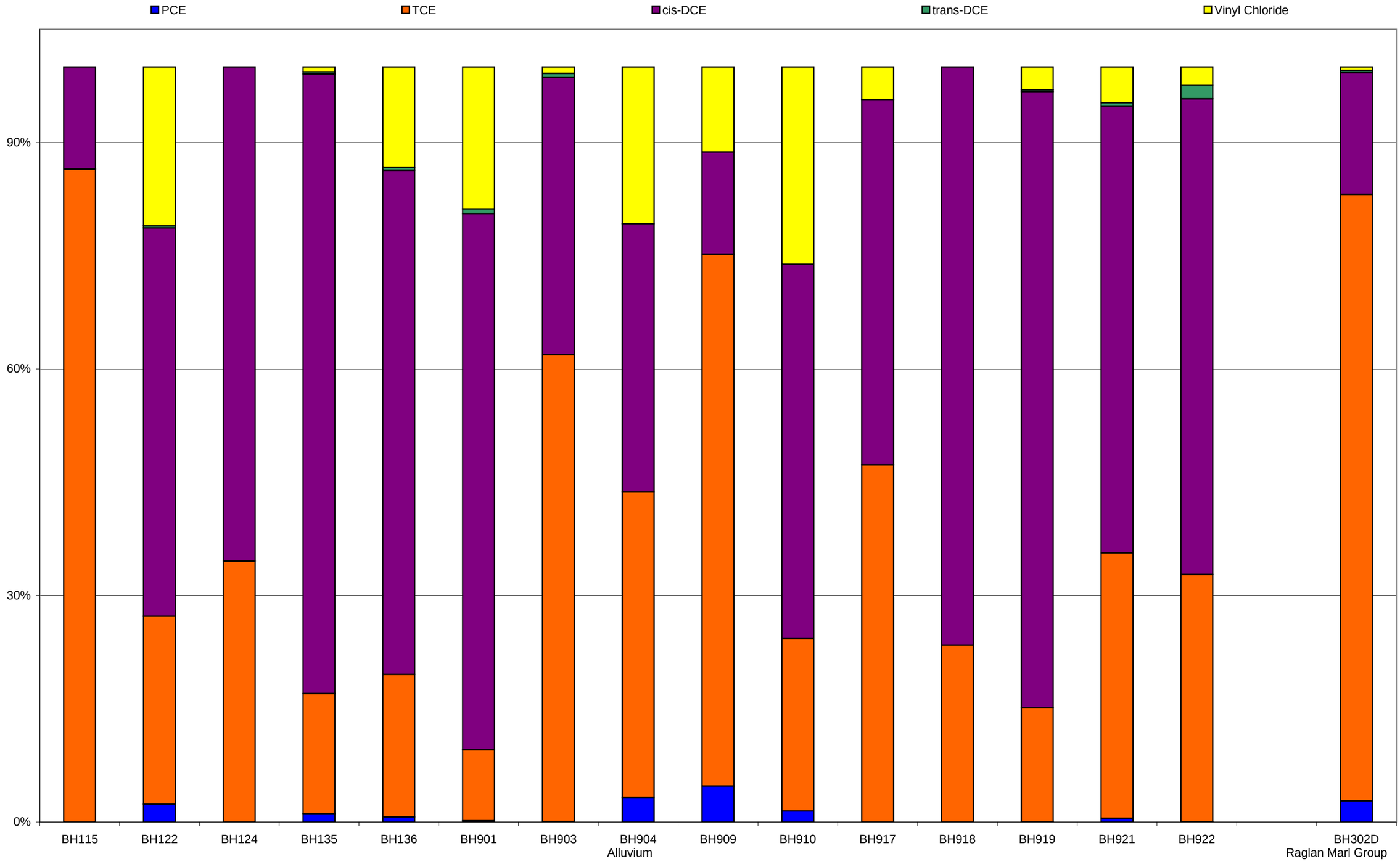


Figure 35C
Measured Concentrations of PCE, TCE and its Associated Breakdown Products – Zone 3
South-Eastern Corner of Main Production Building & Southern End of East Road

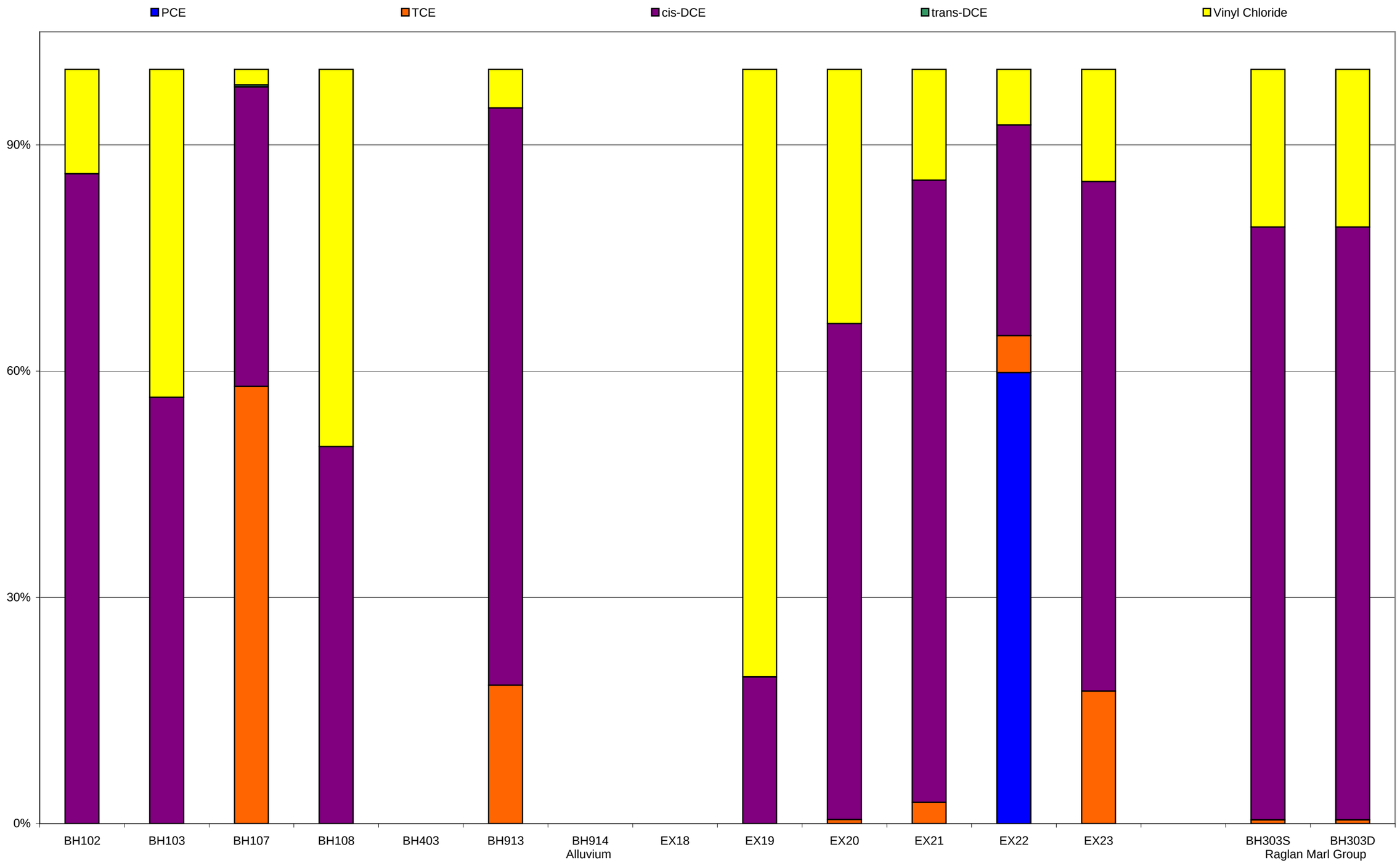


Figure 35D
Measured Concentrations of PCE, TCE and its Associated Breakdown Products – Zone 3

Central Area of Main Production Building

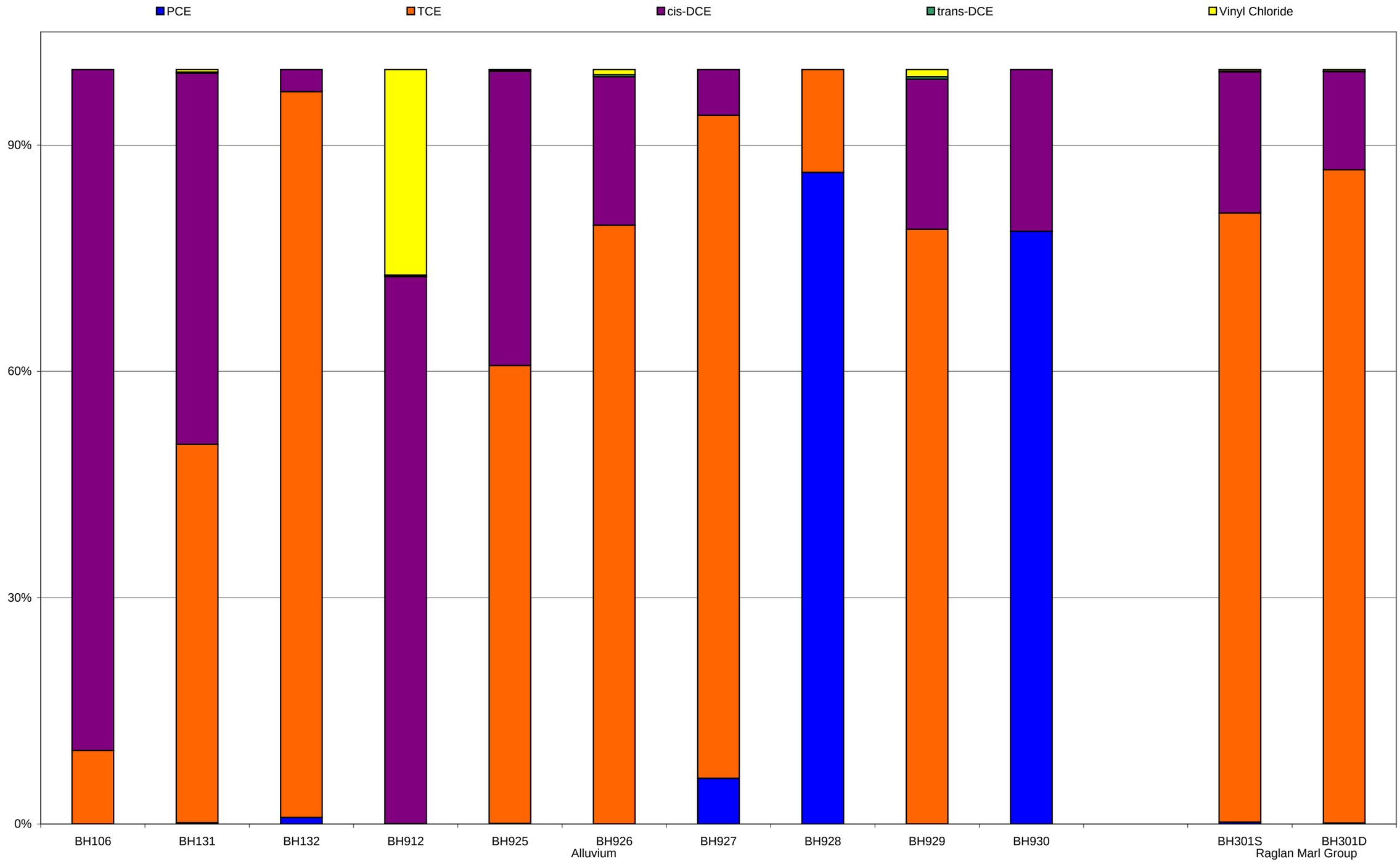


Figure 36A
Concentration of VOC (µg/L) Over Time
Zone 1

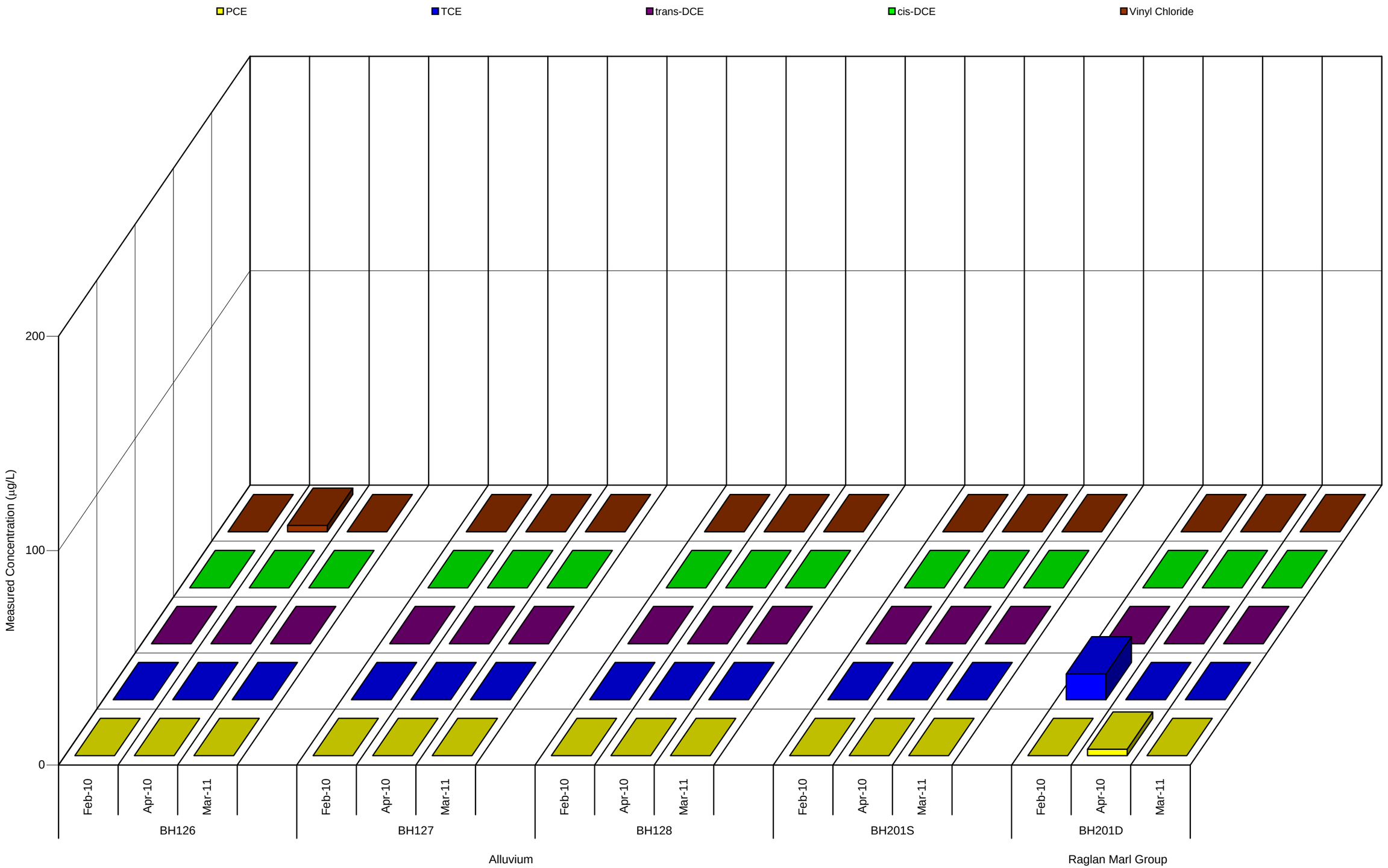


Figure 36B
Measured Concentration of VOC (µg/L) Over Time
Zone 2

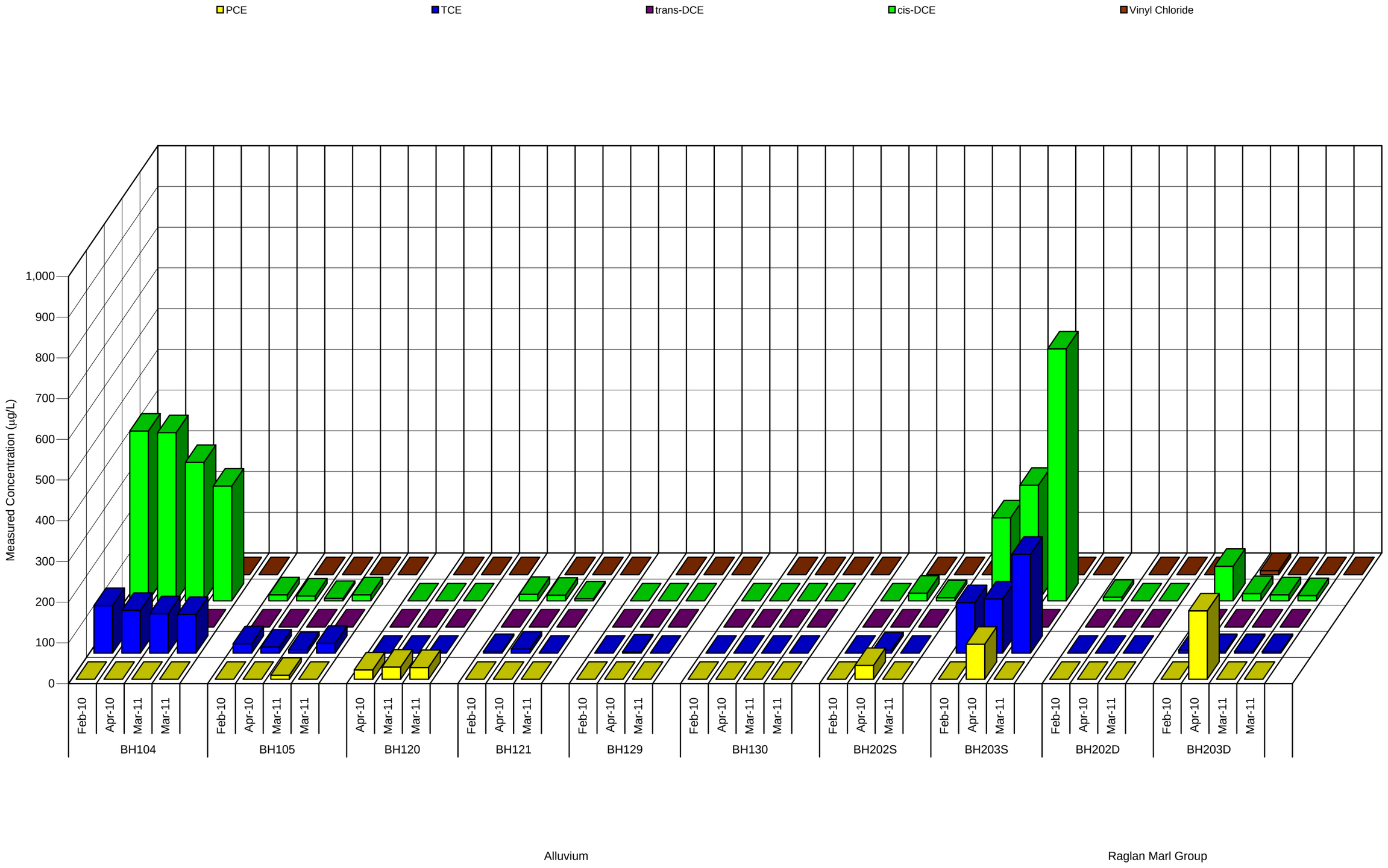


Figure 36C
Measured Concentration of VOC (µg/L) Over Time
Zone 3 - Alluvium

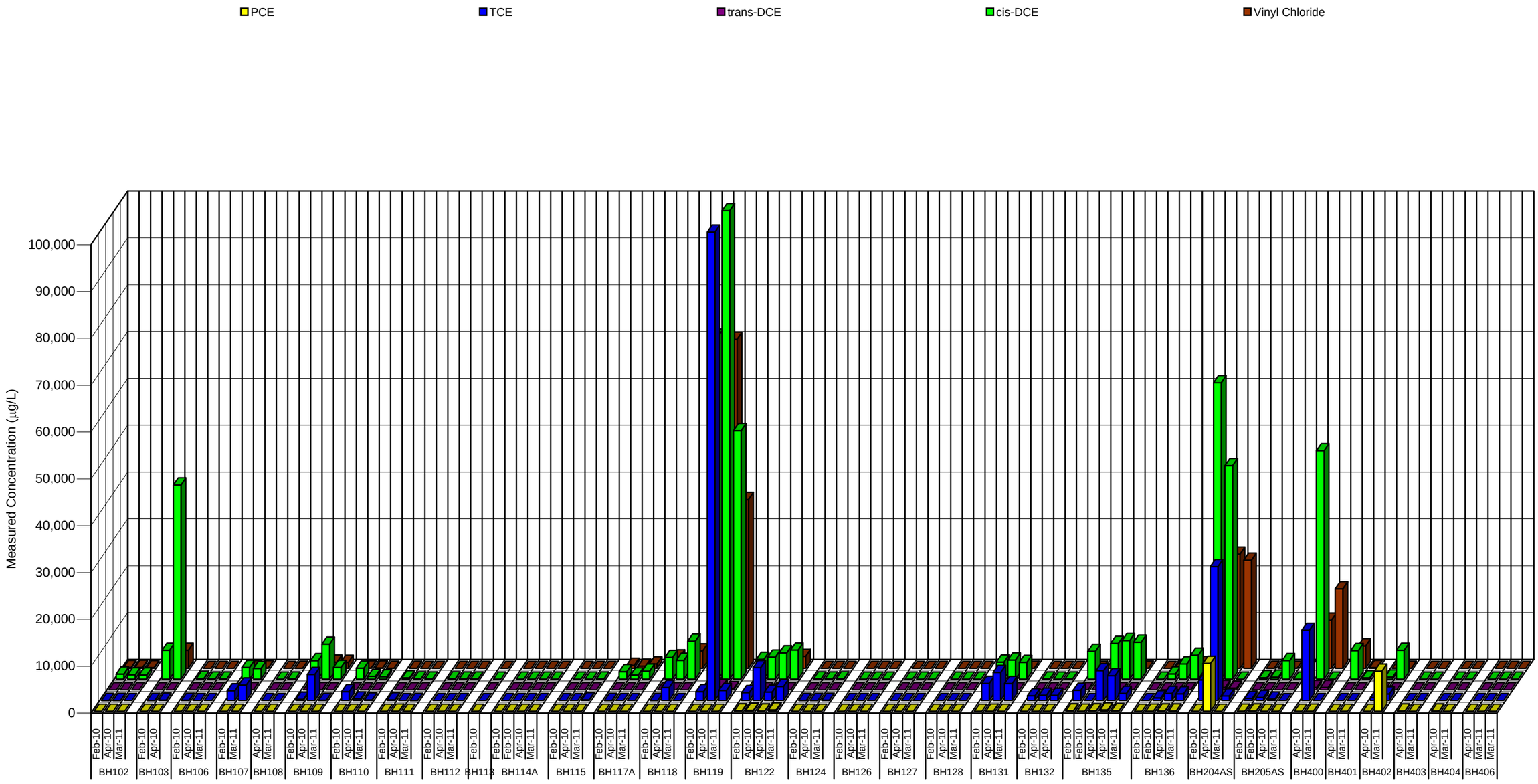


Figure 36D
Measured COncntration of VOC (µg/L) Over Time
Zone 3 - Raglan Marl Group

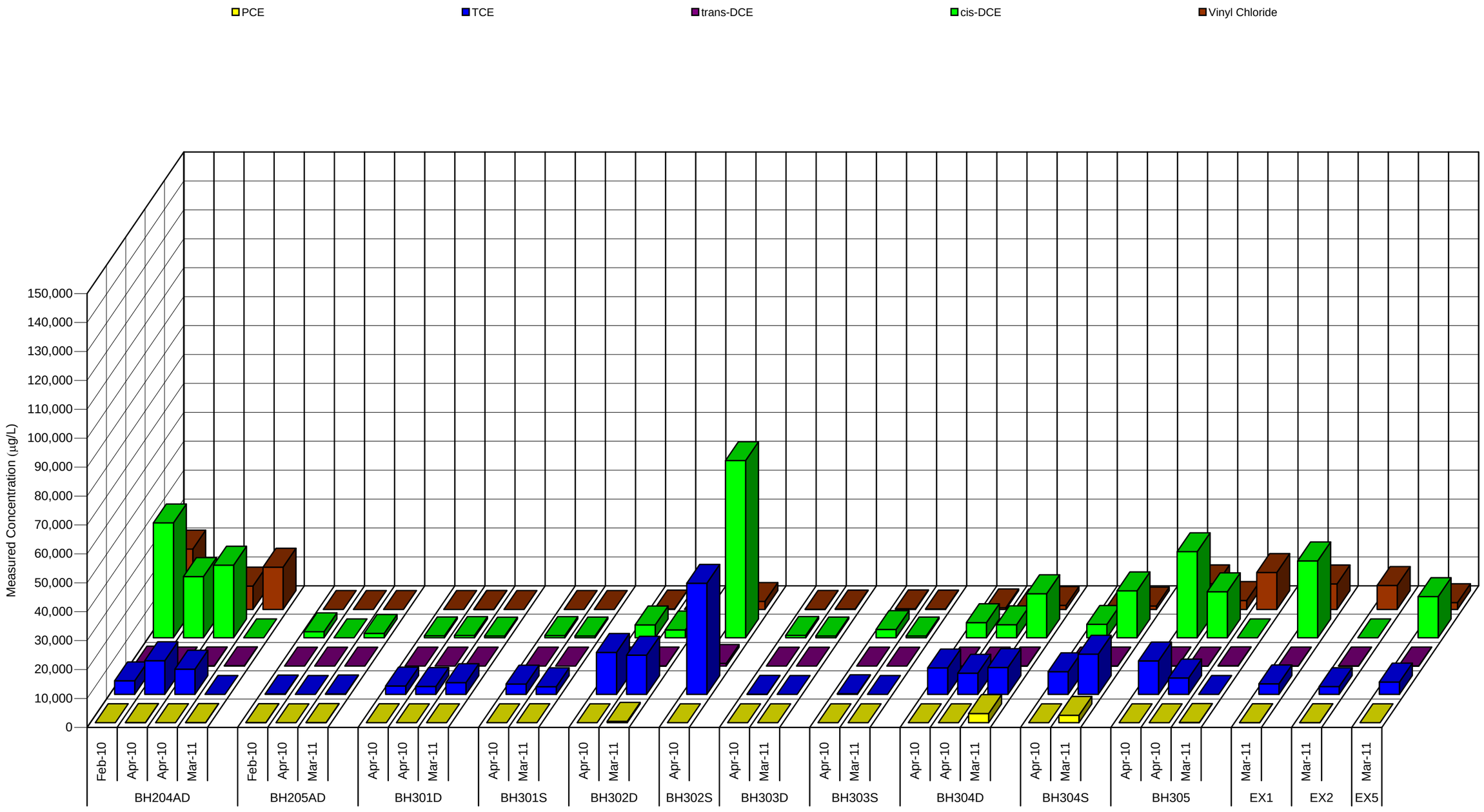
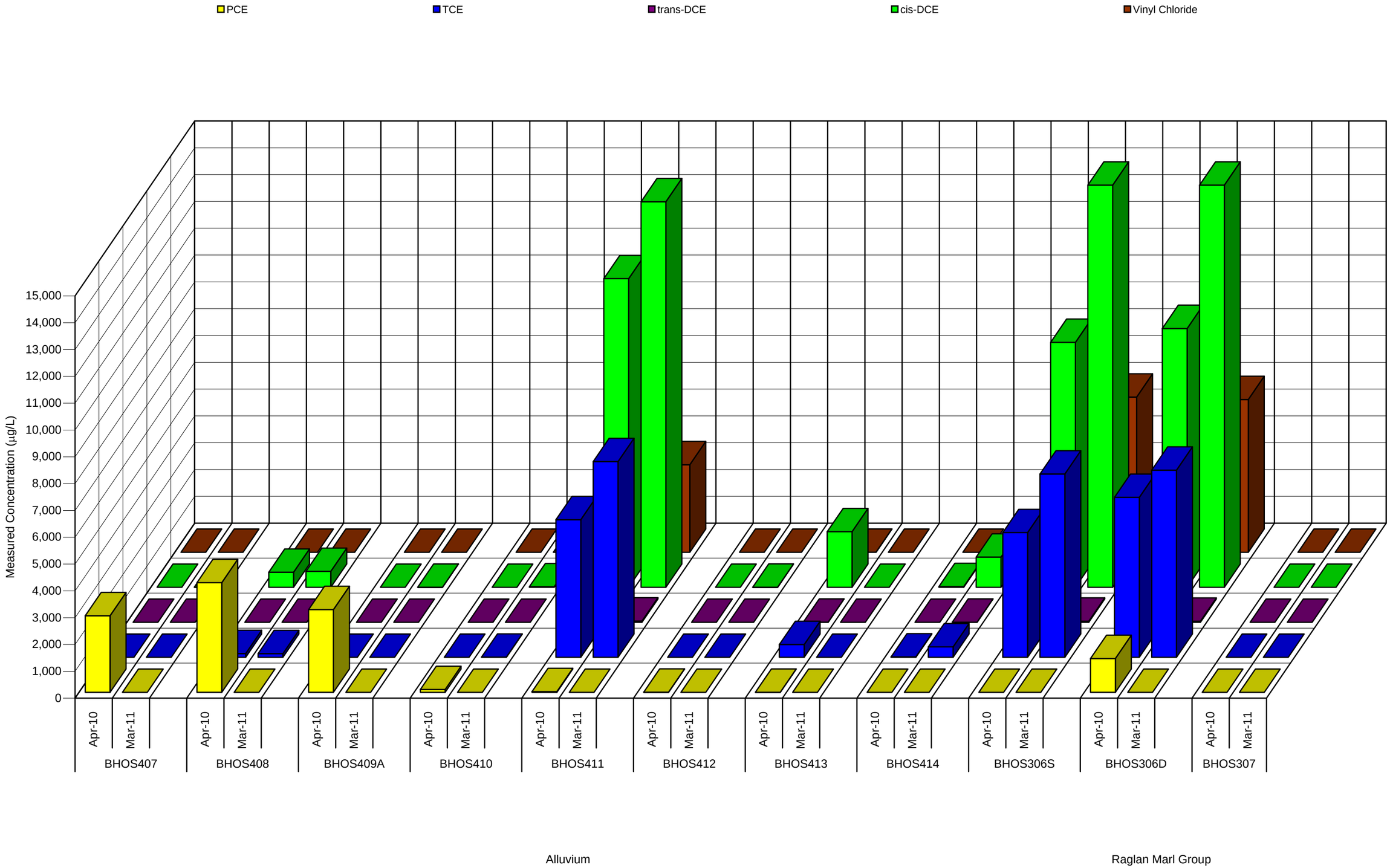
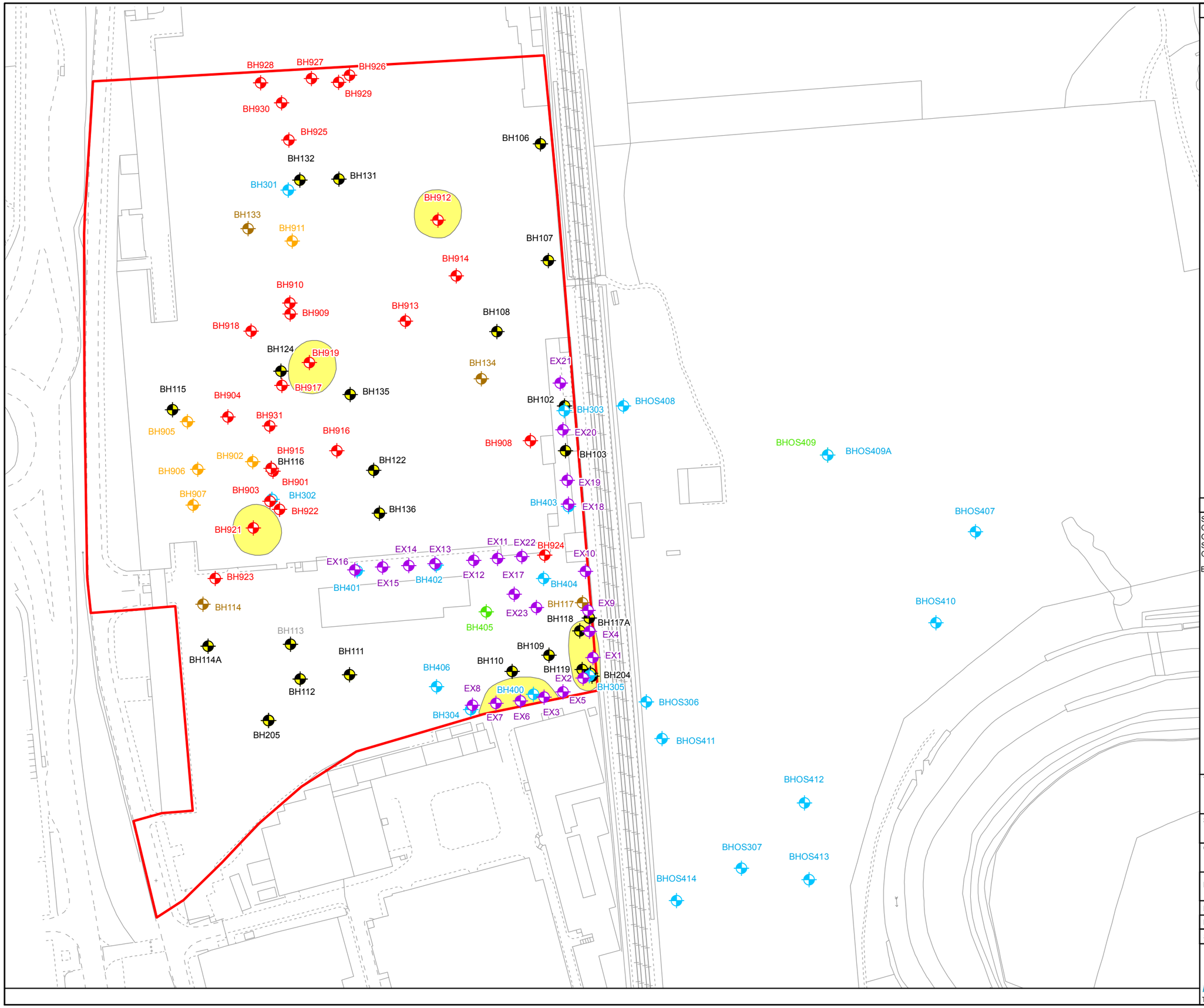


Figure 36E
Measured Concentration of VOC (mg/L) Over Time
Off-Site Wells





LEGEND

- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- ZONE 3 BOUNDARY
- MEASURED CONCENTRATION OF COC > SSAC

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

0 5 10 20 30 40 50 Metres

N

TITLE: **ANTICIPATED EXTENT OF IMPACTS TO GROUNDWATER QUALITY >SSAC PROTECTIVE OF HUMAN HEALTH**

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 37**	
DATE :	19/05/11	DRAWN BY :	RJM
DRG No. :	909362914 GIS		
SCALE :	**1 : 1,500**	PRINT :	**A3**

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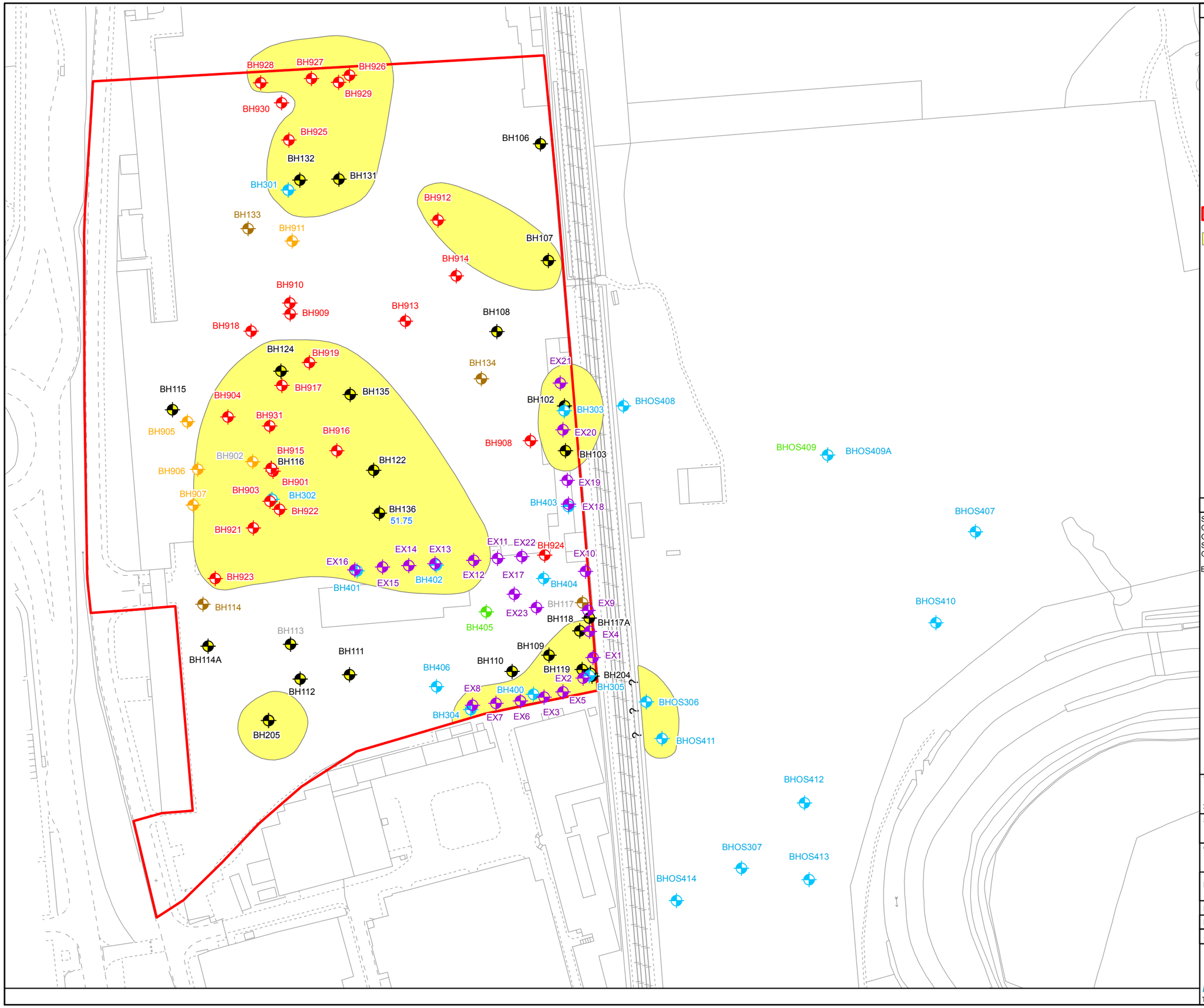

LEGEND

- BOREHOLE LOCATION - PHASE II ESA
- BOREHOLE LOCATION - PHASE IIB ESA
- BOREHOLE LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- MONITORING WELL LOCATION - PHASE II ESA
- MONITORING WELL LOCATION - PHASE IIB ESA
- MONITORING WELL LOCATION - SUPPLEMENTARY SITE INVESTIGATION
- EXTRACTION WELL - SUPPLEMENTARY SITE INVESTIGATION
- ZONE 3 BOUNDARY
- MEASURED CONCENTRATION OF COC > SSAC

NOTES

SYMBOLS FOR BOREHOLES, TRIAL PITS AND OTHER SPECIFIC FEATURES ARE REPRESENTATIONS OF LOCATION ONLY AND UNLESS OTHERWISE SPECIFIED, DO NOT REPRESENT THE TRUE SIZE OF THE FEATURE.

BOREHOLE = NO MONITORING WELL INSTALLED

0 5 10 20 30 40 50 Metres

N

TITLE:
ANTICIPATED EXTENT OF IMPACTS TO GROUNDWATER QUALITY >SSAC PROTECTIVE OF WATER RESOURCES

SITE : **CWMBRAN**

CLIENT : **MERITOR HVBS (UK) LIMITED**

PROJECT :	**90936.29**	**FIGURE 38**	
DATE :	19/05/11	DRAWN BY :	RJM
DRG No. :	909362915 GIS		
SCALE :	**1 : 1,500**	PRINT :	**A3**

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APPENDICES

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Appendix A
Legislative Context and Regulatory Guidance

APPENDIX A
Regulatory and Legislative Context

Land contamination is generally dealt with by the following types of regulation:

- Acts of Parliament to investigate and remedy harm caused by land contamination;
- Conditions placed upon Planning Permissions for the redevelopment of land; and,
- Acts of Parliament and Regulations for the control of waste.

In Wales land contamination is identified and dealt with through Acts / Regulations including:

- The Contaminated Land (Wales) Regulations (2006);
- Part 2A of the Environmental Protection Act (1990);
- The Environment Act 1995;
- The Town and Country Planning Act (1990);
- The Environmental Permitting (England and Wales) Regulations (2007);
- The Water Resources Act (1991);
- The Water Act (2003);;
- The Environmental Damage (Prevention and Remediation) (Wales) Regulations (2009); and,
- The Groundwater (England and Wales) Regulations (2009).

Part 2A of the Environmental Protection Act 1990

Part 2A of the Environmental Protection Act 1990 (which was inserted by Section 57 of the Environment Act 1995) created a regime for the identification and remediation of contaminated land. Section 78A(2) of the Environmental Protection Act 1990 defines contaminated land for the purposes of Part 2A as:

'*any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:*

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or (b) pollution of controlled waters is being, or is likely to be caused.'[1]

Harm is defined under section 78A of the Environmental Protection Act as meaning 'harm to the health of living organisms or other interference with the ecological systems of which they form part and, in the case of man, includes harm to his property'. Types of harm are related to specific receptors in order to determine whether they can be regarded as "significant", as defined in Table A of Part 3 of the Welsh Assembly Government (2006)[2] statutory guidance.

Part 2A sets the definition of contaminated land within the context of the 'suitable for use' approach. The legal definition of contaminated land is also discussed within Statutory Guidance released by DEFRA (2008)[3], although this is currently only applicable for England the paper was prepared in consultation with the other UK countries.

The 'suitable for use' approach underlies the assessment process, and is based on the principles of risk assessment, including the concept of the 'pollutant linkage'.

In the event that there are unacceptable levels of risk posed by a site, a remediation notice can be served under the contaminated land regime introduced under Part 2A of the Environmental Protection Act 1990.

Regulation of Development on Land Affected by Contamination

-

[1] Definition to be amended to "significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused" under the Water Act 2003
[2] Part 2A. Statutory Guidance on Contaminated Land. Welsh Assembly Government, December 2006
[3] Guidance on the legal definition of contaminated land. DEFRA July 2008

Management of risks from contamination in development of land is also regulated in Wales under the Town and Country Planning Act 1990. Land contamination is a material planning consideration within this planning regime. The Local Planning Authority may impose conditions on the development during planning that include preliminary risk assessment, site investigation, risk assessment and remediation. The Environment Agency may use its role as a statutory consultee to provide the Local Planning Authority with advice.

Assessment of risk is again based on the pollutant linkage concept. The aim of risk management in the development should be to render the land suitable for the proposed use and, therefore, to prevent consideration of the site under Part 2A.

The Welsh Assembly Government document Planning Policy Wales (March 2002) provides guidance on the relationship between development and the management of risks from land contamination caused by historical use. The Building Regulations 2000, made under the Building Act 1984, also require measures to be taken to protect new buildings and their occupants from the effects of contamination.

Voluntary Remediation Action

Voluntary remediation action on contamination resulting from historical activities can often anticipate future remediation requirements, such as through the Planning regime, and is encouraged, especially where the site is not being assessed under Part 2A.

Environmental Damage

The Environmental Damage (Prevention and Remediation) Regulations 2009 came into force on 1st March 2009 to implement EC Directive 2004/35 on environmental liability with regard to the prevention and remedying of environmental damage.

These Regulations do not apply retrospectively; environmental damage that took place before the Regulations came into force (1st March 2009), or damage that takes place (or is likely to take place) after that date but is caused by an incident, event or emission that occurred before that date are exempt from the requirements of the Regulations.

The Regulation is concerned with preventing environmental damage. It requires that all operators of activities that cause an imminent threat of environmental damage to take all reasonably practical steps to prevent the damage. Where damage has already been caused, the operator must take all reasonably practical steps to prevent further damage from occurring.

Non-statutory regulatory technical guidance Documents

The UK non-statutory regulatory technical guidance on the assessment of land contamination, primarily released as part of the Contaminated Land Exposure Assessment (CLEA) methodology (DEFRA and EA) has recently been updated. New guidance has been released by the EA, for use in England and Wales. The following documents currently present guiding principles in investigating and assessing potentially contaminated land, which are generally adopted in considering sites within any of the legal frameworks discussed above, or when considering voluntary remediation action:

- *Investigation of potentially contaminated sites – Code of Practice* (British Standard 10175: 2001).
- Contaminated Land Report CLR11 *Model Procedures for the Management of Land Contamination.* (DEFRA and EA, 2004).
- *Human health toxicological assessment of contaminants in soil* Environment Agency Science Report SC050021/SR2 (EA, 2009)
- *Updated technical background to the CLEA model* Environment Agency Science Report SC050021/SR3 (EA, 2009)
- *Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values*

Environment Agency Science Report SC050021/SR7 (EA, 2008)

- *An ecological risk assessment framework for contaminants in soil.* Environment Agency Science Report SC070009/SR1 and related reports S2a-e
- *Groundwater Protection: Policy and Practice*, Environment Agency GP3 Parts 1-4
- *Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination* (EA of England and Wales, 2006) developed in consultation with the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Heritage and Environment Service.
- *Assessing risks posed by hazardous ground gases to buildings* Report C665 (CIRIA, 2007)
- *BS 8485:2007 Code of practice for the characterization and remediation from ground gas in affected developments(British Standards Institution, 2007)*
- *Risk Based Corrective Action (RBCA) Methodology* (ASTM designation E1739-95 & E2081-00).
- *DoE Industry Profiles*

Appendix B
Groundwater Analytical data February – March 2011 (on CD)

Appendix B
Table 1
Ground Level and Groundwater Elevations

Monitoring Well	11 - 12 January 2011				
	Monitoring Well Elevation (mAOD)	Depth to LNAPL (mbgl)	Depth to Groundwater (mbgl)	LNAPL Thickness (mm)	Elevation of Groundwater (mAOD)
	Alluvium				
BH102	54.08	2.10	2.89	790	51.19
BH103	53.86	1.87	3.09	1,219	50.77
BH104	54.53	-	0.98	-	53.55
BH105	54.32	-	1.23	-	53.08
BH106	54.33	-	1.80	-	52.52
BH107	54.34	-	2.37	-	51.97
BH108	54.48	2.48	2.59	110	51.89
BH109	53.52	1.89	2.52	628	51.00
BH110	53.49	1.88	1.90	19	51.59
BH111	53.51	-	2.54	-	50.97
BH112	53.53	-	1.79	-	51.74
BH113	No monitoring well installed in borehole				
BH114	No monitoring well installed in borehole				
BH114A	53.52	-	1.79	-	51.73
BH115	54.58	1.81	1.82	1	52.76
BH116	54.57	DRY			
BH117	No monitoring well installed in borehole				
BH117A	53.50	2.07	2.29	219	51.21
BH118	53.49	2.21	2.44	234	51.05
BH119	53.44	2.24	2.60	361	50.84
BH120	54.59	Not Measured			
BH121	54.59	-	1.84	-	52.75
BH122	54.56	2.62	2.73	110	51.83
BH124	54.59	-	2.08	-	52.52
BH126	58.28	-	1.27	-	57.01
BH127	57.35	-	1.68	-	55.67
BH128	57.76	-	0.66	-	57.10
BH129	54.40	-	0.82	-	53.58
BH130	54.44	-	0.54	-	53.90
BH131	54.59	-	1.88	-	52.71
BH132	54.59	-	2.80	-	51.78
BH133	No monitoring well installed in borehole				
BH134	54.54	Not Measured			
BH135	54.61	2.29	2.42	121	52.19
BH136	54.56	2.67	3.65	980	50.91
BH201S	58.16	-	1.55	-	56.61
BH202S	54.43	Not Measured			
BH203S	54.37	Not Measured			
BH204	No monitoring well installed in borehole				
BH204AS	53.49	2.24	4.27	2,027	49.22
BH205	No monitoring well installed in borehole				
BH205AS	53.52	-	2.00	-	51.52
BH400	53.29	Not Measured			
BH401	53.34	Not Measured			
BH402	53.34	Not Measured			
BH403	53.60	Not Measured			
BH404	53.41	Not Measured			
BH405	No monitoring well installed in borehole				
BH406	53.51	Not Measured			
BH901	54.56	-	2.65	-	51.92
BH902	No monitoring well installed in borehole				
BH903	54.57	-	2.39	-	52.18
BH904	54.59	-	2.92	-	51.67
BH905	No monitoring well installed in borehole				
BH906	No monitoring well installed in borehole				
BH907	No monitoring well installed in borehole				
BH908	54.52	Not Measured			
BH909	54.61	-	1.98	-	52.63
BH910	54.62	-	1.99	-	52.63
BH911	54.60				
BH912	54.56	-	2.30	-	52.27
BH913	54.58	2.38	2.46	82	52.12
BH914	54.54	-	2.39	-	52.15
BH915	54.57	-	2.28	-	52.29
BH916	54.54	DRY			

Notes

mAOD	Metres Above Ordnance Datum
mbgl	Metres Below Ground Level
LNAPL	Light Non-Aqueous Phase Liquid
DRY	No water present in monitoring well
-	No LNAPL encountered

Appendix B
Table 1
Ground Level and Groundwater Elevations

Monitoring Well	11 - 12 January 2011				
	Monitoring Well Elevation (mAOD)	Depth to LNAPL (mbgl)	Depth to Groundwater (mbgl)	LNAPL Thickness (mm)	Elevation of Groundwater (mAOD)
	Alluvium				
BH917	54.61	2.14	2.14	1	52.48
BH918	54.56	-	1.96	-	52.61
BH919	54.59	2.15	2.16	8	52.43
BH921	54.57	-	2.61	-	51.96
BH922	54.57	2.47	2.47	1	52.10
BH923	53.42	-	1.48	-	51.94
BH924	53.41	-	1.22	-	52.18
BH925	54.59	-	1.76	-	52.83
BH926	54.57	-	1.80	-	52.76
BH927	54.60	-	1.79	-	52.80
BH928	54.61	-	1.73	-	52.88
BH929	54.57	-	2.81	-	51.77
BH930	54.60	-	1.75	-	52.85
BH931	54.60	Not Measured			
EX03	53.33	1.89	1.89	1	51.44
EX04	53.49	-	2.09	-	51.40
EX06	53.39	2.20	2.21	6	51.18
EX07	53.39	2.11	2.29	185	51.10
EX08	53.40	1.90	2.67	771	50.73
EX09	53.52	2.08	2.10	11	51.43
EX10	53.59	2.08	2.08	1	51.51
EX11	53.37	-	1.26	-	52.11
EX12	53.34	-	1.36	-	51.98
EX13	53.36	-	1.44	-	51.92
EX14	53.38	-	1.40	-	51.98
EX15	53.36	1.40	1.82	419	51.54
EX16	53.37	-	1.43	-	51.94
EX17	53.47	-	1.66	-	51.81
EX18	53.61	-	1.81	-	51.81
EX19	53.73	1.83	2.51	683	51.22
EX20	53.98	2.08	2.18	104	51.80
EX21	54.25	2.28	2.32	36	51.93
EX22	53.35	-	1.20	-	52.16
EX23	53.51	1.73	1.89	156	51.62
BHOS407	52.45	-	0.26	-	52.19
BHOS408	52.65	-	0.98	-	51.67
BHOS409	52.36	-	0.29	-	52.07
BHOS410	51.82	-	0.42	-	51.40
BHOS411	51.43	-	1.09	-	50.34
BHOS412	50.70	-	0.62	-	50.08
BHOS413	50.70	-	1.29	-	49.40
BHOS414	51.18	-	0.81	-	50.37
	Raglan Marl Group				
BH201D	58.16	-	2.05	-	56.12
BH202D	54.43	-	0.76	-	53.67
BH203D	54.37	-	0.38	-	53.99
BH204AD	53.49	-	3.78	-	49.71
BH205AD	53.52	-	2.61	-	50.91
BH301S	54.60	-	2.25	-	52.36
BH301D	54.60	-	2.58	-	52.03
BH302D	54.55	2.87	2.87	1	51.68
BH303S	54.08	-	3.53	-	50.55
BH303D	54.08	4.19	4.19	1	49.89
BH304S	53.43	-	2.62	-	50.82
BH304D	53.43	-	3.33	-	50.11
BH305	53.46	3.68	4.52	845	48.94
EX01	53.63	-	2.49	-	51.14
EX02	53.38	2.38	2.43	54	50.95
EX05	53.30	2.27	2.27	1	51.03
BHOS306	51.60	-	1.99	-	49.61
BHOS306	51.60	-	1.99	-	49.61
BHOS307	50.73	-	1.11	-	49.62

Notes

mAOD	Metres Above Ordnance Datum
mbgl	Metres Below Ground Level
LNAPL	Light Non-Aqueous Phase Liquid
DRY	No water present in monitoring well
-	No LNAPL encountered

Appendix B
Table 1
Ground Level and Groundwater Elevations

		15 February - 23 March 2011			
Corrected Elevation of Groundwater for (mAOD)	Monitoring Well	Monitoring Well Elevation (mAOD)	Depth to LNAPL (mbgl)	Depth to Groundwater (mbgl)	LNAPL Thickness (mm)
		Alluvium			
51.93	**BH102**	54.08	2.50	3.11	613
51.90	**BH103**	53.86	2.27	3.24	970
-	**BH104**	54.53	-	1.03	-
-	**BH105**	54.32	-	1.36	-
-	**BH106**	54.33	-	2.01	-
-	**BH107**	54.34	-	2.44	-
52.00	**BH108**	54.48	2.68	2.78	102
51.58	**BH109**	53.52	2.39	3.91	1,518
51.61	**BH110**	53.49	-	2.22	-
-	**BH111**	53.51	-	1.90	-
-	**BH112**	53.53	-	3.12	-
	BH113	No monitoring well installed in borehole			
	BH114	No monitoring well installed in borehole			
-	**BH114A**	53.52	-	1.94	-
52.76	**BH115**	54.58	-	2.15	-
	BH116	54.57	DRY		
	BH117	No monitoring well installed in borehole			
51.42	**BH117A**	53.50	2.46	2.52	63
51.26	**BH118**	53.49	2.41	2.53	123
51.17	**BH119**	53.44	Not Measured		
	BH120	54.59	-	1.40	-
-	**BH121**	54.59	-	1.87	-
51.93	**BH122**	54.56	2.56	3.09	526
-	**BH124**	54.59	-	2.34	-
-	**BH126**	58.28	-	1.50	-
-	**BH127**	57.35	-	1.88	-
-	**BH128**	57.76	-	0.96	-
-	**BH129**	54.40	-	0.91	-
-	**BH130**	54.44	-	0.65	-
-	**BH131**	54.59	-	1.99	-
-	**BH132**	54.59	-	1.96	-
	BH133	No monitoring well installed in borehole			
	BH134	54.54	2.59	No groundwater encountered.	
52.30	**BH135**	54.61	2.29	2.67	376
51.82	**BH136**	54.56	2.60	4.24	1,640
-	**BH201S**	58.16	-	1.71	-
	BH202S	54.43	-	0.83	-
	BH203S	54.37	-	1.04	-
	BH204	No monitoring well installed in borehole			
51.10	**BH204AS**	53.49	2.72	4.27	1,553
	BH205	No monitoring well installed in borehole			
-	**BH205AS**	53.52	-	2.27	-
	BH400	53.29	2.51	2.52	11
	BH401	53.34	1.63	1.94	306
	BH402	53.34	1.76	2.21	449
	BH403	53.60	2.17	2.78	608
	BH404	53.41	1.79	2.56	768
	BH405	No monitoring well installed in borehole			
	BH406	53.51	1.78	1.79	6
-	**BH901**	54.56	-	2.65	-
	BH902	No monitoring well installed in borehole			
-	**BH903**	54.57	-	2.79	-
-	**BH904**	54.59	-	2.32	-
	BH905	No monitoring well installed in borehole			
	BH906	No monitoring well installed in borehole			
	BH907	No monitoring well installed in borehole			
	BH908	54.52	2.76	No groundwater encountered.	
-	**BH909**	54.61	-	2.19	-
-	**BH910**	54.62	-	2.18	-
	BH911	No monitoring well installed in borehole			
-	**BH912**	54.56	2.40	2.44	39
52.19	**BH913**	54.58	2.50	2.52	22
-	**BH914**	54.54	2.54	2.54	1
-	**BH915**	54.57	DRY		
	BH916	54.54	DRY		

Notes

mAOD	Metres Above Ordnance Datum
mbgl	Metres Below Ground Level
LNAPL	Light Non-Aqueous Phase Liquid
DRY	No water present in monitoring well
-	No LNAPL encountered

Appendix B
Table 1
Ground Level and Groundwater Elevations

		15 February - 23 March 2011			
Corrected Elevation of Groundwater for (mAOD)	Monitoring Well	Monitoring Well Elevation (mAOD)	Depth to LNAPL (mbgl)	Depth to Groundwater (mbgl)	LNAPL Thickness (mm)
		Alluvium			
52.48	**BH917**	54.61	-	2.39	-
-	**BH918**	54.56	-	2.19	-
52.43	**BH919**	54.59	2.27	2.39	119
-	**BH921**	54.57	-	3.14	-
52.10	**BH922**	54.57	-	2.83	-
-	**BH923**	53.42	-	2.11	-
-	**BH924**	53.41	-	1.73	-
-	**BH925**	54.59	-	1.88	-
-	**BH926**	54.57	-	1.88	-
-	**BH927**	54.60	-	1.85	-
-	**BH928**	54.61	-	1.81	-
-	**BH929**	54.57	-	1.89	-
-	**BH930**	54.60	-	1.85	-
	BH931	54.60			Not Measured
51.44	**EX03**	53.33	-	2.61	-
-	**EX04**	53.49	-	2.40	-
51.19	**EX06**	53.39	-	2.57	-
51.27	**EX07**	53.39	2.41	2.56	146
51.45	**EX08**	53.40	2.30	2.57	274
51.44	**EX09**	53.52	2.51	2.51	1
51.51	**EX10**	53.59	-	2.52	-
-	**EX11**	53.37	-	1.27	-
-	**EX12**	53.34	-	1.44	-
-	**EX13**	53.36	-	1.55	-
-	**EX14**	53.38	-	1.59	-
51.93	**EX15**	53.36	1.61	1.78	172
-	**EX16**	53.37	-	1.53	-
-	**EX17**	53.47	2.02	2.04	26
-	**EX18**	53.61	-	2.15	-
51.86	**EX19**	53.73	2.19	2.30	110
51.90	**EX20**	53.98	2.41	2.49	76
51.96	**EX21**	54.25	2.65	3.03	380
-	**EX22**	53.35	-	1.66	-
51.77	**EX23**	53.51	2.06	2.19	135
-	**BHOS407**	52.45	-	0.60	-
-	**BHOS408**	52.65	-	1.16	-
-	**BHOS409**	52.36	-	0.52	-
-	**BHOS410**	51.82	-	0.78	-
-	**BHOS411**	51.43	-	1.46	-
-	**BHOS412**	50.70	-	1.00	-
-	**BHOS413**	50.70	-	1.25	-
-	**BHOS414**	51.18	-	1.77	-
		Raglan Marl Group			
-	**BH201D**	58.16	-	1.77	-
-	**BH202D**	54.43	-	0.83	-
-	**BH203D**	54.37	-	0.00	-
-	**BH204AD**	53.49	-	3.80	-
-	**BH205AD**	53.52	-	2.32	-
-	**BH301S**	54.60	-	2.55	-
-	**BH301D**	54.60	-	2.88	-
51.68	**BH302D**	54.55	-	3.38	-
-	**BH303S**	54.08	-	2.78	-
49.89	**BH303D**	54.08	-	4.84	-
-	**BH304S**	53.43	-	2.94	-
-	**BH304D**	53.43	-	3.96	-
49.72	**BH305**	53.46	4.19	4.66	470
-	**EX01**	53.63	2.85	2.85	3
51.00	**EX02**	53.38	2.75	2.75	1
51.03	**EX05**	53.30	2.58	2.84	262
-	**BHOS306**	51.60	-	1.90	-
-	**BHOS306**	51.60	-	2.25	-
-	**BHOS307**	50.73	-	2.37	-

Notes

mAOD	Metres Above Ordnance Datum
mbgl	Metres Below Ground Level
LNAPL	Light Non-Aqueous Phase Liquid
DRY	No water present in monitoring well
-	No LNAPL encountered

Appendix B
Table 1
Ground Level and Groundwater Elevations

Elevation of Groundwater (mAOD)	Corrected Elevation of Groundwater for (mAOD)
50.97	51.54
50.62	51.52
53.50	-
52.96	-
52.32	-
51.90	-
51.70	51.80
49.61	51.02
51.27	-
51.60	-
50.42	-
51.58	-
52.43	-
50.98	51.04
50.96	51.07
53.19	-
52.72	-
51.47	51.96
52.26	-
56.78	-
55.47	-
56.81	-
53.50	-
53.79	-
52.60	-
52.63	-
LNAPL present to base of well	
51.94	52.29
50.32	51.85
56.45	-
53.60	-
53.33	-
49.22	50.66
	-
50.77	50.78
51.40	51.69
51.14	51.55
50.82	51.39
50.85	51.56
51.72	51.72
	-
51.78	-
52.27	-
LNAPL present to base of well	
52.42	-
52.44	-
52.12	52.16
52.06	52.08
52.00	52.00

Appendix B
Table 1
Ground Level and Groundwater Elevations

Elevation of Groundwater (mAOD)	Corrected Elevation of Groundwater for (mAOD)
52.22	-
52.38	-
52.20	52.31
51.43	-
51.74	-
51.31	-
51.68	-
52.72	-
52.69	-
52.74	-
52.80	-
52.68	-
52.75	-
50.72	-
51.09	-
50.82	-
50.84	50.97
50.83	51.08
51.01	51.01
51.07	-
52.10	-
51.90	-
51.81	-
51.79	-
51.58	51.74
51.84	-
51.43	51.45
51.46	-
51.43	51.53
51.49	51.56
51.22	51.57
51.69	-
51.32	51.45
51.85	-
51.49	-
51.84	-
51.04	-
49.97	-
49.70	-
49.45	-
49.41	-
56.40	-
53.59	-
54.37	-
	-
51.20	-
52.05	-
51.73	-
51.17	-
51.30	-
49.24	-
50.50	-
49.48	-
48.80	49.24
50.78	50.78
50.63	50.63
50.46	50.70
49.71	-
49.35	-
48.36	-

Appendix B
Table 2
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 1

	Monitoring Well	SSAC	Alluvium				Raglan Marl Group	Laboratory Method Detection Limit
		Human Health	BH126	BH127	BH128	BH201S	BH201D	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**							
	$>C_5$-C_6	*	-	-	-	-	-	5
	$>C_6$-C_8	*	-	-	-	-	-	5
	$>C_8$-C_{10}	ND	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	10
	Aromatics							
	$>C_6$-C_7	*	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	10
	PRO	**	-	-	-	-	-	Sum C_4-C_{12}
	EPH	**	-	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	-	-	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	1
	Benzene	19,000	-	-	-	-	-	1
	Toluene	ND	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	2
	o -Xylene		-	-	-	-	-	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 3
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 2

	Monitoring Well	SSAC	Alluvium															Raglan Marl Group			Laboratory Method Detection Limit
		Human Health	BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH120	BH120 Duplicate	BH121	BH129	BH130	BH130 Duplicate	BH202S	BH203S	BH203S Duplicate	BH926	BH927	BH928	BH202D	BH203D	BH203D Duplicate	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																				
	$>C_5$-C_6	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_6$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	271	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	Aromatics																				
	$>C_6$-C_7	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	PRO	**	-	-	-	-	-	-	-	-	-	-	-	271	-	-	-	-	-	-	-	Sum C_4-C_{12}
	EPH	**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	-	-	-	-	-	-	-	-	-	271	-	-	-	-	-	-	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	130,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 4
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3

	Monitoring Well	SSAC	Alluvium																Laboratory Method Detection Limit
		Human Health	BH106	BH107	BH108	BH110	BH111	BH112	BH115	BH117A	BH118	BH119	BH124	BH131	BH132	BH204AS	BH205AS	BH400	BH401	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																			
	$>C_5$-C_6	*	-	-	-	-	-	-	-	-	-	64	-	-	-	70	-	90	-	5
	$>C_6$-C_8	*	-	-	-	-	9	12	-	-	-	44	-	-	-	21	-	-	-	5
	$>C_8$-C_{10}	ND	-	-	-	-	-	-	-	-	7	31	-	-	-	51	-	28	-	5
	$>C_{10}$-C_{12}	ND	-	-	150	-	-	-	-	20	-	11	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	1,240	-	-	-	-	240	-	480	-	-	-	50	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	1,510	-	-	-	-	100	-	6,970	-	-	-	1,040	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	-	-	-	-	6,090	-	-	-	1,010	-	-	-	10
	Aromatics																			
	$>C_6$-C_7	*	-	-	-	-	-	-	-	-	-	5	-	-	-	5	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	5	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	-	-	-	13	320	-	-	-	10	-	43	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	5,680	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	50	-	-	-	-	-	-	5,310	-	-	-	30	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	440	-	-	-	-	190	-	-	-	-	-	750	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	240	-	-	-	-	60	-	-	-	-	-	710	-	-	-	10
	PRO	**	-	-	150	-	9	12	-	20	20	6,155	-	-	-	162	-	166	-	Sum C_4-C_{12}
	EPH	**	-	-	3,480	-	-	-	-	590	-	18,850	-	-	-	3,590	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	3,630	-	9	12	-	610	20	25,005	-	-	-	3,752	-	166	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	190,000	-	-	-	-	-	-	-	-	-	3	-	-	-	5	-	3	-	1
	Toluene	ND	-	-	-	-	-	-	-	-	-	3	-	-	-	5	-	5	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	5	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	13	-	2
	o -Xylene		-	-	-	-	-	-	-	2	-	-	-	-	-	2	-	15	-	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 4
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3

	Monitoring Well	SSAC	Alluvium																		Laboratory Method Detection Limit
		Human Health	BH400	BH401	BH402	BH406	BH901	BH903	BH904	BH909	BH910	BH912	BH913	BH914	BH917	BH918	BH921	BH922	BH923	BH923 Duplicate	BH924	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																					
	$>C_5$-C_6	*	90	-	-	-	-	-	-	-	-	-	-	-	-	-	159	216	-	-	-	5
	$>C_6$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	459	-	-	-	-	5
	$>C_8$-C_{10}	ND	28	-	-	-	-	-	-	-	-	-	-	-	-	-	85	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	40	10	-	-	-	-	-	40	210	300	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	70	800	-	-	-	-	-	570	2,600	2,640	270	-	480	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	870	910	-	-	-	-	-	210	3,640	2,970	1,310	-	1,920	-	-	-	-	10
	Aromatics																					
	$>C_6$-C_7	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	5
	$>C_7$-C_8	*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	39	-	-	-	-	5
	$>C_8$-C_{10}	*	43	-	-	-	-	-	-	-	-	-	9	-	-	-	32	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	40	30	-	-	-	-	-	80	50	20	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	820	370	-	-	-	-	-	510	800	1,160	60	-	150	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	1,220	650	-	-	-	-	-	160	610	680	450	-	870	-	-	-	-	10
	PRO	**	166	-	-	-	-	-	-	-	-	-	9	-	-	-	780	216	-	-	-	Sum C_4-C_{12}
	EPH	**	-	-	3,060	2,770	-	-	-	-	-	1,570	7,910	7,770	2,090	-	3,420	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	166	-	3,060	2,770	-	-	-	-	-	1,570	7,919	7,770	2,090	-	4,200	216	-	-	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	190,000	3	-	-	-	-	-	-	-	-	-	-	-	-	-	8	3	-	-	-	1
	Toluene	ND	5	-	-	-	-	-	-	-	-	-	-	-	-	-	50	5	-	-	-	2
	Ethylbenzene	ND	5	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	2
	p/m -Xylene	ND	13	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-	2
	o -Xylene		15	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	3

Notes

SSAC	Site-Specific Assess
S	Shallower screened
D	Deeper screened we
NR	Results of risk asses
105	Measured concentra
*	No SSAC derived
**	No SSAC derived du
PRO	Petrol Range Organi
EPH	Extractable Petroleu
TPH	Total Petroleum Hyd
MTBE	Methyl *Tertiary* -Buty
-	Less than laboratory

Appendix B
Table 4
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3

	Monitoring Well	SSAC	Alluvium															Laboratory Method Detection Limit
		Human Health	BH924	BH925	BH929	BH930	EX03	EX04	EX06	EX07	EX08	EX09	EX10	EX10	EX11	EX12	EX13	EX14	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																		
	$>C_5$-C_6	*	-	-	-	-	40	-	36	-	-	-	-	-	-	-	-	-	5
	$>C_6$-C_8	*	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	ND	-	-	-	-	20	-	37	23	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	-	-	-	160	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	-	-	-	1,010	-	-	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	-	-	-	1,060	-	-	-	-	-	-	-	10
	Aromatics																		
	$>C_6$-C_7	*	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	7	12	18	11	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	-	-	-	-	-	-	510	-	-	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	-	-	-	-	730	-	-	-	-	-	-	-	10
	PRO	**	-	-	-	-	67	12	107	34	-	-	-	-	-	-	-	-	Sum C_4-C_{12}
	EPH	**	-	-	-	-	-	-	-	-	3,520	-	-	-	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	-	-	67	12	107	34	3,520	-	-	-	-	-	-	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	190,000	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	1
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	-	4	6	6	3	-	-	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assess
S	Shallower screened
D	Deeper screened we
NR	Results of risk asses
105	Measured concentra
*	No SSAC derived
**	No SSAC derived du
PRO	Petrol Range Organi
EPH	Extractable Petroleu
TPH	Total Petroleum Hyd
MTBE	Methyl *Tertiary* -Buty
-	Less than laboratory

Appendix B
Table 4
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3

	Monitoring Well	SSAC	Alluvium						Raglan Marl Group												Laboratory Method Detection Limit
		Human Health	EX15	EX16	EX17	EX18	EX22	EX23	BH204AD	BH205AD	BH301S	BH301D	BH302D	BH303S	BH303D	BH304S	BH304D	BH305	EX01	EX02	EX05	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																					
	$>C_5$-C_6	*	-	-	-	-	-	-	122	-	-	-	-	-	-	-	11,256	41	-	22	40	5
	$>C_6$-C_8	*	-	-	-	-	-	-	-	478	-	-	-	-	-	11,906	723	32	-	24	-	5
	$>C_8$-C_{10}	ND	-	-	-	-	-	-	-	17	-	-	-	-	-	573		-	-	43	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	30	-	-	-	-	170	-	-	-	-	-	120	-	-	480	-	380	-	-	10
	$>C_{16}$-C_{21}	*	350	-	440	-	-	3,990	280	-	-	-	-	2,470	-	-	640	-	5,830	-	-	10
	$>C_{21}$-C_{35}	*	770	-	340	-	-	3,700	120	-	-	-	-	4,170	-	-	-	-	6,480	-	-	10
	Aromatics																					
	$>C_6$-C_7	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	ND	-	-	-	-	-	110	-	-	-	-	-	80	-	-	-	-	150	-	-	10
	$>C_{16}$-C_{21}	*	-	-	120	-	-	2,520	130	-	-	-	-	1,560	-	-	-	-	3,710	-	-	10
	$>C_{21}$-C_{35}	*	-	-	20	-	-	2,470	90	-	-	-	-	2,470	-	-	-	-	3,830	-	-	10
	PRO	**	-	-	-	-	-	-	122	495	-	-	-	-	-	12,479	12,029	73	-	89	40	Sum C_4-C_{12}
	EPH	**	1,150	-	920	-	-	12,960	620	-	-	-	-	10,870	-	-	1,120	-	20,380	-	-	Sum C_{12}-C_{35}
	TPH	**	1,150	-	920	-	-	12,960	742	495	-	-	-	10,870	-	12,479	13,149	73	20,380	89	40	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	190,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assess
S	Shallower screened
D	Deeper screened we
NR	Results of risk asses
105	Measured concentra
*	No SSAC derived
**	No SSAC derived du
PRO	Petrol Range Organi
EPH	Extractable Petroleu
TPH	Total Petroleum Hyd
MTBE	Methyl *Tertiary* -Buty
-	Less than laboratory

Appendix B
Table 5
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Off-Site

	Monitoring Well	SSAC	Alluvium								Raglan Marl Group			Laboratory Method Detection Limit
		Human Health	BHOS407	BHOS408	BHOS409A	BHOS410	BHOS411	BHOS412	BHOS413	BHOS414	BHOS306S	BHOS306D	BHOS307	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**													
	>C_5-C_6	*	-	-	-	-	71	-	-	-	73	80	-	5
	>C_6-C_8	*	-	-	-	-	-	-	-	-	-	-	-	5
	>C_8-C_{10}	ND	-	-	-	-	-	-	-	-	-	-	-	5
	>C_{10}-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	5
	>C_{12}-C_{16}	ND	-	-	-	-	-	-	-	-	-	-	-	10
	>C_{16}-C_{21}	*	-	-	-	-	-	-	-	-	-	-	-	10
	>C_{21}-C_{35}	*	-	-	-	-	-	-	-	-	-	-	-	10
	Aromatics													
	>C_6-C_7	*	-	-	-	-	-	-	-	-	-	-	-	5
	>C_7-C_8	*	-	-	-	-	-	-	-	-	-	-	-	5
	>C_8-C_{10}	*	-	-	-	-	-	-	-	-	-	-	-	5
	>C_{10}-C_{12}	ND	-	-	-	-	-	-	-	-	-	-	-	5
	>C_{12}-C_{16}	ND	-	-	-	-	-	-	-	-	-	-	-	10
	>C_{16}-C_{21}	*	-	-	-	-	-	-	-	-	-	-	-	10
	>C_{21}-C_{35}	*	-	-	-	-	-	-	-	-	-	-	-	10
	PRO	**	-	-	-	-	71	-	-	-	73	80	-	Sum C_4-C_{12}
	EPH	**	-	-	-	-	-	-	-	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	-	-	71	-	-	-	73	80	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	ND	-	-	-	-	-	-	-	-	-	-	-	1
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	-	-	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 6
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3 - Source Area 8R

	Monitoring Well	SSAC	Alluvium			Laboratory Method Detection Limit
		Water Resources	BH912	BH913	BH914	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**					
	$>C_5$-C_6	*	-	-	-	5
	$>C_6$-C_8	*	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	5
	$>C_{10}$-C_{12}	*	-	-	-	5
	$>C_{12}$-C_{16}	*	40	210	300	10
	$>C_{16}$-C_{21}	*	570	2,600	2,640	10
	$>C_{21}$-C_{35}	*	210	3,640	2,970	10
	Aromatics					
	$>C_6$-C_7	*	-	-	-	5
	$>C_7$-C_8	*	-	-	-	5
	$>C_8$-C_{10}	*	-	9	-	5
	$>C_{10}$-C_{12}	*	-	-	-	5
	$>C_{12}$-C_{16}	2,857	80	50	20	10
	$>C_{16}$-C_{21}	*	510	800	1,160	10
	$>C_{21}$-C_{35}	*	160	610	680	10
	PRO	**	-	9	-	Sum C_4-C_{12}
	EPH	**	1,570	7,910	7,770	Sum C_{12}-C_{35}
	TPH	**	1,570	7,919	7,770	Sum C_4-C_{35}
	MTBE	*	-	-	-	1
	Benzene	*	-	-	-	1
	Toluene	*	-	-	-	2
	Ethylbenzene	*	-	-	-	2
	p/m -Xylene	*	-	-	-	2
	o -Xylene		-	-	-	3

Notes

SSAC	Site-Specific Assessment Criteria
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 7
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3 - Source Area 9R

	Monitoring Well	SSAC	Alluvium												Raglan Marl Group		Laboratory Method Detection Limit
		Water Resources	BH108	BH124	BH401	BH402	BH917	BH921	BH922	EX13	EX14	EX15	EX16	EX18	BH303S	BH303D	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**																
	$>C_5$-C_6	7,400	-	-	-	-	-	159	216	-	-	-	-	-	-	-	5
	$>C_6$-C_8	7,190	-	-	-	-	-	459	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	85	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	*	150	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	*	1,240	-	-	40	-	-	-	-	-	30	-	-	120	-	10
	$>C_{16}$-C_{21}	*	1,510	-	-	70	270	480	-	-	-	350	-	-	2,470	-	10
	$>C_{21}$-C_{35}	*	-	-	-	870	1,310	1,920	-	-	-	770	-	-	4,170	-	10
	Aromatics																
	$>C_6$-C_7	*	-	-	-	-	-	6	-	-	-	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	39	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	32	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	100,000	50	-	-	40	-	-	-	-	-	-	-	-	80	-	10
	$>C_{16}$-C_{21}	*	440	-	-	820	60	150	-	-	-	-	-	-	1,560	-	10
	$>C_{21}$-C_{35}	*	240	-	-	1,220	450	870	-	-	-	-	-	-	2,470	-	10
	PRO	**	150	-	-	-	-	780	216	-	-	-	-	-	-	-	Sum C_4-C_{12}
	EPH	**	3,480	-	-	3,060	2,090	3,420	-	-	-	1,150	-	-	10,870	-	Sum C_{12}-C_{35}
	TPH	**	3,630	-	-	3,060	2,090	4,200	216	-	-	1,150	-	-	10,870	-	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	1,670	-	-	-	-	-	8	3	-	-	-	-	-	-	-	1
	Toluene	*	-	-	-	-	-	50	5	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	7	-	-	-	-	-	-	-	-	2
	p/m -Xylene	4.16	-	-	-	-	-	**17**	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	-	-	4	-	-	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 8
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3 - Source Area 10R

	Monitoring Well	SSAC	Alluvium												Laboratory Method Detection Limit
		Water Resources	BH110	BH114A	BH117	BH118	BH119	BH204AS	BH400	BH406	BH924	EX03	EX04	EX06	EX07	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**															
	$>C_5$-C_6	42,000	-	-	-	-	64	70	90	-	-	40	-	36	-	5
	$>C_6$-C_8	4,120	-	-	-	-	44	21	-	-	-	-	-	11	-	5
	$>C_8$-C_{10}	*	-	-	-	7	31	51	28	-	-	20	-	37	23	5
	$>C_{10}$-C_{12}	*	-	-	20	-	11	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	*	-	-	240	-	480	50	-	10	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	100	-	6,970	1,040	-	800	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	-	-	6,090	1,010	-	910	-	-	-	-	-	10
	Aromatics															
	$>C_6$-C_7	*	-	-	-	-	5	5	-	-	-	-	-	5	-	5
	$>C_7$-C_8	*	-	-	-	-	-	5	5	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	13	320	10	43	-	-	7	12	18	11	5
	$>C_{10}$-C_{12}	7,170	-	-	-	-	5,680	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	25,100	-	-	-	-	5,310	30	-	30	-	-	-	-	-	10
	$>C_{16}$-C_{21}	*	-	-	190	-	-	750	-	370	-	-	-	-	-	10
	$>C_{21}$-C_{35}	*	-	-	60	-	-	710	-	650	-	-	-	-	-	10
	PRO	**	-	-	20	20	6,155	162	166	-	-	67	12	107	34	Sum C_4-C_{12}
	EPH	**	-	-	590	-	18,850	3,590	-	2,770	-	-	-	-	-	Sum C_{12}-C_{35}
	TPH	**	-	-	610	20	25,005	3,752	166	2,770	-	67	12	107	34	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Benzene	909	-	-	-	-	3	5	3	-	-	-	-	5	-	1
	Toluene	*	-	-	-	-	3	5	5	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	4	5	-	-	-	-	3	-	2
	p/m -Xylene	2,430	-	-	-	-	4	-	13	-	-	-	-	5	-	2
	o -Xylene		-	-	2	-	-	2	15	-	-	4	6	6	3	3

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
PRO	Petrol Range Organics (C_4-C_{12}) plus MTBE
EPH	Extractable Petroleum Hydrocarbons (C_{12}-C_{35})
TPH	Total Petroleum Hydrocarbons (C_4-C_{35})
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 8
Total Petroleum Hydrocarbons in Groundwater (µg/l)
Zone 3 - Source Area 10R

	Monitoring Well	SSAC	Alluvium			Raglan Marl Group							Laboratory Method Detection Limit
		Water Resources	EX08	EX09	EX10	BH204AD	BH304S	BH304D	BH305	EX01	EX02	EX05	
TOTAL PETROLEUM HYDROCARBONS	**Aliphatics**												
	$>C_5$-C_6	42,000	-	-	-	122	-	11,256	41	-	22	40	5
	$>C_6$-C_8	4,120	-	-	-	-	**11,906**	723	32	-	24	-	5
	$>C_8$-C_{10}	*	-	-	-	-	573		-	-	43	-	5
	$>C_{10}$-C_{12}	*	-	-	-	-	-	50	-	-	-	-	5
	$>C_{12}$-C_{16}	*	160	-	-	-	-	480	-	380	-	-	10
	$>C_{16}$-C_{21}	*	1,010	-	-	280	-	640	-	5,830	-	-	10
	$>C_{21}$-C_{35}	*	1,060	-	-	120	-	-	-	6,480	-	-	10
	Aromatics												
	$>C_6$-C_7	*	-	-	-	-	-	-	-	-	-	-	5
	$>C_7$-C_8	*	-	-	-	-	-	-	-	-	-	-	5
	$>C_8$-C_{10}	*	-	-	-	-	-	-	-	-	-	-	5
	$>C_{10}$-C_{12}	7,170	-	-	-	-	-	-	-	-	-	-	5
	$>C_{12}$-C_{16}	25,100	50	-	-	-	-	-	-	150	-	-	10
	$>C_{16}$-C_{21}	*	510	-	-	130	-	-	-	3,710	-	-	10
	$>C_{21}$-C_{35}	*	730	-	-	90	-	-	-	3,830	-	-	10
	PRO	**	-	-	-	122	12,479	12,029	73	-	89	40	Sum C_4-C_{12}
	EPH	**	3,520	-	-	620	-	1,120	-	20,380	-	-	Sum C_{12}-C_{35}
	TPH	**	3,520	-	-	742	12,479	13,149	73	20,380	89	40	Sum C_4-C_{35}
	MTBE	*	-	-	-	-	-	-	-	-	-	-	1
	Benzene	909	-	-	-	-	-	-	1	2	-	-	1
	Toluene	*	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	2,430	-	-	-	-	-	-	-	-	-	-	2
	o -Xylene		-	-	-	3	-	-	-	-	-	-	3

Notes

SSAC	Site-Specific Assess
S	Shallower screened
D	Deeper screened we
105	Measured concentra
*	No SSAC derived
**	No SSAC derived du
PRO	Petrol Range Organi
EPH	Extractable Petroleu
TPH	Total Petroleum Hyd
MTBE	Methyl *Tertiary* -Buty
-	Less than laboratory

Appendix B
Table 9
Volatile Organic Compounds in Groundwater (µg/l)
Zone 1

	Monitoring Well	SSAC	Alluvium				Raglan Marl Group	Laboratory Method Detection Limit
		Human Health	BH126	BH127	BH128	BH201S	BH201D	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	3
	Vinyl chloride	350	-	-	-	-	-	2
	Bromomethane	*	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	3
	1,1-dichloroethene	68,000	-	-	-	-	8	3
	Dichloromethane	*	-	-	-	-	-	3
	trans -1-2-dichloroethene	150,000	-	-	-	-	-	3
	1,1-dichloroethane	370,000	-	-	-	-	6	3
	cis -1,2-dichloroethene	27,000	-	-	-	-	-	3
	2,2-dichloropropane	*	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	2
	Benzene	19,000	-	-	-	-	-	1
	Trichloroethene	20,000	-	-	-	-	-	3
	1,2-dichloropropane	*	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	2
	1,1,2-Trichloroethane	1,600	-	-	-	-	-	2
	Tetrachloroethene	200,000	-	-	-	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	3
	o -Xylene		-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	3
	Naphthalene	ND	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	3
	Total VOCs	**	-	-	-	-	14	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 10
Volatile Organic Compounds in Groundwater (µg/l)
Zone 2

	Monitoring Well	SSAC	Alluvium															Raglan Marl Group			Laboratory Method Detection Limit
		Human Health	BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH120	BH120 Duplicate	BH121	BH129	BH130	BH130 Duplicate	BH202S	BH203S	BH203S Duplicate	BH926	BH927	BH928	BH202D	BH203D	BH203D Duplicate	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	2,000	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	380,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	980,000	-	-	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	-	3
	1,1-dichloroethane	2,100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	160,000	340	282	6	15	-	-	5	-	-	-	8	619	646	314	10	-	-	15	13	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	130,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Trichloroethene	110,000	97	95	9	24	-	-	-	-	-	-	-	243	360	1,266	145	3	-	4	4	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	11,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	ND	-	-	10	-	30	29	-	-	-	-	-	-	-	-	10	19	-	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	o -Xylene		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	437	380	25	39	30	29	5	-	-	-	8	862	1009	1595	165	22	-	19	17	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 11
Volatile Organic Compounds in Groundwater (µg/l)
Zpne 3

	Monitoring Well	SSAC	Alluvium																				Laboratory Method Detection Limit
		Human Health	BH102	BH103	BH106	BH107	BH108	BH109	BH110	BH111	BH112	BH114A	BH115	BH117A	BH118	BH119	BH122	BH124	BH131	BH132	BH135	BH136	BH204AS	BH205AS	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	3,000	138	590	-	117	22	1,291	34	-	-	-	-	955	**3,757**	**36,043**	2,542	-	24	-	61	1,014	**23,108**	-	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	60,000	7	4	-	14	-	7	-	-	-	-	-	5	16	99	24	-	7	-	10	19	108	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	1,400,000	-	-	-	16	-	-	6	-	-	-	-	-	-	282	32	-	11	-	27	30	352	-	3
	1,1-dichloroethane	ND	-	-	-	-	-	-	-	-	-	-	-	3	4	36	-	-	-	-	-	-	31	-	3
	cis -1,2-dichloroethene	150,000	860	767	37	2,285	22	2,499	507	21	34	-	25	1,707	8,117		6,214	87	3,566	34	7,873	5,097	-	-	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	2
	Benzene	190,000	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	5	-	1
	Trichloroethene	100,000	-	-	4	3,337	-	47	109	16	12	-	160	-	-	2,132	3,006	46	3,635	1,116	1,527	1,441	993	3	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	5	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	15,000	-	-	-	-	-	-	-	9	-	-	-	-	-	-	287	-	12	10	107	52	10	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2
	p/m -Xylene	ND	-	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	3
	o -Xylene		-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	1,005	1,365	41	5,769	44	3,844	656	46	46	-	207	2,672	11,899	38,606	12,105	133	7,255	1,160	9,605	7,653	24,629	3	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 11
Volatile Organic Compounds in Groundwater (µg/l)
Zpne 3

	Monitoring Well	SSAC	Alluvium																				Laboratory Method Detection Limit
		Human Health	BH400	BH401	BH402	BH403	BH404	BH406	BH406 Duplicate	BH901	BH903	BH904	BH909	BH910	BH912	BH913	BH914	BH917	BH918	BH919	BH919 Duplicate	BH921	BH922	BH923	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	3,000	**16,977**	168	24	-	5	9	-	514	179	38	40	340	**3,024**	46	-	8	-	**4,146**	**3,460**	**2,967**	1,380	9	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	60,000	151	-	4	-	-	-	-	5	39	-	-	-	29	6	-	-	-	61	52	340	486	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	trans-1-2-dichloroethene	1,400,000	522	-	12	-	-	-	-	17	109	-	-	-	21	-	-	-	-	335	280	265	1,068	-	3
	1,1-dichloroethane	ND	-	-	-	-	-	-	-	4	3	-	-	-	-	-	-	-	-	-	-	330	24	-	3
	cis-1,2-dichloroethene	150,000	-	267	6,169	-	4	9	-	1,942	7,891	65	48	645	8,049	688	-	90	36	44,069	93,333	37,112	36,637	42	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	3	2	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	13	11	12	8	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	2,402	18	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	190,000	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	8	3	-	1
	Trichloroethene	100,000	-	-	1,415	-	-	-	-	257	13,276	74	250	297	3	165	-	88	11	12,581	17,296	22,042	19,067	-	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis-1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	9	50	5	-	2
	trans-1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	51	20	-	2
	Tetrachloroethene	15,000	23	-	8,591	-	-	-	-	5	14	6	17	19	-	-	-	-	-	14	12	322	22	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	14	7	-	-	2
	p/m-Xylene	ND	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	13	17	-	-	3
	o-Xylene		15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	16	4	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	17,864	437	16,215	-	9	18	-	2,744	21,516	191	355	1,301	11,126	905	-	186	47	61,309	114,500	65,929	58,738	51	

Notes

SSAC	Site-Specific Assessment C
S	Shallower screened well in
D	Deeper screened well insta
NR	Results of risk assessment
105	Measured concentration ex
*	No SSAC derived
**	No SSAC derived due to m
MTBE	Methyl *Tertiary*-Butyl Ether
-	Less than laboratory metho

Appendix B
Table 11
Volatile Organic Compounds in Groundwater (µg/l)
Zpne 3

	Monitoring Well	SSAC	Alluvium																					Laboratory Method Detection Limit
		Human Health	BH923 Duplicate	BH924	BH925	BH929	BH930	EX03	EX04	EX06	EX07	EX08	EX09	EX10	EX10	EX11	EX12	EX13	EX14	EX15	EX16	EX17	EX18	EX19	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	3,000	-	10	10	16	-	**2,555**	**3,532**	**9,295**	**2,613**	51	288	21	16	3	175	45	59	1,073	113	25	-	509	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	60,000	-	-	4	4	-	42	11	62	6	3	-	-	-	-	-	6	-	4	-	-	-	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	1,400,000	-	-	16	6	-	208	-	96	6	4	-	-	-	-	6	8	-	9	-	-	-	-	3
	1,1-dichloroethane	ND	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	150,000	21	25	4,472	341	3	-	5,214	-	5,171	663	404	23	20	4	2,379	2,394	590	4,498	234	286	-	123	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	190,000	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Trichloroethene	100,000	6	4	6,961	1,352	-	2,291	-	1,615	84	376	28	33	-	-	2,289	1,221	102	-	-	164	-	-	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	-	58	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	15,000	-	10	7	-	11	4	-	-	-	71	-	-	-	9	8,291	26,285	934	-	-	3	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	o -Xylene		-	-	-	-	-	4	6	6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	27	52	11,475	1,719	14	5,162	8,767	11,108	7,883	1,168	720	77	36	16	13,140	29,959	1,685	5,584	347	478	-	632	

Notes

SSAC	Site-Specific Assessment C
S	Shallower screened well in
D	Deeper screened well insta
NR	Results of risk assessment
105	Measured concentration ex
*	No SSAC derived
**	No SSAC derived due to m
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory metho

Appendix B
Table 11
Volatile Organic Compounds in Groundwater (µg/l)
Zpne 3

	Monitoring Well	SSAC	Alluvium				Raglan Marl Group													Laboratory Method Detection Limit
		Human Health	EX20	EX21	EX22	EX23	BH204AD	BH205AD	BH301S	BH301D	BH302D	BH303S	BH303D	BH304S	BH304D	BH305	EX01	EX02	EX05	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	3,000	246	151	15	11	**14,625**	-	7	10	74	163	140	1,196	1,417	**12,777**	**8,839**	**8,295**	2,359	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	6	-	-	-	-	-	-	-	-	3	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	60,000	-	5	-	-	107	-	-	-	24	6	3	25	30	67	45	26	28	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	1,400,000	-	-	-	-	114	-	3	3	53	-	-	50	60	106	54	56	57	3
	1,1-dichloroethane	ND	-	-	-	-	20	-	-	-	-	-	-	-	-	21	8	13	-	3
	cis -1,2-dichloroethene	150,000	480	848	57	50	-	1,515	614	611	2,719	613	442	16,227	15,240	-	26,587	-	14,221	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	18	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	190,000	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1
	Trichloroethene	100,000	4	29	10	13	-	154	2,650	4,068	13,554	4	-	13,898	9,299	-	3,655	2,683	4,273	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	15,000	-	-	122	-	70	69	8	6	474	-	-	2,547	3,177	88	32	29	5	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	o -Xylene		-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	730	1,033	214	74	14,952	1,738	3,282	4,698	16,911	786	585	33,943	29,227	13,063	39,222	11,120	20,943	

Notes

SSAC	Site-Specific Assessment C
S	Shallower screened well in
D	Deeper screened well insta
NR	Results of risk assessment
105	Measured concentration ex
*	No SSAC derived
**	No SSAC derived due to m
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory metho

Appendix B
Table 12
Volatile Organic Compounds in Groundwater (µg/l)
Off-Site

	Monitoring Well	SSAC	Alluvium								Raglan Marl Group			Laboratory Method Detection Limit
		Human Health	BHOS407	BHOS408	BHOS409A	BHOS410	BHOS411	BHOS412	BHOS413	BHOS414	BHOS306S	BHOS306D	BHOS307	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	1,000,000	-	-	-	-	3,268	-	-	-	5,789	5,699	-	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	ND	-	3	-	-	33	-	-	-	28	27	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	ND	-	-	-	-	48	-	-	4	42	40	-	3
	1,1-dichloroethane	ND	-	-	-	-	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	ND	5	593	3	20	14,382	4	-	1,128	16,975	17,096	-	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	ND	-	-	-	-	-	-	-	-	-	2	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	ND	-	-	-	-	-	-	-	-	-	-	-	1
	Trichloroethene	ND	-	137	-	5	7,300	-	-	390	6,836	6,979	-	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	1,900,000	-	-	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	ND	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	ND	-	-	-	-	-	-	-	-	-	-	-	3
	o -Xylene		-	-	-	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	ND	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	5	733	3	25	25,031	4	-	1,522	29,670	29,843	-	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of human health
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 13
Volatile Organic Compounds in Groundwater (µg/l)
Zone 2- Source Area 2

	Monitoring Well	SSAC	Alluvium							Raglan Marl Group		Laboratory Method Detection Limit
		Water Resources	BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH121	BH203S	BH203S Duplicate	BH203D	BH203D Duplicate	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	*	-	-	-	-	-	-	-	-	-	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	*	-	-	-	-	-	-	-	-	-	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	*	-	-	-	-	-	-	3	-	-	3
	1,1-dichloroethane	*	-	-	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	142	**340**	**282**	6	15	5	**619**	**646**	15	13	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	*	-	-	-	-	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	2
	Benzene	*	-	-	-	-	-	-	-	-	-	1
	Trichloroethene	69	**97**	**95**	9	24	-	**243**	**360**	4	4	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	2
	Toluene	*	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	-	-	-	-	-	2
	Tetrachloroethene	806	-	-	10	-	-	-	-	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	*	-	-	-	-	-	-	-	-	-	3
	o -Xylene	*	-	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	3
	Naphthalene	*	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	3	-	-	-	-	-	-	-	3
	Total VOCs	**	437	380	25	39	5	862	1,009	19	17	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 14
Volatile Organic Compounds in Groundwater (µg/l)
Zpne 2 - Source Area 3R

	Monitoring Well	SSAC	Alluvium			Laboratory Method Detection Limit
		Water Resources	BH926	BH927	BH928	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	2
	MTBE	*	-	-	-	1
	Chloromethane	*	-	-	-	3
	Vinyl chloride	2.15	**11**	-	-	2
	Bromomethane	*	-	-	-	1
	Chloroethane	*	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	3
	1,1-dichloroethene	*	-	-	-	3
	Dichloromethane	*	-	-	-	3
	trans -1-2-dichloroethene	108	4	-	-	3
	1,1-dichloroethane	*	-	-	-	3
	cis -1,2-dichloroethene	108	**314**	10	-	3
	2,2-dichloropropane	*	-	-	-	1
	Bromochloromethane	*	-	-	-	2
	Chloroform	*	-	-	-	2
	1,1,1-trichloroethane	*	-	-	-	2
	1,1-dichloropropene	*	-	-	-	3
	Carbon tetrachloride	*	-	-	-	2
	1,2-dichloroethane	*	-	-	-	2
	Benzene	*	-	-	-	1
	Trichloroethene	51	**1,266**	**145**	3	3
	1,2-dichloropropane	*	-	-	-	2
	Dibromomethane	*	-	-	-	3
	Bromodichloromethane	*	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	2
	Toluene	*	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	2
	Tetrachloroethene	478	-	10	19	3
	1,3-dichloropropane	*	-	-	-	2
	Dibromochloromethane	*	-	-	-	2
	1,2-dibromoethane	*	-	-	-	2
	Chlorobenzene	*	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	2
	Ethylbenzene	*	-	-	-	2
	p/m -Xylene	*	-	-	-	3
	o -Xylene	*	-	-	-	2
	Styrene	*	-	-	-	2
	Bromoform	*	-	-	-	2
	Isopropylbenzene	*	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	4
	Bromobenzene	*	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	3
	Propylbenzene	*	-	-	-	3
	2-chlorotoluene	*	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	3
	4-chlorotoluene	*	-	-	-	3
	tert-butylbenzene	*	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	3
	sec-butylbenzene	*	-	-	-	3
	4-isopropyltoluene	*	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	3
	n-butylbenzene	*	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	3
	Naphthalene	*	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	3
	Total VOCs	**	1,595	165	22	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risl
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 15
Volatile Organic Compounds in Groundwater (µg/l)
Zone 3 - Source Area 3R

	Monitoring Well	SSAC	Alluvium					Raglan Marl Group	Laboratory Method Detection Limit
		Water Resources	BH131	BH132	BH301S	BH912	BH925	BH301D	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	3
	Vinyl chloride	2.15	**24**	-	**7**	**3,024**	**10**	**10**	2
	Bromomethane	*	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	3
	1,1-dichloroethene	*	7	-	-	29	4	-	3
	Dichloromethane	*	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	108	11	-	3	21	16	3	3
	1,1-dichloroethane	*	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	108	**3,566**	34	**614**	**8,049**	**4,472**	**611**	3
	2,2-dichloropropane	*	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	5	-	2
	1,1,1-trichloroethane	*	-	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	2
	Benzene	*	-	-	-	-	-	-	1
	Trichloroethene	50.8	**3,635**	**1,116**	**2,650**	3	**6,961**	**4,068**	3
	1,2-dichloropropane	*	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	2
	Toluene	*	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	-	-	2
	Tetrachloroethene	478	12	10	8	-	7	6	3
	1,3-dichloropropane	*	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	-	2
	p/m -Xylene	*	-	-	-	-	-	-	3
	o -Xylene	*	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	3
	Naphthalene	*	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	3
	Total VOCs	**	7,255	1,160	3,282	11,126	11,475	4,698	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 16
Volatile Organic Compounds in Groundwater (µg/l)
Zone 3 - Source Area 4R

	Monitoring Well	SSAC	Alluvium																		Raglan Marl Group	Laboratory Method Detection Limit
		Water Resources	BH122	BH124	BH135	BH136	BH402	BH901	BH903	BH904	BH917	BH919	BH919 Duplicate	BH921	BH922	BH923	BH923 Duplicate	EX12	EX13	EX14	EX15	BH302D	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	3.17	2,542	-	**61**	**1,014**	**24**	**514**	**179**	**38**	**8**	**4,146**	**3,460**	**2,967**	**1,380**	**9**	-	**175**	**45**	**59**	**1,073**	**74**	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	17,748,000	24	-	10	19	4	5	39	-	-	61	52	340	486	-	-	-	6	-	4	24	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	3
	trans -1-2-dichloroethene	158	32	-	27	30	12	17	109	-	-	**335**	**280**	**265**	1,068	-	-	6	8	-	9	53	3
	1,1-dichloroethane	3,010	-	-	-	-	-	4	3	-	-	-	-	330	24	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	159	**6,214**	87	**7,873**	**5,097**	**6,169**	**1,942**	**7,891**	65	90	**44,069**	**93,333**	**37,112**	**36,637**	42	21	**2,379**	**2,394**	**590**	**4,498**	**2,719**	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	8	-	13	11	12	8	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	19,500	-	-	-	-	-	-	5	-	-	-	-	2,402	18	-	-	-	-	-	-	6	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	*	-	-	-	-	-	-	-	-	-	2	-	8	3	-	-	-	-	-	-	-	1
	Trichloroethene	65	**3,006**	46	**1,527**	**1,441**	**1,415**	**257**	**13,276**	**74**	**88**	**12,581**	**17,296**	**22,042**	**19,067**	-	6	**2,289**	**1,221**	**102**	-	**13,554**	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	*	-	-	-	-	-	-	-	-	-	11	9	50	5	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	406	-	-	-	-	-	-	-	-	-	12	-	51	20	-	-	-	-	-	-	-	2
	Tetrachloroethene	407	287	-	107	52	**8,591**	5	14	6	-	14	12	322	22	-	-	**8,291**	**26,285**	**934**	-	**474**	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	-	-	-	-	18	14	7	-	-	-	-	-	-	-	-	2
	p/m -Xylene	*	-	-	-	-	-	-	-	-	-	16	13	17	-	-	-	-	-	-	-	-	3
	o -Xylene	*	-	-	-	-	-	-	-	-	-	21	16	4	-	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	12,105	133	9,605	7,653	16,215	2,744	21,516	191	186	61,309	114,500	65,929	58,738	51	27	13,140	29,959	1,685	5,584	16,911	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Apendix B
Table 17
Volatile Organic Compounds in Groundwater (µg/l)
Zone 3 - Source Area 5

	Monitoring Well	SSAC	Alluvium						Raglan Marl Group	Laboratory Method Detection Limit
		Water Resources	BH102	BH103	BH107	BH303S	EX20	EX21	BH303D	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	3
	Vinyl chloride	1.52	**138**	**590**	**117**	**163**	**246**	**151**	**140**	2
	Bromomethane	*	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	3
	1,1-dichloroethene	1,765,000	7	4	14	6	-	5	3	3
	Dichloromethane	*	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	76.1	-	-	16	-	-	-	-	3
	1,1-dichloroethane	*	-	-	-	-	-	-	-	3
	cis -1,2-dichloroethene	76	**860**	**767**	**2,285**	**613**	**480**	**848**	**442**	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	-	-	-	2
	1,1,1-trichloroethane	*	-	-	-	-	-	-	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	-	-	-	-	-	2
	Benzene	*	-	-	-	-	-	-	-	1
	Trichloroethene	26.6	-	-	**3,337**	4	4	**29**	-	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	2
	Toluene	*	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	*	-	-	-	-	-	-	-	2
	Tetrachloroethene	*	-	-	-	-	-	-	-	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	-	-	-	-	2
	p/m -Xylene	*	-	4	-	-	-	-	-	3
	o -Xylene	*	-	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	3
	Naphthalene	*	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	3
	Total VOCs	**	1,005	1,365	5,769	786	730	1,033	585	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 18
Volatile Organic Compounds in Groundwater (µg/l)
Zone 3 - Source Area 6R

	Monitoring Well	SSAC	Alluvium	Raglan Marl Group	Laboratory Method Detection Limit
		Water Resources	BH205AS	BH205AD	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	2
	MTBE	*	-	-	1
	Chloromethane	*	-	-	3
	Vinyl chloride	*	-	-	2
	Bromomethane	*	-	-	1
	Chloroethane	*	-	-	3
	Trichlorofluoromethane	*	-	-	3
	1,1-dichloroethene	*	-	-	3
	Dichloromethane	*	-	-	3
	trans -1-2-dichloroethene	*	-	-	3
	1,1-dichloroethane	*	-	-	3
	cis -1,2-dichloroethene	285	-	**1,515**	3
	2,2-dichloropropane	*	-	-	1
	Bromochloromethane	*	-	-	2
	Chloroform	*	-	-	2
	1,1,1-trichloroethane	*	-	-	2
	1,1-dichloropropene	*	-	-	3
	Carbon tetrachloride	*	-	-	2
	1,2-dichloroethane	*	-	-	2
	Benzene	*	-	-	1
	Trichloroethene	94.7	3	**154**	3
	1,2-dichloropropane	*	-	-	2
	Dibromomethane	*	-	-	3
	Bromodichloromethane	*	-	-	2
	cis -1,3-dichloropropene	*	-	-	2
	Toluene	*	-	-	2
	trans -1,3-dichloropropene	*	-	-	2
	1,1,2-Trichloroethane	*	-	-	2
	Tetrachloroethene	325	-	69	3
	1,3-dichloropropane	*	-	-	2
	Dibromochloromethane	*	-	-	2
	1,2-dibromoethane	*	-	-	2
	Chlorobenzene	*	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	2
	Ethylbenzene	*	-	-	2
	p/m -Xylene	*	-	-	3
	o -Xylene	*	-	-	2
	Styrene	*	-	-	2
	Bromoform	*	-	-	2
	Isopropylbenzene	*	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	4
	Bromobenzene	*	-	-	2
	1,2,3-trichloropropane	*	-	-	3
	Propylbenzene	*	-	-	3
	2-chlorotoluene	*	-	-	3
	1,3,5-trimethylbenzene	*	-	-	3
	4-chlorotoluene	*	-	-	3
	tert-butylbenzene	*	-	-	3
	1,2,4-trimethylbenzene	*	-	-	3
	sec-butylbenzene	*	-	-	3
	4-isopropyltoluene	*	-	-	3
	1,3-dichlorobenzene	*	-	-	3
	1,4-dichlorobenzene	*	-	-	3
	n-butylbenzene	*	-	-	3
	1,2-dichlorobenzene	*	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	2
	1,2,4-trichlorobenzene	*	-	-	3
	Hexachlorobutadiene	*	-	-	3
	Naphthalene	*	-	-	2
	1,2,3-trichlorobenzene	*	-	-	3
	Total VOCs	**	3	1,738	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significant level of risk *via* this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 19
Volatile Organic Compounds in Groundwater (µg/l)
Zone 3 - Source Area 7R

	Monitoring Well	SSAC	Alluvium										Raglan Marl Group							Laboratory Method Detection Limit
		Water Resources	BH109	BH118	BH119	BH204AS	BH400	EX03	EX04	EX06	EX07	EX08	BH204AD	BH304S	BH304D	BH305	EX01	EX02	EX05	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	MTBE	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Vinyl chloride	1.17	**1,291**	**3,757**	**36,043**	**23,108**	**16,977**	**2,555**	**3,532**	**9,295**	**2,613**	**51**	**14,625**	**1,196**	**1,417**	**12,777**	**8,839**	**8,295**	**2,359**	2
	Bromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Chloroethane	*	-	-	-	-	-	-	-	-	-	-	6	-	-	3	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1-dichloroethene	6,790	7	16	99	108	151	42	11	62	6	3	107	25	30	67	45	26	28	3
	Dichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	trans -1-2-dichloroethene	58.6	-	5	**282**	**352**	**522**	**208**	-	**96**	6	4	**114**	50	**60**	**106**	54	56	57	3
	1,1-dichloroethane	59	-	4	36	31	-	-	4	-	-	-	20	-	-	21	8	13	-	3
	cis -1,2-dichloroethene	58.8	**2,499**	**8,117**	-	-	-	-	**5,214**	-	**5,171**	**663**	-	**16,227**	**15,240**	-	**26,587**	-	**14,221**	3
	2,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Bromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chloroform	*	-	-	-	-	3	-	-	-	-	-	-	-	4	-	-	-	-	2
	1,1,1-trichloroethane	606	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	18	-	2
	1,1-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Carbon tetrachloride	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dichloroethane	*	-	-	4	-	5	-	-	-	-	-	-	-	-	-	-	-	-	2
	Benzene	*	-	-	3	5	3	-	-	5	-	-	-	-	-	1	2	-	-	1
	Trichloroethene	15.7	**47**	-	**2,132**	**993**	-	**2,291**	-	**1,615**	**84**	**376**	-	**13,898**	**9,299**	-	**3,655**	**2,683**	**4,273**	3
	1,2-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromomethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Bromodichloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Toluene	*	-	-	3	5	5	-	-	-	-	-	-	-	-	-	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,2-Trichloroethane	58.9	-	-	-	-	**139**	58	-	14	-	-	7	-	-	-	-	-	-	2
	Tetrachloroethene	35	-	-	-	10	23	4	-	-	-	**71**	**70**	**2,547**	**3,177**	**88**	32	29	5	3
	1,3-dichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Dibromochloromethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2-dibromoethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Chlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Ethylbenzene	*	-	-	-	4	5	-	-	3	-	-	-	-	-	-	-	-	-	2
	p/m -Xylene	*	-	-	4	-	13	-	-	5	-	-	-	-	-	-	-	-	-	3
	o -Xylene	*	-	-	-	2	15	4	6	6	3	-	3	-	-	-	-	-	-	2
	Styrene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Bromoform	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	Isopropylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
	Bromobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Propylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	2-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-chlorotoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	tert-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	-	3	-	-	7	-	-	-	-	-	-	-	-	-	3
	sec-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	4-isopropyltoluene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	n-butylbenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Naphthalene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Total VOCs	**	3,844	11,899	38,606	24,629	17,864	5,162	8,767	11,108	7,883	1,168	14,952	33,943	29,227	13,063	39,222	11,120	20,943	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significantlevel of risk via this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 20
Volatile Organic Compounds in Groundwater (µg/l)
Off-Site - Source Area 7R

	Monitoring Well	SSAC	Alluvium	Raglan Marl Group		Laboratory Method Detection Limit
		Water Resources	BHOS411	BHOS306S	BH306OSD	
VOLATILE ORGANIC COMPOUNDS	Dichlorodifluoromethane	*	-	-	-	2
	MTBE	*	-	-	-	1
	Chloromethane	*	-	-	-	3
	Vinyl chloride	1.17	**3,268**	**5,789**	**5,699**	2
	Bromomethane	*	-	-	-	1
	Chloroethane	*	-	-	-	3
	Trichlorofluoromethane	*	-	-	-	3
	1,1-dichloroethene	6,790	33	28	27	3
	Dichloromethane	*	-	-	-	3
	trans -1-2-dichloroethene	58.6	48	42	40	3
	1,1-dichloroethane	59	-	-	-	3
	cis -1,2-dichloroethene	58.8	**14,382**	**16,975**	**17,096**	3
	2,2-dichloropropane	*	-	-	-	1
	Bromochloromethane	*	-	-	-	2
	Chloroform	*	-	-	-	2
	1,1,1-trichloroethane	606	-	-	2	2
	1,1-dichloropropene	*	-	-	-	3
	Carbon tetrachloride	*	-	-	-	2
	1,2-dichloroethane	*	-	-	-	2
	Benzene	*	-	-	-	1
	Trichloroethene	15.7	**7,300**	**6,836**	**6,979**	3
	1,2-dichloropropane	*	-	-	-	2
	Dibromomethane	*	-	-	-	3
	Bromodichloromethane	*	-	-	-	2
	cis -1,3-dichloropropene	*	-	-	-	2
	Toluene	*	-	-	-	2
	trans -1,3-dichloropropene	*	-	-	-	2
	1,1,2-Trichloroethane	58.9	-	-	-	2
	Tetrachloroethene	35	-	-	-	3
	1,3-dichloropropane	*	-	-	-	2
	Dibromochloromethane	*	-	-	-	2
	1,2-dibromoethane	*	-	-	-	2
	Chlorobenzene	*	-	-	-	2
	1,1,1,2-tetrachloroethane	*	-	-	-	2
	Ethylbenzene	*	-	-	-	2
	p/m -Xylene	*	-	-	-	3
	o -Xylene	*	-	-	-	2
	Styrene	*	-	-	-	2
	Bromoform	*	-	-	-	2
	Isopropylbenzene	*	-	-	-	3
	1,1,2,2-tetrachloroethane	*	-	-	-	4
	Bromobenzene	*	-	-	-	2
	1,2,3-trichloropropane	*	-	-	-	3
	Propylbenzene	*	-	-	-	3
	2-chlorotoluene	*	-	-	-	3
	1,3,5-trimethylbenzene	*	-	-	-	3
	4-chlorotoluene	*	-	-	-	3
	tert-butylbenzene	*	-	-	-	3
	1,2,4-trimethylbenzene	*	-	-	-	3
	sec-butylbenzene	*	-	-	-	3
	4-isopropyltoluene	*	-	-	-	3
	1,3-dichlorobenzene	*	-	-	-	3
	1,4-dichlorobenzene	*	-	-	-	3
	n-butylbenzene	*	-	-	-	3
	1,2-dichlorobenzene	*	-	-	-	3
	1,2-dibromo-3-chloropropane	*	-	-	-	2
	1,2,4-trichlorobenzene	*	-	-	-	3
	Hexachlorobutadiene	*	-	-	-	3
	Naphthalene	*	-	-	-	2
	1,2,3-trichlorobenzene	*	-	-	-	3
	Total VOCs	**	25,031	29,670	29,843	

Notes

SSAC	Site-Specific Assessment Criteria
S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
NR	Results of risk assessment demonstrate contaminant does not present significant level of risk *via* this pathway
105	Measured concentration exceeds the SSAC derived to be protective of water resources
*	No SSAC derived
**	No SSAC derived due to multiple components
MTBE	Methyl *Tertiary* -Butyl Ether
-	Less than laboratory method detection limit

Appendix B
Table 21
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater and pH
Zone 1

	Monitoring Well	Alluvium				Raglan Marl Group	Laboratory Method Detection Limit
		BH126	BH127	BH128	BH201S	BH201D	
METALS	Arsenic	-	-	-	-	-	2.5
	Boron	-	-	-	76	60	12
	Cadmium	-	-	-	-	-	0.5
	Chromium	1.6	-	-	1.9	-	1.5
	Chromium-VI	-	-	-	-	-	0.03
	Copper	-	-	-	-	-	7
	Iron	793	-	-	795	176	20
	Lead	-	-	-	-	-	5
	Manganese	6	-	5	33	2,652	2
	Mercury	-	-	-	-	-	1
	Nickel	-	-	-	-	3	2
	Selenium	-	-	-	-	-	3
	Zinc	5	-	-	5	5	3
	Total Cyanide	530	-	-	-	-	20
	Free Cyanide	-	-	-	-	-	20
	pH	7.60	6.92	6.74	7.58	7.46	
	Total Organic Carbon	16,000	15,000	16,000	29,000	43,000	2,000

Notes

S Shallower screened well installed in dual installation location
D Deeper screened well installed in dual installation location
- Less than laboratory method detection limit

Appendix B
Table 22
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater andpH
Zone 2

	Monitoring Well	Alluvium									Laboratory Method Detection Limit
		BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH120	BH120 Duplicate	BH121	BH129	BH130	
METALS	Arsenic	-	-	-	-	-	-	-	-	-	2.5
	Boron	24	31	22	30	54	47	32	138	23	12
	Cadmium	-	-	-	-	-	-	-	-	-	0.5
	Chromium	-	3	-	-	-	-	2	2	2	1.5
	Chromium-VI	-	-	-	-	-	-	-	-	-	0.03
	Copper	-	-	-	-	-	-	-	-	-	7
	Iron	2,364	-	-	-	-	-	2,074	-	265	20
	Lead	-	-	-	-	-	-	-	-	-	5
	Manganese	1,299		119		3		586	69	8	2
	Mercury	-	-	-	-	-	-	-	-	-	1
	Nickel	2	3	-	-	-	2	4	-	-	2
	Selenium	-	-	-	-	-	-	-	-	-	3
	Zinc	7	65	-	73	4	55	7	3	30	3
	Total Cyanide	-	NA	50.00	NA	-	NA	-	-	-	20
	Free Cyanide	-	NA	-	NA	-	NA	-	-	-	20
	pH	7.89	NA	7.66	NA	7.46	NA	7.80	8.31	7.51	
	Total Organic Carbon	31,000	11,000	18,000	NA	29,000	NA	64,000	36,000	22,000	2,000

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
NA	Not analysed for

Appendix B
Table 22
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater andpH
Zone 2

	Monitoring Well	Alluvium							Raglan Marl Group			Laboratory Method Detection Limit
		BH130 Duplicate	BH202S	BH203S	BH203S Duplicate	BH926	BH927	BH928	BH202D	BH203D	BH203D Duplicate	
METALS	Arsenic	-	-	-	-	3	3	-	3	-	-	2.5
	Boron	19	64	49	51	96	75	78	103	29	28	12
	Cadmium	-	-	-	-	-	-	-	-	-	-	0.5
	Chromium	-	-	-	2	2	3	5	-	-	-	1.5
	Chromium-VI	-	-	-	-	-	-	-	-	-	-	0.03
	Copper	-	-	-	-	-	-	-	-	-	-	7
	Iron	-	-	-	-	90	38	35	-	-	-	20
	Lead	-	-	-	-	-	-	-	-	-	-	5
	Manganese		112	462					5	8		2
	Mercury	-	-	-	-	-	-	-	-	-	-	1
	Nickel	-	-	-	5	-	-	-	-	-	-	2
	Selenium	-	-	-	-	-	-	-	-	-	-	3
	Zinc	56	52	-	65	71	92	77	33	-	60	3
	Total Cyanide	NA	-	-	NA	NA	NA	NA	-	50.00	NA	20
	Free Cyanide	NA	-	-	NA	NA	NA	NA	-	-	NA	20
	pH	NA	7.94	7.44	NA	NA	NA	NA	8.27	7.89	NA	
	Total Organic Carbon	NA	NA	21,000	NA	NA	NA	NA	-	25,000	NA	2,000

Notes

S	S
D	D
-	L
NA	N

Appendix B
Table 23
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater and pH
Zone 3

	Monitoring Well	Alluvium																												Laboratory Method Detection Limit	
		BH102	BH103	BH106	BH107	BH108	BH109	BH110	BH111	BH112	BH114A	BH115	BH117	BH118	BH119	BH122	BH124	BH131	BH132	BH135	BH136	BH204AS	BH205AS	BH400	BH401	BH402	BH403	BH404	BH406	BH406 Duplicate		BH901
METALS	Arsenic	-	-	-	-	-	2.5	6.9	-	-	-	-	2.8	2.6	10.6	-	3.1	2.9	-	-	-	8	-	7.7	5.6	-	-	-	-	-	2.5	-
	Boron	396	840	235	595	254	68	77	49	151	-	-	484	399	175	87	4,574	1,797	90	100	85	138	74	156	200	199	209	299	58	50	12	217
	Cadmium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-
	Chromium	-	-	-	-	4.1	-	-	-	-	-	-	-	-	-	7.3	-	4.4	3.5	-	-	21	-	16.7	-	-	3.1	-	1.5	-	1.5	-
	Chromium-VI	-	-	-	-	-	NA	-	-	-	-	NA	-	-	-	NA	NA	-	-	NA	NA	-	-	-	-	-	-	NA	-	-	0.03	NA
	Copper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
	Iron	-	-	-	624	2,862	234	3,835	-	-	-	24	44	55	159	3,347	23	62	49	499	8,552	32,870	-	32,560	35	-	-	136	-	-	20	136
	Lead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
	Manganese	NA	NA	5	396	NA	5,386	9,862	32	141	8	4	6,157	4,371	31,180	577	76	NA	NA	518	2,698	16,820	-	13,050	322	1,807	NA	623	2,867	NA	2	789
	Mercury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
	Nickel	4	4	-	-	-	-	11	-	-	-	-	2	4	9	-	-	-	-	-	-	14	-	10	2	-	-	-	-	-	2	-
	Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
	Zinc	50	61	33	35	85	67	70	11	7	3	56	37	39	27	56	51	79	75	55	55	64	4	65	37	6	66	35	-	54	3	36
	Total Cyanide	NA	NA	-	-	NA	-	-	60	20	50	-	-	-	-	-	-	NA	NA	-	-	-	60	-	-	-	NA	10	50	NA	20	-
	Free Cyanide	NA	NA	-	-	NA	-	-	-	-	-	-	-	-	-	-	-	NA	NA	-	-	-	-	-	-	-	NA	-	20	NA	20	-
	pH	NA	NA	8.12	8.01	NA	8.25	7.97	7.04	6.58	7.08	7.52	8.41	8.42	7.47	7.03	6.92	NA	NA	7.24	6.93	6.96	7.34	6.87	8.13	8.3	NA	NA	7.8	NA		NA
	Total Organic Carbon	NA	NA	NA	NA	NA	NA	22,000	17,000	39,000	4,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	48,000	15,000	51,000	NA	NA	NA	NA	110,000	NA	2,000	NA

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
NA	Not analysed for

Appendix B
Table 23
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater and pH
Zone 3

	Monitoring Well	Alluvium																								Laboratory Method Detection Limit
		BH903	BH904	BH909	BH910	BH912	BH913	BH914	BH917	BH918	BH919	BH919 Duplicate	BH921	BH922	BH923	BH923 Duplicate	BH924	BH925	BH929	BH930	EX03	EX04	EX06	EX07	EX08	EX09	EX10	
METALS	Arsenic	-	-	3	3.2	-	-	-	-	-	3.2	-	2.7	4.1	-	-	3.8	3	-	-	3	3	6.3	7.1	4.9	-	2.9	2.5
	Boron	239	65	109	72	885	17,320	1,246	5,700	6,647	1,240	1,300	368	127	73	65	336	632	140	430	70	501	234	512	304	257	1,132	12
	Cadmium	-	-	-	-	-	-	-	-	-	0.7	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
	Chromium	-	-	-	-	4.5	2.5	3.4	-	-	1.7	-	-	2	-	-	-	4.1	2.1	2.1	1.8	-	-	-	-	-	-	1.5
	Chromium-VI	NA	NA	NA	NA	-	-	-	NA	NA	NA	-	NA	NA	-	-	NA	-	-	-	-	-	-	-	-	NA	NA	0.03
	Copper	-	-	-	-	-	-	-	-	-	-	-	-	70	-	-	-	-	-	-	-	-	-	-	-	-	-	7
	Iron	-	1,062	490	92	3,061	7,904	8,201	10,380	629	15,170	-	5,136	1,950	0	0	262	29	42	24	2,575	46	29,690	24,730	9,919	7,199	8,458	20
	Lead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	Manganese	862	109	185	843	NA	NA	NA	2,127	1,149	3,256	NA	3,185	945	8	NA	1,895	NA	NA	NA	2,692	4,302	6,427	3,089	2,898	1,410	2,049	2
	Mercury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Nickel	-	-	-	-	-	4	-	8	-	10	15	3	18	-	-	3	5	-	-	30	3	11	19	5	-	-	2
	Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Zinc	37	57	53	45	72	72	70	56	65	64	56	62	58	37	54	37	73	430	78	60	31	51	42	44	59	49	3
	Total Cyanide	20	-	-	-	NA	NA	NA	-	-	-	NA	30	110	-	NA	20	NA	NA	NA	10	-	-	-	10	-	-	20
	Free Cyanide	-	-	-	-	NA	NA	NA	-	-	-	NA	-	60	-	NA	-	NA	NA	NA	-	-	-	-	-	-	-	20
	pH	NA	7.64	7.34	7.41	NA	NA	NA	6.93	7.32	6.33	NA	6.88	6.86	8	NA	NA	NA	NA	NA	7.27	8.45	7.26	7.31	7.45	8.21	8.01	
	Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8,000	NA	NA	NA	NA	24,000	NA	44,000	44,000	29,000	NA	NA	2,000

Notes

S S
D D
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NA N

Appendix B
Table 23
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater and pH
Zone 3

	Monitoring Well	Alluvium													Raglan Marl Group												Laboratory Method Detection Limit
		EX10 Duplicate	EX11	EX12	EX13	EX14	EX15	EX16	EX17	EX18	EX19	EX20	EX21	EX22	EX23	BH204AD	BH205AD	BH301S	BH301D	BH302D	BH303S	BH303D	BH304S	BH304D	BH305	EX01	EX02	EX05	
METALS	Arsenic	-	7.6	4.5	-	6.4	3.5	8.3	3.1	-	-	-	-	2.7	5.7	4.8	-	4.1	-	-	-	-	-	-	4.7	2.7	5	4.2	2.5
	Boron	1,087	356	495	113	284	247	250	71	194	1,003	1,010	458	307	110	57	33	385	292	692	442	454	23	26	65	266	64	67	12
	Cadmium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
	Chromium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.3	107.7	-	-	-	-	-	-	-	-	-	1.5
	Chromium-VI	-	-	-	-	-	-	-	NA	-	-	-	-	NA	NA	-	-	-	100	NA	-	-	-	-	-	NA	-	-	0.03
	Copper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
	Iron	-	-	-	-	-	341	-	168	-	-	-	-	36	-	223	-	-	177	100	34	-	-	-	313	3,461	6,723	1,453	20
	Lead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
	Manganese	NA	614	957	1,651	89	1,275	399	1,699	NA	NA	NA	NA	1,222	1,092	563	33	NA	NA	41	NA	NA	30	163	547	16,230	11,120	5,053	2
	Mercury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Nickel	-	3	7	-	4	-	-	-	2	-	2	2	-	-	4	-	-	-	-	5	5	-	-	5	-	9	5	2
	Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	Zinc	52	53	51	33	56	45	28	61	48	54	49	54	35	56	49	-	65	81	41	83	62	-	-	66	60	53	48	3
	Total Cyanide	NA	-	20	-	-	-	10	-	NA	NA	NA	NA	20	-	-	-	NA	NA	-	NA	NA	10	-	-	-	-	-	20
	Free Cyanide	NA	-	-	-	-	-	-	-	NA	NA	NA	NA	10	-	-	-	NA	NA	-	NA	NA	-	-	-	-	-	-	20
	pH	NA	8.36	8.3	8.37	8.36	8.26	8.25	8.42	NA	NA	NA	NA	NA	NA	7.81	8.25	NA	NA	NA	NA	NA	8.03	7.71	7.88	7.94	7.77	7.74	
	Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,000	47,000	NA	NA	NA	NA	NA	58,000	35,000	26,000	NA	39,000	26,000	2,000

Notes

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NA

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Appendix B
Table 24
Metals, Cyanide and Total Organic Carbon (µg/l) in Groundwater and pH
Zone 3

	Monitoring Well	Alluvium								Raglan Marl Group			Laboratory Method Detection Limit
		BHOS407	BHOS408	BHOS409A	BHOS410	BHOS411	BHOS412	BHOS413	BHOS414	BHOS306S	BHOS306D	BHOS307	
METALS	Arsenic	-	-	-	-	3.4	-	-	2.8	-	4.7	6.4	2.5
	Boron	66	1,112	47	42	45	47	42	23	56	54	27	12
	Cadmium	-	-	-	-	-	-	-	-	-	-	-	0.5
	Chromium	-	62.2	-	-	-	-	-	-	-	-	-	1.5
	Chromium-VI	-	-	-	-	-	-	-	-	-	-	-	0.03
	Copper	-	-	-	25	-	-	-	-	-	-	-	7
	Iron	-	-	762	93	-	-	-	-	31	-	-	20
	Lead	-	-	-	-	-	-	-	-	-	-	-	5
	Manganese	1,197	449	1,561	13	3,945	249	12	11	5,895	5,870	-	2
	Mercury	-	-	-	-	-	-	-	-	-	-	-	1
	Nickel	18	6	5	11	8	5	-	-	3	4	-	2
	Selenium	-	-	-	-	-	-	-	-	-	-	-	3
	Zinc	62	6	11	41	9	9	6	5	6	8	8	3
	Total Cyanide	-	-	-	-	-	-	-	-	-	-	-	20
	Free Cyanide	-	-	-	-	-	-	-	-	-	-	-	20
	pH	7.1	8.46	6.59	6.55	8.41	8.03	7.79	8.52	8.35	8.36	8.13	
	Total Organic Carbon	10,000	9,000	8,000	10,000	9,000	3,000	2,000	8,000	11,000	11,000	4,000	2,000

Notes

S Shallower screened well installed in dual installation location
D Deeper screened well installed in dual installation location
- Less than laboratory method detection limit

Appendix B
Table 25
Biogeochemical Parameters (µg/l) in Groundwater Zone 1

	Monitoring Well	Alluvium				Raglan Marl Group	Laboratory Method Detection Limit
		BH126	BH127	BH128	BH201S	BH201D	
BIOGEOCHEMICAL	Nitrate	3,700	1,000	1,400	2,600	1,300	200
	Nitrite	-	-	-	-	-	20
	Manganese	6	-	5	33	2,652	2
	Iron	793	-	-	795	176	20
	Sulphate	4,500	35,560	18,610	28,010	72,350	50
	Sulphide	-	-	-	-	-	300
	Carbon Dioxide	41,760	37,548	44,561	73,693	110,531	1
	Methane	-	-	-	-	47	1
	BOD	-	-	-	-	-	1,000
	COD	-	-	-	-	-	7,000

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand

Appendix B
Table 26
Biogeochemical Parameters (µg/l) in Groundwater

	Monitoring Well	Alluvium															Raglan Marl Group			Laboratory Method Detection Limit
		BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH120	BH120 Duplicate	BH121	BH129	BH130	BH130 Duplicate	BH202S	BH203S	BH203S Duplicate	BH926	BH927	BH928	BH202D	BH203D	BH203D Duplicate	
BIOGEOCHEMICAL	Nitrate	700	400	32,700	200	7,100	10,200	600	3,200	2,800	600	600	10,000	500	300	5,300	7,400	6,100	1,800	1,000	200
	Nitrite	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	40	-	-	20
	Manganese	1,299	NA	119	NA	3	NA	586	69	8	NA	112	462	NA	NA	NA	NA	5	8	NA	2
	Iron	2,364	-	-	-	-	-	2,074	-	265	-	-	-	-	90	38	35	-	-	-	20
	Sulphate	33,000	29,620	72,320	36,840	42,750	42,090	16,790	27,100	21,610	18,910	25,800	20,770	61,040	34,570	40,390	45,360	20,400	10,700	58,450	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
	Carbon Dioxide	45,203	44,317	51,261	39,776	111,840	134,882	63,585	22,609	55,727	70,766	77,632	28,472	38,572	92,721	103,686	97,220	49,366	35,111	36,511	1
	Methane	6	8	-	-	-	-	464	-	-	-	-	21	18	31	-	-	-	-	-	1
	BOD	-	NA	-	NA	-	NA	26,000	-	-	NA	-	-	-	NA	NA	NA	-	-	-	1,000
	COD	-	NA	-	NA	-	NA	62,000	-	7,000	NA	-	-	-	NA	NA	NA	-	-	-	7,000

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
NA	Not analysed for
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand

Appendix B
Table 28
Biogeochemical Parameters (µg/l) in Groundwater
Zone 3

	Monitoring Well	Alluvium																				Laboratory Method Detection Limit
		BH102	BH103	BH106	BH107	BH108	BH109	BH110	BH111	BH112	BH114A	BH115	BH117A	BH118	BH119	BH122	BH124	BH131	BH132	BH135	BH136	BH204AS	
BIOGEOCHEMICAL	Nitrate	300	300	2,800	1,000	-	-	300	300	16,200	3,000	5,700	-	-	-	3,800	22,300	1,000	4,100	9,100	400	-	200
	Nitrite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	-	-	420	-	-	20
	Manganese	NA	NA	5	396	NA	5,386	9,862	32	141	8	4	6,157	4,371	31,180	577	76	NA	NA	518	2,698	16,820	2
	Iron	-	-	-	624	2,862	234	3,835	-	-	-	24	44	55	159	3,347	23	62	49	499	8,552	32,870	20
	Sulphate	1,680	990	26,460	29,370	660	1,790	95,960	1,150	38,610	55,910	22,890	840	840	3,680	33,500	13,630	36,050	42,120	40,040	28,480	90,350	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
	Carbon Dioxide	78,515	95,490	38,268	NA	62,766	33,689	388,268	163,112	70,976	18,472	26,110	NA	NA	NA	118,817	22,470	103,594	98,655	72,644	189,156	NA	1
	Methane	4,047	3,770	-	154	4,872	18,443	3,123	-	-	-	-	26,124	24,621	15,438	952	-	69	-	14	4,073	15,319	1
	BOD	NA	NA	-	-	NA	20,000	4,000	-	-	-	-	12,000	4,000	2,000	-	-	NA	NA	-	6,000	20,000	1,000
	COD	NA	NA	-	-	NA	44,000	36,000	-	-	-	-	36,000	37,000	183,000	7,000	16,000	NA	NA	7,000	58,000	201,000	7,000

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
NA	Not analysed for
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand

Appendix B
Table 28
Biogeochemical Parameters (µg/l) in Groundwater
Zone 3

	Monitoring Well	Alluvium																				Laboratory Method Detection Limit
		BH205AS	BH400	BH401	BH402	BH403	BH404	BH406	BH406 Duplicate	BH901	BH903	BH904	BH909	BH910	BH912	BH913	BH914	BH917	BH918	BH919	BH919 Duplicate	BH921	
BIOGEOCHEMICAL	Nitrate	19,100	-	-	700	300	400	500	300	4,800	3,700	6,800	10,200	10,600	200	-	200	1,600	11,700	900	2,300	1,300	200
	Nitrite	2,420	-	-	150	-	-	-	-	90	60	-	20	60	-	-	-	160	680	-	-	420	20
	Manganese	-	13,050	322	1,807	NA	623	2,867	NA	789	862	109	185	843	NA	NA	NA	2,127	1,149	3,256	NA	3,185	2
	Iron	-	32,560	35	-	-	136	-	-	136	-	1,062	490	92	3,061	7,904	8,201	10,380	629	15,170	-	5,136	20
	Sulphate	52,010	5,780	5,410	30,170	1,290	1,000	67,440	23,830	32,070	36,460	26,670	40,170	41,080	12,710	8,250	890	14,670	7,410	15,930	14,330	40,250	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
	Carbon Dioxide	73,142	NA	67,777	NA	55,527	34,889	167,268	147,871	62,540	NA	48,538	102,031	67,288	120,284	182,849	84,334	237,160	121,791	347,197	433,808	NA	1
	Methane	-	14,022	898	283	31,395	11,081	5,869	8,435	93	16	5	548	112	2,113	7,730	18,416	1,803	7,682	1,826	1,885	93	1
	BOD	-	8,000	42,000	2,000	NA	24,000	7,000	NA	-	-	-	-	-	NA	NA	NA	2,000	9,000	3,000	NA	-	1,000
	COD	-	189,000	91,000	26,000	NA	94,000	88,000	NA	-	13,000	-	-	-	NA	NA	NA	28,000	42,000	50,000	NA	57,000	7,000

Notes

S	S
D	D
-	L
NA	N
BOD	B
COD	C

Appendix B
Table 28
Biogeochemical Parameters (µg/l) in Groundwater
Zone 3

	Monitoring Well	Alluvium																					Laboratory Method Detection Limit
		BH922	BH923	BH923 Duplicate	BH924	BH925	BH929	BH930	EX03	EX04	EX06	EX07	EX08	EX09	EX10	EX10 Duplicate	EX11	EX12	EX13	EX14	EX15	EX16	EX17	EX18	
BIOGEOCHEMICAL	Nitrate	10,200	4,400	16,600	300	800	300	5,100	300	-	300	300	400	400	200	300	-	-	6,100	23,200	-	-	400	300	200
	Nitrite	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	570	-	-	-	410	-	20
	Manganese	945	8	NA	1,895	NA	NA	NA	2,692	4,302	6,427	3,089	2,898	1,410	2,049	NA	614	957	1,651	89	1,275	399	1,699	NA	2
	Iron	1,950	-	-	262	29	42	24	2,575	46	29,690	24,730	9,919	7,199	8,458	-	-	-	-	-	341	-	168	-	20
	Sulphate	81,620	18,640	18,660	3,600	44,770	33,540	45,300	22,310	840	1,060	6,650	25,190	5,830	430	840	1,240	13,990	37,770	22,910	2,120	4,490	30,800	2,410	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
	Carbon Dioxide	NA	20,488	34,168	17,968	120,708	84,238	108,769	NA	NA	NA	NA	106,171	71,864	44,519	52,246	29,668	NA	NA	NA	NA	70,806	25,877	61,822	1
	Methane	349	-	-	4,218	13	48	-	2,231	29,885	13,585	26,285	8,121	26,577	26,490	29,200	2,258	1,575	214	46	4,801	2,149	23,899	39,445	1
	BOD	-	-	NA	2,000	NA	NA	NA	1,000	4,000	5,000	23,000	7,000	18,000	18,000	NA	8,000	5,000	-	-	8,000	27,000	11,000	NA	1,000
	COD	70,000	-	NA	24,000	NA	NA	NA	56,000	37,000	115,000	90,000	53,000	44,000	36,000	NA	21,000	30,000	7,000	12,000	33,000	57,000	28,000	NA	7,000

Notes

S	S
D	D
-	L
NA	N
BOD	B
COD	C

Appendix B
Table 28
Biogeochemical Parameters (µg/l) in Groundwater
Zone 3

	Monitoring Well	Alluvium					Raglan Marl Group												Laboratory Method Detection Limit
		EX19	EX20	EX21	EX22	EX23	BH204AD	BH205AD	BH301S	BH301D	BH302D	BH303S	BH303D	BH304S	BH304D	BH305	EX01	EX02	EX05	
BIOGEOCHEMICAL	Nitrate	200	300	300	300	500	400	10,700	5,100	3,400	4,000	300	300	16,500	39,200	400	-	400	400	200
	Nitrite	-	-	-	-	-	-	50	120	230	210	-	-	-	-	-	-	-	-	20
	Manganese	NA	NA	NA	1,222	1,092	563	33	NA	NA	41	NA	NA	30	163	547	16,230	11,120	5,053	2
	Iron	-	-	-	36	-	223	-	-	177	100	34	-	-	-	313	3,461	6,723	1,453	20
	Sulphate	93,570	1,600	1,880	10,910	2,890	15,200	42,050	32,810	26,480	38,490	2,020	3,870	19,660	78,840	13,250	2,270	5,200	32,320	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
	Carbon Dioxide	190,023	111,025	75,318	7,562	48,090	NA	59,551	51,963	41,089	NA	69,773	63,816	NA	NA	NA	NA	NA	NA	1
	Methane	24,391	3,372	5,038	3,769	39,737	23,631	267	54	81	39	3,241	2,566	1,149	1,307	19,433	22,872	11,525	4,692	1
	BOD	NA	NA	NA	4,000	14,000	3,000	-	NA	NA	-	NA	NA	-	-	2,000	15,000	2,000	4,000	1,000
	COD	NA	NA	NA	24,000	22,000	70,000	-	NA	NA	-	NA	NA	31,000	30,000	63,000	45,000	68,000	43,000	7,000

Notes

S	S
D	D
-	L
NA	N
BOD	E
COD	C

Appendix B
Table 28
Biogeochemical Parameters (µg/l) in Groundwater
Off-Site

	Monitoring Well	Alluvium								Raglan Marl Group			Laboratory Method Detection Limit
		BHOS407	BHOS408	BHOS409A	BHOS410	BHOS411	BHOS412	BHOS413	BHOS414	BHOS306S	BHOS306D	BHOS307	
BIOGEOCHEMICAL	Nitrate	300	-	-	4,600	-	-	2,500	1,900	500	400	NA	200
	Nitrite	-	-	-	-	-	-	-	-	-	-	NA	20
	Manganese	1,197	449	1,561	13	3,945	249	12	11	5,895	5,870	NA	2
	Iron	-	-	762	93	-	-	-	-	31	-	NA	20
	Sulphate	18,280	6,590	21,060	19,830	15,880	13,960	9,880	16,550	7,340	7,290	NA	50
	Sulphide	-	-	-	-	-	-	-	-	-	-	NA	300
	Carbon Dioxide	63,725	81,122	88,507	61,973	NA	72,569	61,015	52,871	NA	NA	NA	1
	Methane	5	937	7	-	3,145	7	-	5	6,678	6,851	NA	1
	BOD	-	-	-	-	1,000	-	-	-	1,000	3,000	-	1,000
	COD	-	14,000	-	-	18,000	-	-	-	30,000	30,000	-	7,000

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
-	Less than laboratory method detection limit
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand

Appendix B
Table 29
Stabilised Hydrogeochemical Paramaters

Monitoring Well		Alluvium				Raglan Marl Group
		BH126	BH127	BH128	BH201S	BH201D
Electrical Conductivity	(µS/cm)	162	218	297	475	653
Dissolved Oxygen	(mg/l)	10.42*	7.20*	6.20*	2.32	0.60
pH	pH units	9.00	8.60	9.45	8.42	8.00
Oxidation-Reduction Potential	(mV)	39.1	-23.9	-63.8	-50.1	-18.6

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
*	Fault with oxygen probe overestimating DO values

Appendix B
Table 30
Stabilised Hydrogeochemical Parameters

Monitoring Well		Alluvium															Raglan Marl Group		
		BH104	BH104 Duplicate	BH105	BH105 Duplicate	BH120	BH120 Duplicate	BH121	BH129	BH130	BH130 Duplicate	BH202S	BH203S	BH203S Duplicate	BH926	BH927	BH928	BH202D	BH203D	BH203D Duplicate
Electrical Conductivity	(µS/cm)	753	703	266	393	580	577	562	465	594	460	608	655	607	558	582	599	640	536	525
Dissolved Oxygen	(mg/l)	0.36	0.57	4.67*	0.76	0.63	0.75	0.49	0.30	6.03*	3.01	0.50	1.75	2.94	0.55	0.25	0.42	0.34	0.32	0.21
pH	pH units	7.32	7.25	9.30	7.25	6.75	6.74	7.38	7.97	6.94	6.97	8.56	11.69	7.40	8.39	8.44	7.58	8.14	9.72	7.50
Oxidation-Reduction Potential	(mV)	-79.0	-29.9	-52.0	53.6	75.9	22.0	-154.1	-43.0	98.0	55.4	-53.4	-180.3	-36.5	-67.8	-81.1	-43.4	-77.0	-116.8	-16.5

Notes

S	Shallower screened well installed in dual installation location
D	Deeper screened well installed in dual installation location
*	Fault with oxygen probe overestimating DO values

Appendix B
Table 31
Stabilised Hydrogeochemical Parameters
Zone 3

Monitoring Well		Alluvium																											
		BH102	BH103	BH106	BH107	BH108	BH109	BH110	BH111	BH112	BH114A	BH115	BH117A	BH118	BH119	BH122	BH124	BH131	BH132	BH135	BH136	BH204AS	BH205AS	BH400	BH401	BH402	BH403	BH404	BH406	BH406 Duplicate
Electrical Conductivity	(µS/cm)	597	953	401	429	699	519	686	446	365	233	2,477	646	602	1,041	581	549	589	526	552	728	1,097	506	816	762	382	593	337	869	656
Dissolved Oxygen	(mg/l)	0.41	0.40	3.87	0.52	0.44	0.19	0.35	4.47*	3.33	6.33*	11.35*	0.24	0.31	0.59	0.28	0.48	0.43	0.48	0.36	0.29	0.38	5.92*	0.34	0.22	0.37	0.41	0.34	0.72	0.34
pH	pH units	7.07	7.15	11.09	10.33	7.33	7.55	10.91	9.88	6.91	9.21	7.25	8.82	7.53	8.88	6.57	6.47	6.81	6.76	6.71	6.57	9.23	8.06	9.58	8.06	7.26	7.48	7.48	12.69	7.08
Oxidation-Reduction Potential	(mV)	-47.0	-96.4	-172.7	-145.4	-134.6	-161.3	-176.7	-96.7	54.4	3.4	44.0	-144.1	-131.6	-88.5	-18.4	89.1	23.0	41.0	26.1	-62.5	-104.4	-5.5	-97.5	-207.5	-60.1	-161.3	-173.3	-167.5	-108.0

Notes

S Shallower screened well installed in dual installation location
D Deeper screened well installed in dual installation location
* Fault with oxygen probe overestimating DO values

Appendix B
Table 31
Stabilised Hydrogeochemical Parameters
Zone 3

Monitoring Well		Alluvium																											
		BH901	BH903	BH904	BH909	BH910	BH912	BH913	BH914	BH917	BH918	BH919	BH919 Duplicate	BH921	BH922	BH923	BH923 Duplicate	BH924	BH925	BH929	BH930	EX03	EX04	EX06	EX07	EX08	EX09	EX10	EX10 Duplicate	EX11
Electrical Conductivity	(µS/cm)	467	547	350	561	566	717	677	875	604	736	706	729	769	1,125	532	499	372	632	557	589	582	613	679	604	530	664	567	562	345
Dissolved Oxygen	(mg/l)	0.44	0.63	2.18	0.34	0.33	0.38	0.36	0.27	0.29	0.41	0.35	0.49	0.51	0.45	6.32*	3.23	0.61	0.36	0.38	1.33	0.30	0.38	0.44	0.28	0.15	0.34	0.53	0.21	0.27
pH	pH units	7.34	7.83	6.79	6.80	6.84	7.04	7.04	7.15	6.63	6.92	6.07	6.02	6.39	6.37	7.69	6.82	7.91	7.36	7.77	7.38	7.59	7.77	9.87	10.00	10.33	7.55	7.57	7.69	7.69
Oxidation-Reduction Potential	(mV)	-22.3	-33.5	38.1	-25.0	-4.4	-117.8	-122.9	-144.9	-47.4	-85.4	5.3	10.8	6.4	-6.2	-15.0	66.4	-184.5	-52.6	-47.7	-40.7	-16.0	-129.0	-128.6	-139.6	-177.5	-184.1	-145.9	-179.0	-150.0

Notes

S Shallower sc
D Deeper scre
* Fault with ox

Appendix B
Table 31
Stabilised Hydrogeochemical Parameters
Zone 3

Monitoring Well		Alluvium												Raglan Marl Group											
		EX12	EX13	EX14	EX15	EX16	EX17	EX18	EX19	EX20	EX21	EX22	EX23	BH204AD	BH205AD	BH301S	BH301D	BH302D	BH303S	BH303D	BH304S	BH304D	BH305	EX01	EX02	EX05
Electrical Conductivity	(µS/cm)	397	443	490	414	673	886	614	1,251	706	598	363	644	916	556	573	541	578	620	641	753	734	884	674	720	580
Dissolved Oxygen	(mg/l)	1.07	0.63	1.26	0.25	0.24	0.32	0.54	0.37	0.44	0.31	0.29	0.27	0.26	0.64	0.35	0.41	0.64	0.76	0.40	0.55	0.53	0.10	0.69	0.37	0.73
pH	pH units	6.98	7.87	7.36	7.38	9.22	8.21	7.45	7.12	6.97	7.14	9.35	7.48	9.89	8.32	7.37	7.19	7.88	7.13	7.15	11.66	9.99	9.47	7.05	9.77	9.82
Oxidation-Reduction Potential	(mV)	-30.4	-136.0	-49.4	-177.6	-194.0	-106.2	-161.2	-133.5	-77.1	-85.3	-120.5	-58.0	-97.3	-34.6	-63.2	-30.6	-37.0	-43.8	3.0	-126.9	-36.1	-93.5	-80.9	-126.3	-72.0

Notes

S Shallower scr
D Deeper scree
* Fault with oxy

Appendix B
Table 32
Stabilised Hydrogeochemical Parameters

Monitoring Well		Alluvium								Raglan Marl Group		
		BHOS407	BHOS408	BHOS409A	BHOS410	BHOS411	BHOS412	BHOS413	BHOS414	BHOS306S	BHOS306D	BHOS307
Electrical Conductivity	(µS/cm)	149	543	134	142	389	111	90	391	420	426	288
Dissolved Oxygen	(mg/l)	0.37	0.25	0.23	5.90*	0.32	0.35	3.15	0.94	0.31	0.34	0.39
pH	pH units	9.91	7.51	9.02	9.51	6.47	9.30	7.98	5.61	7.33	7.46	7.45
Oxidation-Reduction Potential	(mV)	-103.9	39.4	-12.4	-56.9	59.4	-103.5	-36.5	126.9	40.1	26.4	-11.6

Notes

S Shallower screened well installed in dual installation location
D Deeper screened well installed in dual installation location
* Fault with oxygen probe overestimating DO values