ENVIRONMENT
& HEALTH

Hydro Components UK Ltd
Unit 16, Pantglas Industrial Estate
Bedwas
Caerphilly
CF83 8DR

Dear Rhiann

SITE PROTECTION AND MONITORING PROGRAMME (SPMP), GROUNDWATER MONITORNIG, JULY 2019 (ROUND 31): ENVIRONMENTAL PERMIT REF. BX94551F

Date 13/08/2019

Ramboll
8 Village Way
Tongwynlais
Cardiff
CF15 7NE
United Kingdom

T +44 2920 543 550
www.ramboll.co.uk

Ref 1700003424_01

BACKGROUND

Hydro Components UK Ltd. (Hydro), (formerly Sapa Extrusions Ltd.) has carried out regular groundwater monitoring at the installation since August 2005. Ramboll UK Ltd (Ramboll) has carried out twenty-five rounds of monitoring between August 2005 and February 2018; and Mabbett and Associates Ltd (M&A) carried out monitoring on four occasions (between February 2009 and April 2010). In accordance with the SPMP, groundwater monitoring is required in order to assess the nature of any identified groundwater contamination arising from potential identified sources over the longer term; and to confirm improvements in site control and management have reduced the levels of contamination.

The main manufacturing operations at the site ceased in March 2014 and the installation was partially decommissioned, including decontamination works (cleaning of press-pits, removal of oil storage tanks etc.). However, anodising and fabrication activities re-commenced at the site in 2016 and are currently ongoing.

A Compliance Assessment Report (CAR), (Ref: CAR_NRW0035057) was issued by Natural Resources Wales (NRW) on 1st May 2019 following a routine site inspection / meeting, which included discussion of the previous SPMP monitoring results (Ramboll Report Ref: 1700002328, August 2018). Regarding the groundwater monitoring programme, NRW confirmed that Round 31 of the current monitoring plan must be undertaken; and that Hydro would need provide a review and proposal to NRW.

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered Office:
240 Blackfriars Road
London
SE1 8NW

This report details the results of the thirty-first round of groundwater monitoring which was undertaken on 18th July 2019.

SCOPE OF WORKS

Groundwater samples were recovered from the following seven SPMP monitoring wells (shown on Figure 1): BH1, BH4, BH6, BHS6, BH11, BH12, and MW1. It was not possible to obtain a sample from MW2 on this monitoring occasion due to slight silting-up of the standpipe and comparatively low groundwater level across the site. Groundwater samples were also collected from boreholes BHS1 and BHS4, located to the north of the main facility, to be analysed for hydrocarbon interpretation only.

At each location, the depth to groundwater was recorded and, where present, the thickness of free product was recorded. Boreholes were purged of three times the well volume prior to sampling.

Groundwater samples collected from the seven SPMP boreholes were analysed for metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V, Be,), pH, total cyanide, sulphate, ammonia and Total Petroleum Hydrocarbons (TPH). Additionally, groundwater samples from borehole BHS6; up gradient borehole BH11; and cross gradient boreholes BH4 and BH6 were analysed for total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), iron, and redox potential, in order to gain further information on the potential source of discolouration of groundwater in monitoring wells BH6 and BHS6.

Samples from BHS1, BHS4, BHS6, and BH6 were analysed for TPH interpretation to establish whether or not the same type of hydrocarbon is present in up-gradient locations as that identified in BHS6.

For continuity, the results have been compared with UK Drinking Water Standards (UK DWS) in the groundwater analysis summary table (attached). However, given the objective of the SPMP, to identify increases in groundwater concentrations which may be attributable to the permitted operations, the UK DWS are presented for benchmarking purposes only. The 2018 concentrations should also be considered against the Reference Data collected in August 2005 (BH1, BH4, BH6, BH11, BH12, MW1, MW2) and February 2009 (BHS6), which is included in the table attached to this letter.

RESULTS

A full set of laboratory certificates, a summary table, and graphical representation of results are attached to this letter and the main findings are summarised below.

Groundwater Monitoring Results

A summary of the key findings of the groundwater monitoring and analysis results are presented below:

- Groundwater levels across the site ranged from 3.22m below ground level (bgl) (MW2) to 4.09m bgl (BHS6) and are slightly lowered, compared to the previous round of monitoring in August 2018.
- Concentrations of TPH ranged from 0.037mg/l in BH6 to 95.8mg/l in BH12. Historically, the highest TPH concentration is found in BH12 with a strong hydrocarbon odour and an oily sheen on the surface of the sample observed. Approximately 20mm of free product was detected during the most recent round of monitoring, which was removed using a disposable bailer prior to sampling. The sample was noted to have a hydrocarbon odour and an oily sheen on the surface consistent with previous findings. The concentration of TPH in BH12 has increased from 42.7mg/l to 95.8ml/l since the last time it was recorded in August 2018. This most recent concentration is greater than the

Reference Data concentration of 7.8mg/l; however, it remains below previous significantly elevated concentrations previously recorded at this location.

- Slight increases in the concentration of TPH were recorded in boreholes BH1, BH4, BH6, BH11, and BHS6; however, in each case they are within the range of concentrations previously recorded at each location.
- The groundwater sample recovered from BHS6 (the 'sentry borehole') was coloured black which is consistent with previous monitoring rounds. During the most recent round of monitoring, the recorded TPH concentration has increased slightly from 0.011mg/l in August 2018 to 0.039mg/l in July 2019. The July 2019 concentration does not exceed the sentry borehole risk-based trigger concentration of 0.108 mg/l.
- Additional samples were collected from upgradient boreholes BHS1 and BHS4 during the July 2019 monitoring round. Samples from boreholes BHS1 and BHS4, along with samples from boreholes BHS6 and BH6, were submitted to the laboratory for TPH interpretation analysis to establish whether or not the same type of hydrocarbon is present in up-gradient locations as that identified in BHS6.
    - The sample from BHS6 recorded a TPH concentration of 0.039mg/l, which was interpreted by the laboratory as a 'mineral oil style unresolved complex mixture (UCM) in the range nC22-nC34'.
    - The sample from BH6 recorded a TPH concentration of 0.037mg/l, which was interpreted by the laboratory as a 'low level mineral oil style unresolved complex mixture (UCM) in the range nC22-nC34'.
    - The sample from BHS1 recorded a TPH concentration of 0.129mg/l, which was interpreted by the laboratory as a 'mineral oil style unresolved complex mixture (UCM) in the range nC22-nC34'.
    - The sample from BHS4 recorded a TPH concentration of 5.56mg/l, which was interpreted by the laboratory as a 'large mineral oil style UCM in the range nC16-nC40+'.

The laboratory interpretations suggest that hydrocarbon present in boreholes BHS1 and BHS4 are potentially of a similar likely source; and the hydrocarbon in boreholes BH6 and BHS6 are potentially of the same type as is present in up-gradient locations.

- Black/brown coloured groundwater has previously been observed in monitoring wells BH6 and BH5, located adjacent east and west of BHS6. Samples of groundwater from BHS6 and BH6; and BH4, BH11 (across and up gradient monitoring wells) were analysed for TSS, TDS, TOC, iron and redox potential in order to gain further information on the potential source of discolouration of groundwater at locations BHS6, BH6 and BH5. The results are presented in Table 1 and are discussed further in the following section.
- Across the site, pH values ranged from pH 6.7 (BH12) to pH 7.8 (BHS6), i.e. all were above the lower limit identified in the Water Supply (Water Quality) Regulations 2000 (i.e. pH 6.5).
- Arsenic, cadmium, lead, and mercury were not detected above the laboratory limit of detection (LOD) in any samples analysed during this monitoring round.

- Boron was detected in all samples during the most recent round of monitoring; at a maximum concentration of 60µg/l in BH11. Concentrations are consistent with those previously recorded; and, remain well below the UK DWS of 1,000µg/l.
- Chromium was detected above the laboratory LOD (0.1µg/l) in the sample from BHS6 at a concentration of 0.13µg/l, which slightly exceeds the Reference Data; however, remains below the UK DWS of 50µg/l.
- Concentrations of copper were recorded above the laboratory LOD (1µg/l) in borehole BHS6 at a concentration of 66µg/l, which does not exceed the UK DWS of 2,000µg/l. The recorded concentration in BHS6 exceeds the Reference Data, but is within the range of values previously recorded at the location.
- Concentrations of nickel were recorded above the laboratory LOD (1µg/l) in boreholes BH1 (1µg/l), BH6 (2µg/l), BH11 (5µg/l), and BH12 (3µg/l), which do not exceed the UK DWS of 20µg/l. The recorded concentrations are within the range of values previously recorded at each location.
- Selenium was recorded at concentrations at or above the laboratory LOD (1ug/l) in boreholes BH4 (1µg/l) and BH11 (2µg/l), which are below the UK DWS of 10µg/l.
- Concentrations of zinc ranged from below the laboratory LOD (<1µg/l) in boreholes BH4 and BHS6 to 22µg/l in MW1. An overall decrease in zinc concentrations was observed during the most recent round of monitoring and all detected concentrations do not exceed the UK DWS (5,000µg/l).
- Concentrations of ammonia ranged from 100µg/l in BH12 to 1,600µg/l in BH11, which exceeds the UK DWS of 500µg/l. Ammonia was not detected above the laboratory LOD the first time it was analysed for in November 2005; however, since then it has been detected at concentrations exceeding the UK DWS on six occasions (September 2012, April 2013, February 2016, January 2017, August 2018, and July 2019). The highest recorded concentration of ammonia in borehole BH11 was 2,100µg/l in January 2017.
- Cyanide was below the laboratory LOD (<20µg/l) in all sampled monitoring wells except BH11. The concentration of cyanide in BH11 (50µg/l) is equal to the DWS of 50µg/l, which has been equalled and/or exceeded at this location on six occasions since monitoring began.
- The concentrations of sulphate in groundwater ranged from below the LOD (<3mg/l) in BH12 to 35mg/l in BH6 and BH11. Sulphate concentrations do not exceed the UK DWS of 250mg/l at any of the monitoring locations.

Groundwater Discolouration

Table 1 below presents the results of additional analysis carried out on groundwater collected from BHS6 and BH6, which have previously been noted as discoloured; and BH4, BH11, which are located up and across gradient of BHS6. Monitoring wells BHS6 and BH6 are located to the south of the main Extrusions Building; BH4 is located across gradient, to the west of BHS6; BH11 is located up hydraulic gradient of BHS6. It was not possible to obtain a sample from MW2, located down hydraulic gradient of BHS6, in the south-east of the site, during the most recent round of monitoring due to further 'silting-up' of the monitoring well and a low groundwater level across the site.

Table 1: Additional Analysis					
Determinand	**BH4**	**BHS6**	**BH6**	**BH11**	**MW2**
Total Suspended Solids (TSS) (mg/l)	154	65	44	890	NS
Total Dissolved Solids (TDS) (mg/l)	260	780	310	440	NS
Total Organic Carbon (TOC) (mg/l)	1.6	73	3.9	2.1	NS
Iron (total dissolved) (µg/l)	570	2,560	290	860	NS
Magnesium (total dissolved) (µg/l)	8,000	<1,000	6,000	10,000	NS
Manganese (total dissolved) (µg/l)	18	370	313	525	NS
Redox Potential (mV)	180.1	173.6	179.8	141.7	NS
pH	6.8	7.8	6.9	7.1	NS
Description	Brown, silty. Very dark brown / black at base of well	Black	Pale brown. Dark brown / black at base of well	Brown, very silty (due to low volume of water in well)	NS
Notes: Descriptions are based on visual observations at the time of sampling. No hydrocarbon odours or oily sheens were noted during sample collection. NS = Not sampled.					

The results indicate that TDS and TOC were higher in BHS6 (where the most prominent discolouration occurs) than in the other analysed samples. Additionally, dissolved iron concentrations were notably higher in borehole BHS6. The discolouration is therefore likely to be related to the elevated concentration of iron and resultant dissolved solids causing the groundwater to appear black, rather than a hydrocarbon source. Although, during recent monitoring rounds, fluctuations in hydrocarbon concentration have been identified in BHS6 and BH6, the values are not significantly elevated for an industrial site and no oily sheen was observed on groundwater.

At the request of NRW, the concentrations of magnesium and manganese have been assessed in association with the presence of discoloration of groundwater in boreholes BH6 and BHS6. Magnesium was not detected above the laboratory LOD in borehole BHS6 and it is therefore considered unlikely to be contributing to the discolouration of groundwater. Manganese was recorded at elevated concentrations in borehole BH6 and BHS6 when compared to concentrations in borehole BH4; however, even greater concentrations were detected in borehole BH11, which is not affected by groundwater discolouration in the same way as boreholes BH6 and BHS6.

Although redox potential and pH do not appear to correlate strongly with the discolouration, slight increases in dissolved metal concentrations do correlate with the increase in dissolved iron, suggesting that redox potential and TOC may be an influence on the groundwater chemistry in this area of the site.

The iron concentration in BHS6 (2,560µg/l) is elevated above the Environmental Quality Standard (EQS) for inland surface water of 1,000µg/l. The cause of the discolouration and dissolved iron is not known; however, may indicate an area of less oxygenated groundwater in this area of the site. The absence of discolouration in BH4, BH11 and MW2, along with comparatively lower concentrations of iron, indicates that the area of impacted groundwater is restricted to monitoring wells BHS6 and BH6. The absence of discolouration recorded in monitoring wells BH11 and MW2 (during previous monitoring rounds) suggests that on-site or off-site migration of discoloured groundwater or higher dissolved iron contamination is considered unlikely. It is also unlikely that the discolouration is attributable to an operational activity.

CONCLUSIONS AND RECOMMENDATIONS

The results of the thirty-first (July 2019) round of groundwater monitoring have identified minor variations in TPH concentrations across the site; however, all are within the range of concentrations previously recorded at each monitoring point. A measurable thickness of free product (approximately 2cm thick) was recorded in borehole BH12. Free product has previously been recorded in this location; however, not always as a measurable thickness. A previous investigation by Ramboll (2008) concluded, (following forensic analysis of the product in BH12), that the contamination is historical and is therefore not associated with activities carried out under the Permit. The former P16 press pit which contained waste hydraulic oil may be the source of contamination in BHS4. Although the source of potential contamination has been removed; residual contamination may be present beneath the ground slab of the building which is slowly migrating to the south-east.

The TPH concentration in the Sentry Borehole (BHS6) did not exceed the risk-based trigger concentration during the most recent round of monitoring. The trigger concentration is designed to be protective of the river from hydrocarbon (including free phase product) contamination in the west of the site; and has been exceeded in two previous monitoring rounds. TPH identification analysis has been carried out on samples from BH6, BHS1, BHS4 and BHS6. The laboratory interpretations suggest that hydrocarbons present in boreholes BHS1 and BHS4 are potentially of the same source; and the hydrocarbon in boreholes BH6 and BHS6 are potentially of the same type as is present in up-gradient locations.

An elevated ammonia concentration was identified in BH11 at a similar concentration to those recorded in January 2017 and August 2018. The source of the ammonia has not been attributed to on-site operational activities and is located up-hydraulic gradient from the operational area of the site.

Investigation has continued into the presence of discoloured groundwater in BHS6 and BH6. The discolouration is localised and is considered unlikely to be migrating onto or off the site. The discolouration is unlikely to be attributed to operational activities and the results indicate that redox potential and TOC may be an influence on the groundwater chemistry in this area of the site.

Ramboll understands that the current activities carried out under the Permit do not involve bulk storage of fuels or oils. Accordingly, the TPH fluctuations identified at some monitoring locations are considered

likely to be associated with historical activities. Going forward, NRW may consider a reduced monitoring frequency given current site activities; however, the sentry borehole (BHS6) remains key in monitoring the potential risk to the river and six-monthly monitoring may be required to continue.

Please do not hesitate to contact us if you wish to discuss any of the above.

Yours sincerely

Robert Hodgson
Consultant
Site Solutions

D +44 (0)2090 543556
M +44 (0)7885 999674
rhodgson@ramboll.com

Lucy Cleverley
Managing Consultant
Site Solutions

D +44 (0)2920 543557
M +44 (0)7713 311202
lcleverley@ramboll.com

Encl. Appendix 1, Borehole Location Plan

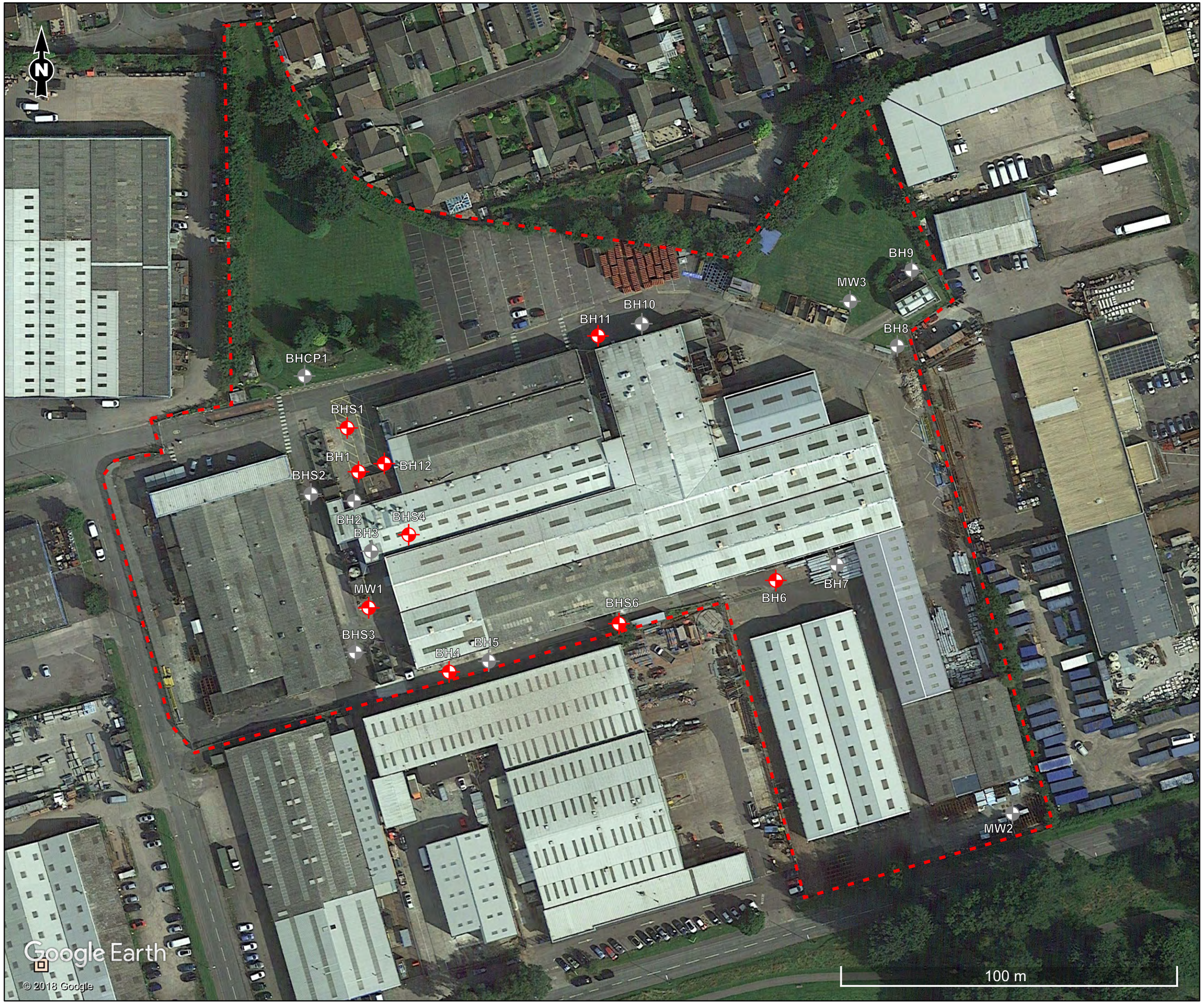
Appendix 2, Groundwater Analytical Results Summary Table

Appendix 3, Contaminant Graphs

Appendix 4, Laboratory Certificate of Analysis

Appendix 1

Borehole Location Plan



Legend

- Approximate Site Boundary
- Monitoring Well / Borehole Sampled in August 2018
- Monitoring Well / Borehole Not Sampled

Figure Title
Borehole Location Plan

Project Name
SPMP Groundwater Monitoring Round 31

Project Number	Figure No.
1700003424	1
Date	**Prepared By**
July 2019	RH
Scale	**Issue**
See Scalebar	1

Client
Hydro Components UK Ltd

RAMBOLL

Appendix 2

Groundwater Analytical Results Summary Table

Borehole Location	Date	TPH/EPH (mg/l)	Arsenic (µg/l)	Boron (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Copper (µg/l)	Lead (µg/l)	Mercury (µg/l)	Nickel (µg/l)	Selenium (µg/l)	Zinc (µg/l)	Ammonia as N (µg/l)	Total Cyanide (µg/l)	pH	Sulphate as SO_4 (mg/l)	Water Level (m bgl)
UK Drinking Water Standard		0.01mg/l**	10µg/l*	1,000* µg/l	5*µg/l	50*µg/l	2,000* µg/l	25*µg/l	1*µg/l	20*µg/l	10*µg/l	5,000µg/l**	500*µg/l	50*µg/l	6.5-10*	250mg/l*	
BH1	Aug-05	9	9	NA	ND	ND	ND	ND	ND	ND	ND	ND	1200	ND	6.5	10	3.85
	Nov-05	170	8	ND	ND	ND	ND	ND	ND	ND	ND	8	60	ND	6.5	12	2.90
	Feb-06	26	ND	16	ND	ND	ND	ND	ND	5	ND	ND	60	ND	6.4	ND	3.51
	May-06	9.7	ND	17	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	6.5	49	3.36
	Oct-06	58	ND	26	ND	ND	ND	ND	ND	10	ND	7	60	ND	6.5	23	3.56
	Feb-07	3.4	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	70	ND	6.5	ND	2.88
	Jun-07	7.9	ND	24	ND	ND	ND	ND	ND	8	ND	ND	730	ND	6.4	24	3.45
	Dec-07	20	ND	26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.2	ND	3.13
	Apr-08	170	ND	20	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	6.6	ND	3.17
	Aug-08	6	ND	64	ND	7	ND	ND	ND	ND	ND	8	ND	ND	6.6	ND	3.17
	Feb-09	8.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.10
	Jun-09	ND	1.4	39	ND	9.9	ND	ND	ND	2.3	1.3	100	120	ND	6.5	5.1	3.68
	Oct-09	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.55
	Apr-10	ND	0.9	NA	0.03	14	ND	ND	ND	4	0.5	10	NA	NA	6.5	ND	3.12
	Sep-10	9.39	ND	20	ND	6	ND	ND	ND	2	ND	ND	30	ND	6.4	12	3.49
	Apr-11	28.95	ND	20	ND	2	2	ND	ND	2	ND	9	ND	ND	6.6	6	3.72
	Sep-11	76.31	ND	20	ND	7	ND	ND	ND	2	ND	2	50	ND	6.4	8	3.53
	Mar-12	51.97	1	ND	0.1	6	2	3	ND	2	1	6	20	20	7	8	3.60
	Sep-12	7.81	1	40	ND	2	3	4	ND	3	ND	20	70	ND	7.3	11	3.24
	Apr-13	15.75	ND	NA	ND	2	ND	ND	ND	ND	ND	5	20	ND	7.3	7	3.39
	Oct-13	11.7	ND	20	ND	3	ND	ND	ND	2	ND	7	70	ND	6.9	9	3.70
	Jul-14	19.01	ND	20	ND	2	ND	ND	ND	1	ND	3	ND	ND	6.6	6	3.72
	Jan-15	0.98	ND	ND	ND	ND	ND	ND	ND	1	ND	25	110	ND	6.9	7	2.80
	Jul-15	14.4	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	70	ND	7.1	9	3.53
	Feb-16	5.2	ND	30	ND	ND	ND	ND	ND	4	ND	74	130	ND	6.6	13	2.41
	Aug-16	6.11	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	80	ND	6.6	8.6	3.53
	Jan-17	9.03	ND	ND	ND	3	ND	ND	ND	4	ND	5	70	ND	7.1	8.9	3.55
	Aug-17	41	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	50	ND	6.6	10	3.46
	Feb-18	11.9	3	40	ND	ND	ND	ND	ND	5	ND	66	300	ND	6.8	8	3.05
	Aug-18	0.056	ND	20	ND	ND	ND	ND	ND	ND	ND	10	80	ND	6.5	12	3.76
	Jul-19	38.3	ND	20	ND	ND	ND	ND	ND	1	ND	10	300	ND	6.8	21	3.86
BH4	Aug-05	61	10	NA	ND	ND	ND	ND	ND	ND	ND	ND	110	ND	6.8	34	4.02
	Nov-05	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.6	20	3.10
	Feb-06	0.07	ND	24	ND	10	ND	ND	ND	ND	ND	ND	110	ND	6.8	25	3.73
	May-06	0.02	ND	23	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	6.9	26	3.56
	Oct-06	0.02	ND	30	ND	ND	17	ND	ND	ND	ND	10	ND	ND	6.8	34	3.81
	Feb-07	0.4	ND	27	ND	ND	ND	ND	ND	ND	ND	ND	80	ND	7	21	3.11
	Jun-07	0.15	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	210	ND	6.8	24	3.62
	Dec-07	ND	ND	27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	24	3.28
	Apr-08	0.19	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.1	20	3.39
	Aug-08	ND	ND	36	ND	7	ND	ND	ND	ND	ND	ND	ND	ND	6.8	19	3.30
	Feb-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.10
	Jun-09	ND	1.3	33	ND	12	1.3	ND	ND	ND	1.4	7.1	40	ND	7	15	3.80
	Oct-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.79
	Apr-10	ND	2	NA	ND	12	ND	ND	ND	3	0.7	5	NA	NA	6.9	17	3.35
	Sep-10	0.01	ND	20	ND	4	ND	ND	ND	ND	ND	ND	20	ND	6.8	15	3.62
	Apr-11	0.03	ND	30	ND	4	2	ND	ND	ND	ND	ND	ND	ND	7	16	3.84
	Sep-11	0.01	ND	20	ND	7	ND	ND	ND	ND	1	ND	30	ND	6.6	18	3.61
	Mar-12	0.03	ND	ND	0.1	6	3	2	ND	ND	2	5	ND	ND	7.3	21	3.75
	Sep-12	ND	ND	20	ND	3	1	ND	ND	ND	1	ND	ND	ND	7.5	19	3.42
	Apr-13	0.02	ND	NA	ND	3	ND	ND	ND	ND	ND	ND	10	ND	7.4	17	3.57
	Oct-13	0.02	ND	20	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	7.2	18	3.80
	Jul-14	ND	ND	20	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	7	14	3.86
	Jan-15	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	7.3	15	2.97
	Jul-15	ND	ND	20	ND	2	ND	ND	ND	ND	ND	ND	20	ND	7.5	16	3.65
	Feb-16	0.02	ND	30	ND	2	ND	ND	ND	ND	ND	21	10	ND	6.8	14	2.50
	Aug-16	0.04	ND	10	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	6.8	17.5	3.69
	Jan-17	0.01	ND	ND	ND	2	ND	ND	ND	ND	ND	2	10	ND	7.4	17.6	3.70
	Aug-17	0.01	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	6.7	17	3.60
	Feb-18	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	150	ND	ND	6.9	19	3.22
	Aug-18	0.016	ND	20	ND	ND	ND	ND	ND	ND	1	ND	30	ND	6.8	18	3.90
	Jul-19	0.047	ND	30	ND	ND	ND	ND	ND	ND	1	ND	190	ND	6.8	22	4.00
BH6	Aug-05	0.03	9	NA	2	ND	ND	ND	ND	48	ND	140	700	ND	5.5	440	3.68
	Nov-05	0.05	8	ND	2	ND	ND	ND	ND	58	ND	200	490	ND	4.5	450	3.07
	Feb-06	0.03	ND	23	2	7	7	ND	ND	45	ND	130	1200	ND	4.6	740	3.45
	May-06	ND	ND	25	2	ND	9	ND	ND	56	ND	160	920	ND	4.5	830	3.29
	Oct-06	0.01	ND	21	1	ND	7	ND	ND	46	ND	130	120	ND	4.5	380	3.41
	Feb-07	ND	ND	29	1	ND	5	ND	ND	36	ND	95	630	ND	4.6	340	2.99
	Jun-07	0.03	ND	27	ND	ND	ND	ND	ND	24	ND	54	470	ND	4.6	230	3.39
	Dec-07	ND	ND	29	ND	ND	ND	ND	ND	13	ND	53	200	ND	4.7	110	3.18
	Apr-08	ND	ND	27	ND	ND	ND	ND	ND	15	ND	39	140	ND	5.0	170	3.27
	Aug-08	ND	ND	31	ND	ND	ND	ND	ND	13	ND	31	140	ND	5.0	130	3.08
	Jun-09	ND	ND	34	ND	ND	ND	ND	ND	6.7	ND	23	160	ND	5.5	97	4.83
	Apr-10	ND	1.1	NA	0.22	3	ND	ND	ND	5	1.1	21	NA	NA	5.6	100	3.28
	Sep-10	ND	ND	20	0.3	2	ND	ND	ND	4	ND	54	20	ND	5.6	58	3.42
	Apr-11	0.59	ND	50	0.2	1	2	ND	ND	3	ND	20	ND	ND	5.6	61	3.60
	Sep-11	0.97	ND	20	0.2	4	ND	ND	ND	5	ND	11	20	ND	5.9	47	3.46
	Mar-12	0.01	ND	ND	0.3	2	ND	2	0.1	1	1	9	ND	ND	6.8	60	3.50
	Sep-12	0.06	ND	20	0.1	ND	ND	2	ND	1	2	12	ND	ND	7	51	3.24
	Apr-13	0.03	ND	NA	0.2	2	ND	ND	ND	1	1	29	ND	ND	7.1	49	3.36
	Oct-13	0.06	ND	20	0.1	2	ND	ND	ND	ND	1	13	ND	ND	6.8	32	3.56
	Jul-14	0.01	ND	20	ND	1	ND	ND	ND	ND	1	3	ND	ND	6.8	35	3.60
	Jan-15	0.08	ND	ND	ND	ND	2	ND	ND	4	ND	4	10	ND	6.9	37	2.95
	Jul-15	0.03	ND	20	ND	ND	ND	ND	ND	1	1	ND	20	ND	7.3	29	3.45
	Feb-16	0.15	1	80	0.2	ND	7	1	ND	8	1	64	20	ND	6.5	43	2.51
	Aug-16	0.02	ND	70	0.1	ND	3	ND	ND	6	ND	98	ND	ND	6.7	32.6	3.43
	Jan-17	0.05	1	ND	0.2	ND	5	ND	ND	7	ND	4	10	ND	7.3	36.2	3.43
	Aug-17	0.02	1	ND	0.1	ND	4	ND	ND	5	1	ND	ND	ND	6.8	38	3.37
	Feb-18	0.29	4	190	0.6	ND	19	4	ND	19	5	248	20	ND	7	44	3.07
	Aug-18	0.011	ND	ND	ND	ND	52	ND	ND	14	ND	173	110	ND	7	39	3.58
	Jul-19	0.037	ND	20	ND	ND	ND	ND	ND	2	ND	4	120	ND	6.9	35	3.66

Borehole Location	Date	TPH/EPH (mg/l)	Arsenic (µg/l)	Boron (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Copper (µg/l)	Lead (µg/l)	Mercury (µg/l)	Nickel (µg/l)	Selenium (µg/l)	Zinc (µg/l)	Ammonia as N (µg/l)	Total Cyanide (µg/l)	pH	Sulphate as SO_4 (mg/l)	Water Level (m bgl)
UK Drinking Water Standard		0.01mg/l**	10µg/l*	1,000* µg/l	5*µg/l	50*µg/l	2,000* µg/l	25*µg/l	1*µg/l	20*µg/l	10*µg/l	5,000µg/l**	500*µg/l	50*µg/l	6.5-10*	250mg/l*	
BH11	Aug-05	0.06	11	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	7.4	190	3.62
	Nov-05	0.05	6	ND	ND	ND	ND	ND	ND	ND	ND	7	ND	ND	6.8	140	2.79
	Feb-06	0.03	ND	34	ND	10	ND	ND	ND	ND	ND	6	50	ND	7.6	560	3.00
	May-06	0.03	ND	31	ND	ND	ND	ND	ND	ND	ND	ND	400	30	7.1	180	3.27
	Oct-06	0.09	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.9	13	3.33
	Feb-07	ND	ND	34	ND	ND	ND	ND	ND	ND	ND	ND	70	50	6.8	31	2.77
	Jun-07	0.04	ND	32	ND	ND	ND	ND	ND	ND	ND	ND	220	ND	6.8	44	3.21
	Dec-07	ND	ND	31	ND	ND	ND	ND	ND	ND	ND	ND	ND	20	6.5	49	3.08
	Apr-08	0.17	ND	21	ND	ND	ND	ND	ND	ND	ND	47	ND	ND	7.0	30	3.00
	Aug-08	0.04	ND	25	ND	6	5	ND	ND	25	ND	94	60	ND	6.8	200	3.10
	Jun-09	ND	ND	ND	ND	ND	1.9	1.8	ND	2.5	ND	24	230	ND	6.7	23	3.50
	Apr-10	ND	1.7	NA	0.04	10	ND	ND	0.05	4	1.8	7	NA	NA	6.5	49	3.05
	Sep-10	0.04	ND	40	ND	3	ND	ND	ND	2	ND	12	80	190	7.0	53	3.36
	Apr-11	0.24	ND	30	ND	2	3	ND	ND	1	ND	5	10	260	7.3	28	3.56
	Sep-11	0.04	ND	20	ND	5	1	ND	ND	1	1	18	10	60	6.5	41	3.48
	Mar-12	0.01	ND	ND	ND	3	ND	ND	ND	ND	2	16	ND	40	7.3	28	3.51
	Sep-12	0.47	ND	20	ND	1	1	2	ND	6	ND	15	800	ND	7.1	18	3.11
	Apr-13	0.04	ND	NA	0.1	2	ND	ND	ND	3	1	10	900	40	7.1	31	3.26
	Oct-13	0.07	ND	30	ND	2	3	ND	ND	2	1	10	70	560	7.5	40	3.60
	Jul-14	0.19	ND	50	ND	1	1	ND	ND	1	ND	7	ND	50	6.8	23	3.64
	Jan-15	0.01	ND	ND	ND	ND	ND	ND	0.3	1	ND	18	30	ND	7.7	26	2.71
	Jul-15	0.03	ND	ND	ND	ND	ND	ND	ND	3	ND	10	20	ND	7.3	12	3.45
	Feb-16	0.01	ND	ND	ND	ND	ND	ND	ND	ND	2	5	500	ND	6.4	36	2.38
	Aug-16	0.09	ND	ND	ND	ND	ND	ND	ND	3	ND	13	30	ND	6.8	27	3.44
	Jan-17	0.09	ND	ND	ND	2	3	3	ND	8	ND	7	2100	ND	7.1	24.8	3.42
	Aug-17	0.08	ND	80	ND	ND	ND	ND	ND	2	ND	11	200	ND	7	39	3.36
	Feb-18	ND	ND	20	ND	ND	ND	ND	ND	ND	3	89	30	30	6.6	35	2.96
	Aug-18	0.056	ND	140	ND	ND	2	ND	ND	5	1	82	1200	20	6.8	39	3.67
	Jul-19	0.316	ND	60	ND	ND	ND	ND	ND	5	2	7	1600	50	7.1	35	3.77
BH12	Aug-05	7.8	7	NA	ND	ND	ND	ND	ND	ND	ND	ND	1400	ND	6.6	5	4.00
	Nov-05	34	ND	ND	ND	20	ND	ND	ND	7	ND	9	ND	ND	6.4	22	3.02
	Feb-06	13	ND	16	ND	ND	ND	ND	ND	10	ND	ND	70	ND	6.3	ND	3.64
	May-06	71	ND	15	ND	10	ND	ND	ND	5	ND	ND	ND	ND	6.5	ND	3.51
	Oct-06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Feb-07	21	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	120	ND	6.5	ND	3.01
	Jun-07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Dec-07	1000	ND	26	ND	ND	ND	ND	ND	7	ND	30	79	ND	6.3	ND	3.23
	Apr-08	34	ND	19	ND	ND	ND	ND	ND	5	ND	ND	ND	ND	6.6	ND	3.33
	Aug-08	260	ND	23	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	6.5	ND	3.28
	Feb-09	48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.11
	Jun-09	240	ND	ND	ND	ND	2	1.5	ND	3.7	ND	15	190	ND	6.4	4.8	3.68
	Oct-09	380	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.85
	Apr-10	72	1.7	NA	0.04	15	0.9	ND	ND	6	0.9	7	NA	NA	6.5	ND	3.45
	Sep-10	160.7	ND	20	ND	5	ND	ND	ND	2	ND	6	40	ND	6.4	ND	3.71
	Apr-13	45.98	1	NA	ND	2	ND	ND	ND	12	ND	10	10	ND	7.2	8	3.51
	Oct-13	128	ND	10	ND	3	ND	ND	ND	2	ND	8	80	ND	6.9	ND	3.80
	Jul-14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.88
	Jan-15	34.2	ND	ND	ND	ND	ND	ND	ND	1	ND	67	60	ND	6.8	ND	2.92
	Jul-15	49	ND	ND	ND	ND	ND	ND	ND	4	ND	ND	80	ND	6.9	ND	3.68
	Feb-16	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.55
	Aug-16	90.2	ND	10	ND	ND	ND	ND	ND	2	ND	7	40	ND	6.5	ND	3.69
	Jan-17	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.70
	Aug-17	121	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	50	ND	6.5	ND	3.63
	Feb-18	34.3	ND	ND	ND	ND	ND	ND	ND	1	ND	11	200	ND	6.7	4	3.18
	Aug-18	42.7	ND	20	ND	ND	ND	ND	ND	5	ND	20	ND	ND	6.5	5	3.92
	Jul-19	95.8	ND	20	ND	ND	ND	ND	ND	3	ND	5	100	ND	6.7	ND	3.98
MW1	Aug-05	0.17	11	NA	ND	ND	ND	ND	ND	ND	ND	32	160	ND	6.6	24	4.01
	Nov-05	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	43	ND	ND	6.8	33	3.11
	Feb-06	0.16	ND	22	ND	ND	ND	ND	ND	ND	ND	80	50	ND	6.6	25	3.73
	May-06	0.14	ND	20	ND	8	ND	ND	ND	ND	ND	32	ND	ND	6.8	23	3.58
	Oct-06	0.08	12	20	ND	10	5	ND	ND	ND	ND	24	ND	ND	7.2	22	3.87
	Feb-07	0.58	ND	27	ND	ND	ND	ND	ND	ND	ND	51	230	ND	7	22	3.18
	Jun-07	0.35	ND	27	ND	ND	ND	ND	ND	ND	ND	40	80	ND	6.7	21	3.61
	Dec-07	0.31	ND	29	ND	ND	ND	ND	ND	ND	ND	40	ND	ND	6.5	22	3.29
	Apr-08	2.1	ND	26	ND	ND	ND	ND	ND	ND	ND	37	50	ND	6.8	20	3.41
	Aug-08	0.06	ND	26	ND	ND	ND	ND	ND	ND	ND	56	ND	ND	6.7	18	3.29
	Feb-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.44
	Jun-09	ND	ND	ND	ND	ND	10	14	ND	3.4	ND	120	210	ND	7	2.6	3.15
	Oct-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.87
	Apr-10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.41
	Sep-10	0.03	ND	20	0.1	4	1	ND	ND	1	ND	86	20	ND	6.6	24	3.64
	Apr-11	0.55	ND	30	0.1	1	5	ND	ND	2	ND	126	ND	ND	6.8	22	3.86
	Sep-11	0.12	ND	50	ND	4	1	ND	ND	1	ND	49	20	ND	6.7	26	3.64
	Mar-12	0.12	ND	ND	0.2	5	3	3	ND	2	1	126	ND	ND	7.1	22	3.75
	Sep-12	0.31	ND	20	ND	2	2	2	ND	1	1	46	ND	ND	7.3	19	3.41
	Apr-13	0.08	ND	NA	0.1	2	ND	ND	ND	2	ND	84	30	ND	7.3	17	3.56
	Oct-13	2.32	ND	20	ND	2	ND	ND	ND	2	1	73	ND	ND	7	22	3.80
	Jul-14	2.42	ND	20	ND	1	1	ND	ND	2	ND	40	ND	ND	6.9	15	3.86
	Jan-15	0.31	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	10	ND	7.2	14	2.95
	Jul-15	0.08	ND	20	ND	ND	ND	ND	ND	1	ND	26	60	ND	7.4	20	3.65
	Feb-16	0.3	ND	ND	ND	ND	1	ND	ND	ND	ND	26	10	ND	6.8	26	2.47
	Aug-16	0.15	ND	10	ND	ND	1	ND	ND	ND	1	14	ND	ND	6.6	19.8	3.67
	Jan-17	0.15	ND	ND	ND	2	1	ND	ND	ND	ND	38	ND	ND	7.2	20.7	3.70
	Aug-17	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	46	ND	ND	6.8	24	3.60
	Feb-18	0.03	ND	80	ND	ND	ND	ND	ND	ND	ND	168	ND	ND	6.9	22	3.20
	Aug-18	0.339	ND	20	0.3	ND	2	ND	ND	1	2	116	ND	ND	6.7	20	3.88
	Jul-19	0.147	ND	30	ND	ND	ND	ND	ND	ND	ND	22	340	ND	7	29	3.99

Borehole Location	Date	TPH/EPH (mg/l)	Arsenic (µg/l)	Boron (µg/l)	Cadmium (µg/l)	Chromium (µg/l)	Copper (µg/l)	Lead (µg/l)	Mercury (µg/l)	Nickel (µg/l)	Selenium (µg/l)	Zinc (µg/l)	Ammonia as N (µg/l)	Total Cyanide (µg/l)	pH	Sulphate as SO_4 (mg/l)	Water Level (m bgl)
UK Drinking Water Standard		0.01mg/l**	10µg/l*	1,000* µg/l	5*µg/l	50*µg/l	2,000* µg/l	25*µg/l	1*µg/l	20*µg/l	10*µg/l	5,000µg/l**	500*µg/l	50*µg/l	6.5-10*	250mg/l*	
MW2	Aug-05	0.03	6	NA	ND	ND	ND	ND	ND	140	ND	120	95	ND	5.5	370	3.19
	Nov-05	0.1	ND	ND	2	ND	ND	ND	ND	100	ND	100	ND	ND	5.4	380	2.60
	Feb-06	0.27	ND	24	4	6	ND	ND	ND	140	ND	110	70	ND	5.5	480	3.00
	May-06	ND	ND	25	3	ND	ND	ND	ND	120	ND	91	70	ND	5.6	580	2.94
	Oct-06	0.01	ND	27	7	ND	ND	ND	ND	210	ND	200	90	ND	5.8	790	3.04
	Feb-07	ND	ND	33	3	ND	ND	ND	ND	150	ND	110	90	ND	5.6	510	2.69
	Jun-07	0.03	ND	28	5	ND	ND	ND	ND	170	ND	170	240	ND	5.4	510	2.94
	Dec-07	ND	ND	29	3	ND	ND	ND	ND	100	ND	120	88	ND	5.5	350	2.68
	Apr-08	ND	ND	27	2	ND	ND	ND	ND	62	ND	72	ND	ND	5.5	210	2.83
	Aug-08	0.09	ND	30	1	ND	ND	ND	ND	50	ND	76	ND	ND	5.6	170	2.70
	Jun-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Apr-10	ND	0.5	NA	0.54	8	3.6	ND	ND	10	0.6	170	NA	NA	6.3	100	NA
	Sep-10	0.04	ND	30	0.8	3	ND	ND	ND	19	ND	121	30	ND	6.1	82	2.94
	Apr-11	11.97	ND	30	0.1	2	2	ND	ND	5	ND	7	ND	ND	7.4	71	3.14
	Sep-11	0.3	ND	40	0.1	5	ND	ND	ND	10	ND	11	60	ND	6.4	71	3.00
	Mar-12	0.2	ND	ND	0.5	2	1	6	ND	12	1	33	ND	ND	7	61	3.09
	Sep-12	0.22	ND	20	0.1	ND	1	5	ND	8	ND	30	ND	ND	7.1	54	2.82
	Apr-13	0.13	ND	NA	0.4	2	ND	ND	ND	5	ND	21	30	ND	7.7	55	2.95
	Oct-13	0.38	ND	20	ND	1	ND	ND	ND	6	ND	17	10	ND	6.7	60	3.12
	Jul-14	0.42	ND	20	ND	ND	ND	ND	ND	4	ND	16	ND	ND	6.6	45	3.18
	Jan-15	0.11	ND	ND	0.1	ND	ND	ND	ND	4	ND	17	50	ND	6.8	44	2.58
	Jul-15	0.18	ND	30	ND	ND	ND	ND	ND	7	ND	21	50	ND	7	43	3.05
	Feb-16	0.06	ND	ND	0.1	ND	ND	ND	ND	2	ND	17	20	ND	6.3	36	2.11
	Aug-16	0.71	ND	ND	ND	ND	ND	ND	ND	2	ND	9	30	ND	6.3	36.4	3.02
	Jan-17	0.12	ND	ND	0.1	1	ND	ND	ND	3	ND	9	10	ND	6.9	39.4	3.04
	Aug-17	0.04	ND	80	ND	ND	ND	ND	ND	2	ND	8	10	ND	6.2	41	2.96
	Feb-18	0.03	ND	ND	ND	ND	ND	ND	ND	2	ND	80	10	ND	6.3	36	2.70
	Aug-18	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.20
	Jul-19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.22
BHS6 (Sentry Borehole)	Feb-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.47
	Jun-09	ND	2.8	ND	ND	ND	13	1.1	ND	4.2	1.8	6.7	310	ND	7.3	NA	4.00
	Oct-09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.00
	Apr-10	0.74	30	NA	1.8	380	410	41	2.5	51	21	71	NA	NA	7.5	81	3.65
	Sep-10	0.01	ND	30	1	28	1723	11	ND	26	ND	338	300	ND	7.3	46	3.86
	Apr-11	0.04	10	40	0.8	48	85	21	0.4	7	4	37	400	ND	7.8	55	4.03
	Sep-11	0.07	9	ND	1.1	28	81	22	0.2	7	4	24	400	ND	7.5	61	3.90
	Mar-12	0.04	8	ND	0.9	14	66	17	ND	5	3	22	330	ND	7.9	63	3.95
	Sep-12	0.04	8	ND	0.8	38	99	20	0.3	7	3	15	160	ND	8.2	59	3.66
	Apr-13	0.04	ND	NA	10.6	ND	189	ND	ND	ND	ND	515	60800	ND	8.2	60	3.81
	Oct-13	0.02	7	50	0.5	24	62	14	0.2	5	2	20	280	ND	7.5	ND	3.97
	Jul-14	0.05	8	ND	0.5	8	38	4	ND	5	2	11	240	ND	7.9	47	4.02
	Jan-15	0.03	9	ND	0.4	33	119	12	0.2	8	1	9	250	ND	7.7	3	3.30
	Jul-15	0.02	9	ND	0.3	10	66	7	0.2	5	3	8	320	ND	7.8	29	3.85
	Feb-16	0.05	5	30	0.1	10	38	3	0.1	3	2	48	160	ND	7.4	56	2.85
	Aug-16	0.04	8	60	0.3	15	75	7	0.2	5	1	58	180	ND	8.1	63.4	3.86
	Jan-17	0.03	9	ND	0.3	15	81	7	0.1	5	1	19	220	ND	8.2	57.9	3.87
	Sep-17	0.15	8	ND	0.3	15	71	8	ND	7	4	27	180	ND	7.7	55	3.78
	Feb-18	0.58	7	ND	0.2	6	49	4	ND	4	2	102	ND	ND	7.9	41	3.48
	Aug-18	0.011	ND	ND	ND	ND	69	ND	ND	ND	ND	88	200	ND	7.7	41	4.02
	Jul-19	0.039	ND	20	ND	13	66	ND	ND	ND	ND	ND	470	ND	7.8	30	4.09

Notes:
The red cells indicate where the concentration exceeds the UK Drinking Water Standard
The yellow cells indicate where laboratory detection limits have been raised due to matrix interference
The green cells indicate rounds of monitoring carried out by Mabbett & Associates Ltd

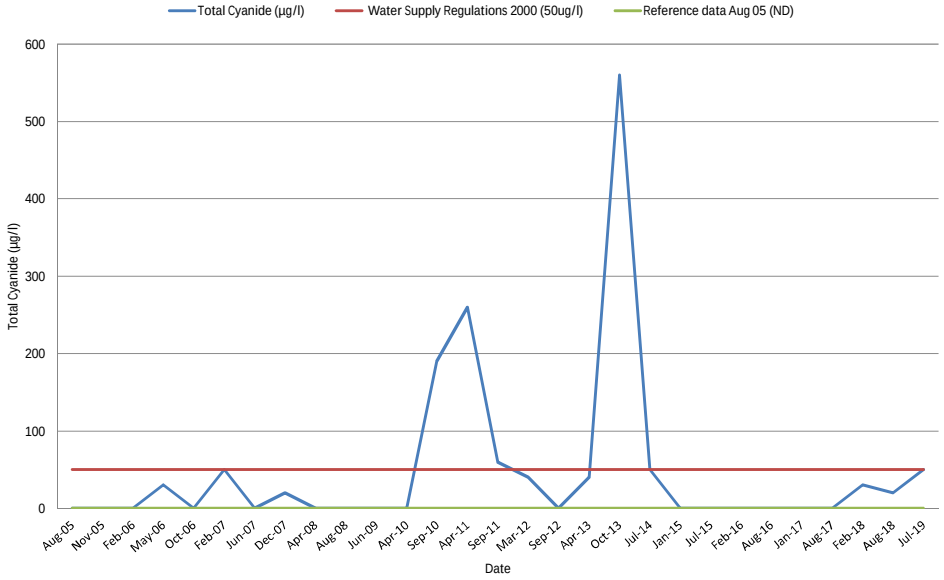
*Water Supply (Water Quality) Regulations 2000
* *The Water Supply (Water Quality) Regulations 1989

NS = No sample taken - free product present
ND = Not detected above laboratory detection limits
NA = Not analysed

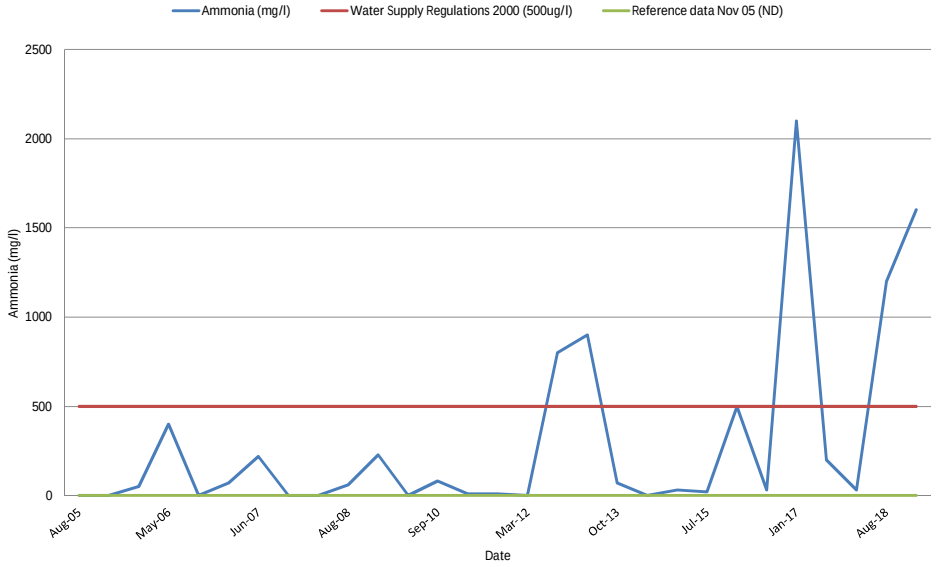
Appendix 3

Contaminant Graphs

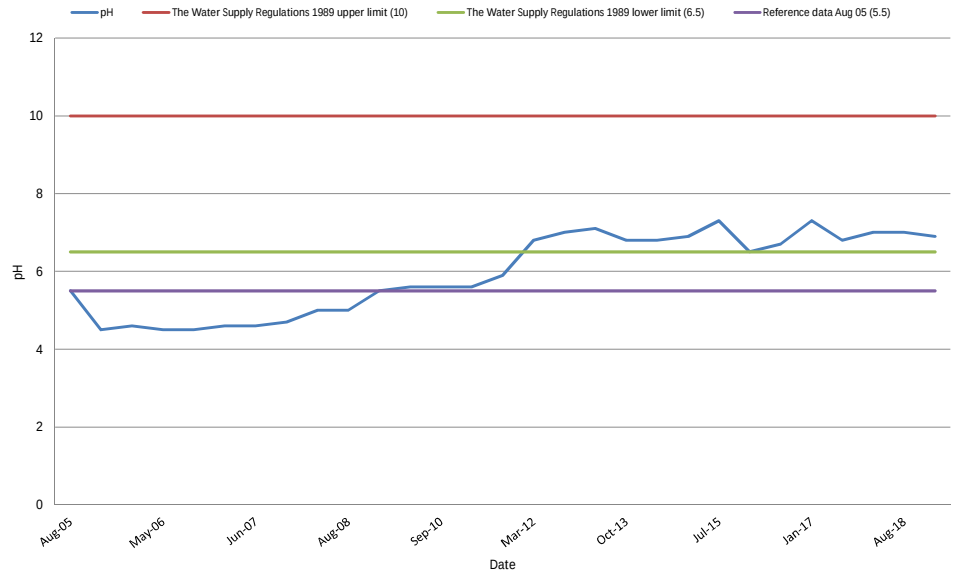
Borehole BH11 - Total Cyanide



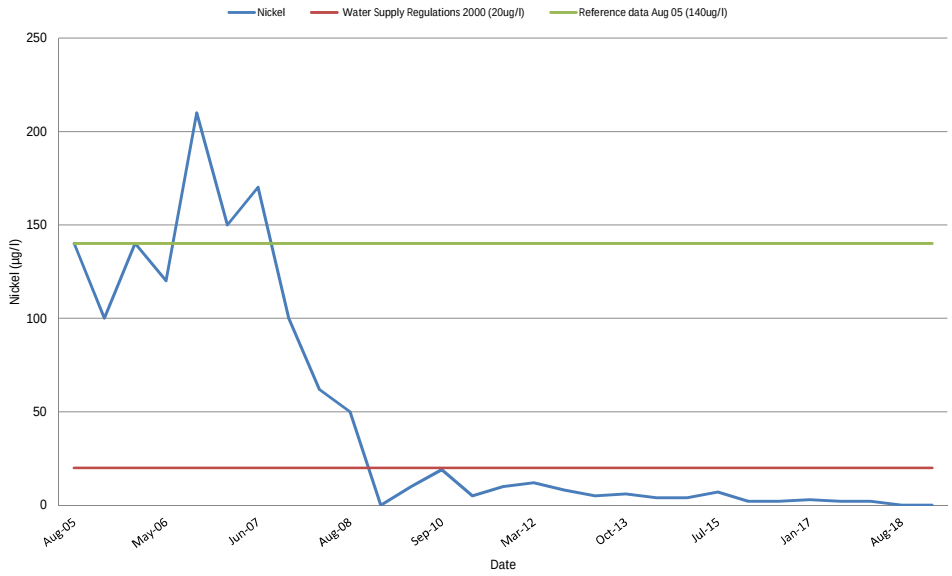
Borehole BH11 - Ammonia



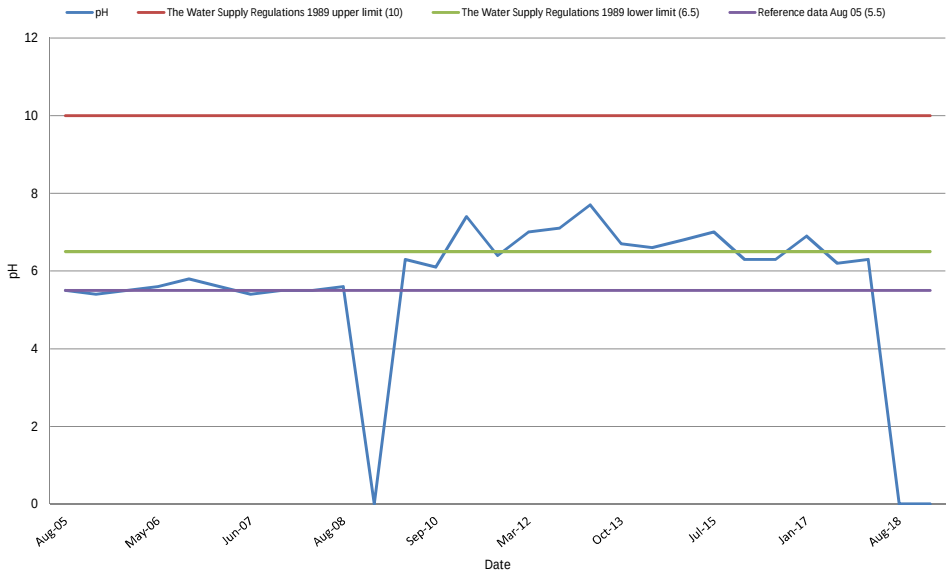
Borehole 6 - pH



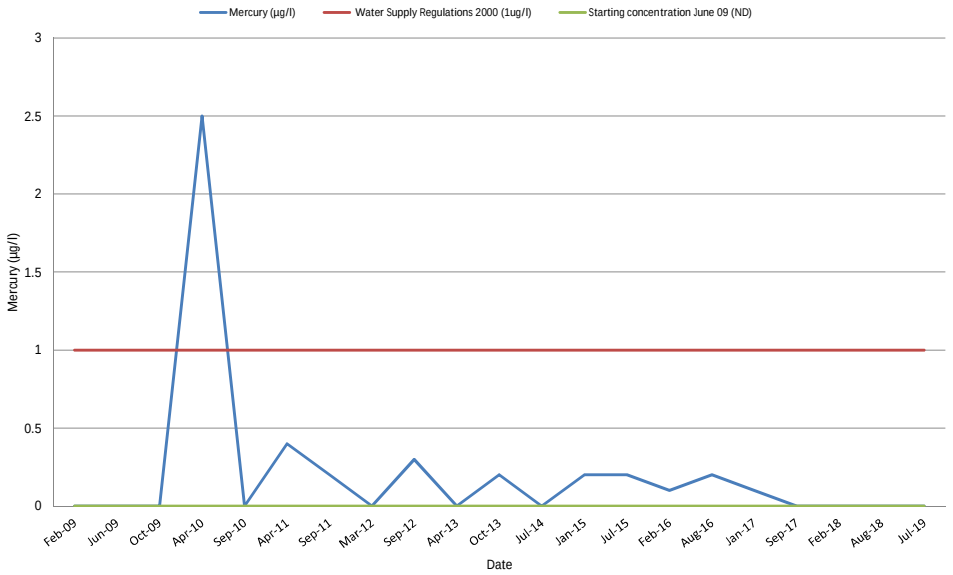
Borehole MW2 - Nickel



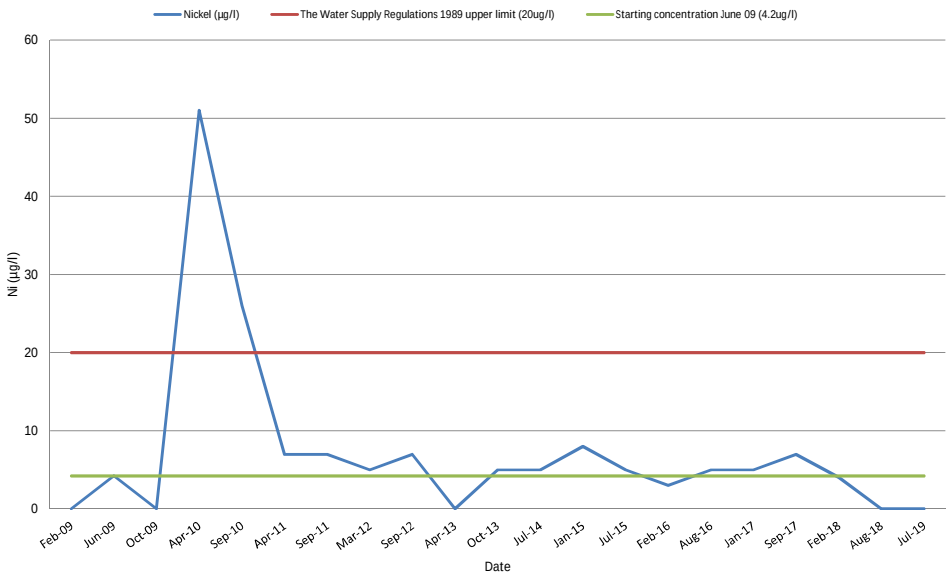
Borehole MW2 - pH



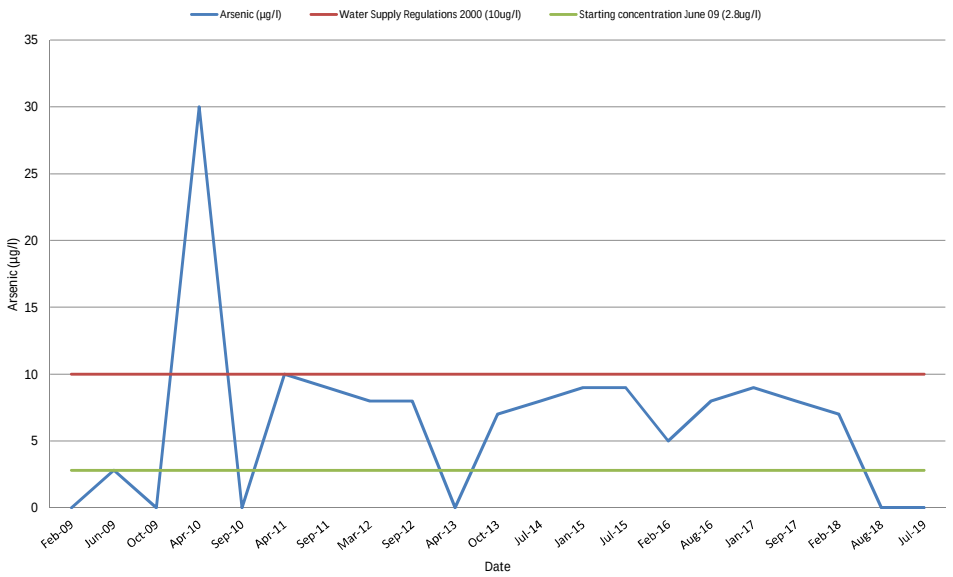
Borehole BHS6 - Mercury



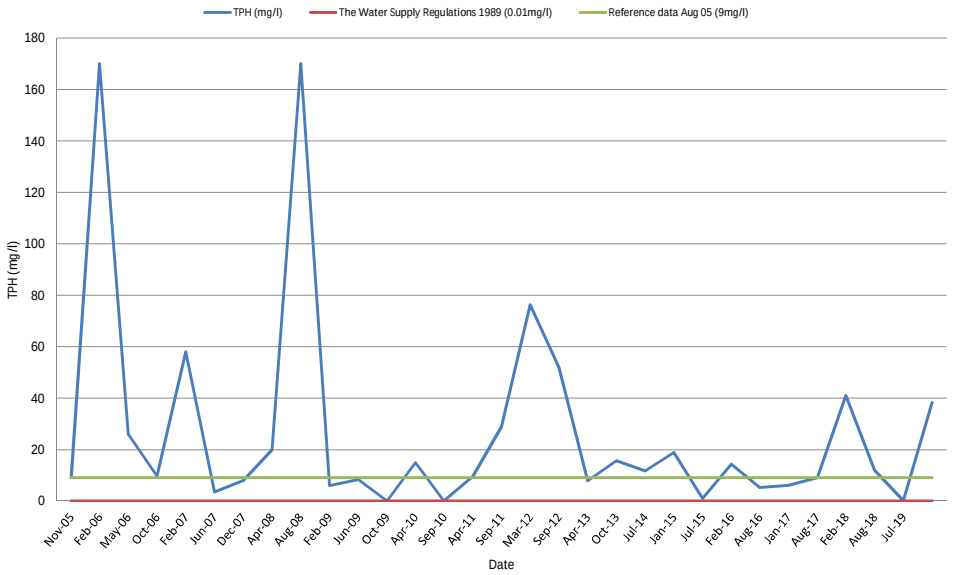
Borehole BHS6 - Nickel



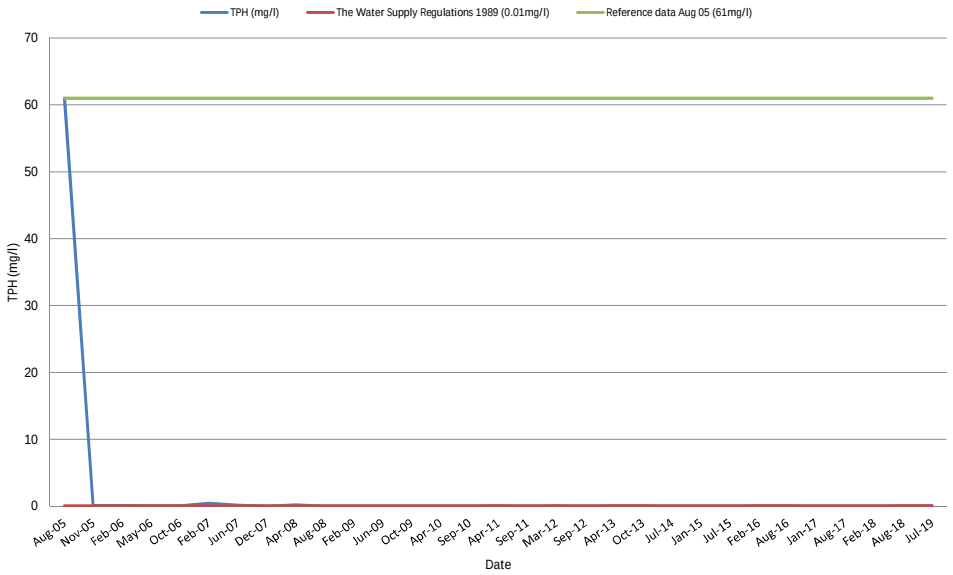
Borehole BHS6 - Arsenic



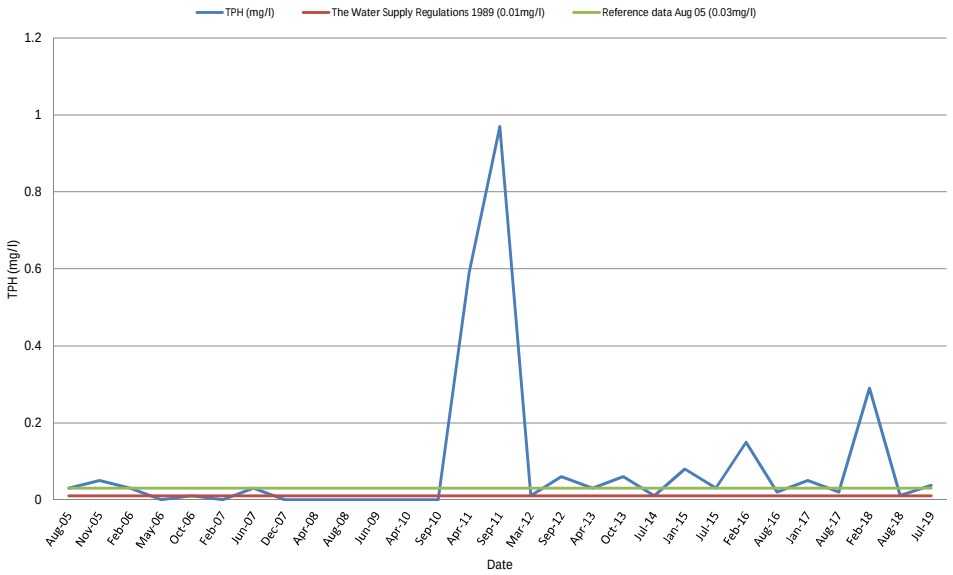
Borehole BH1



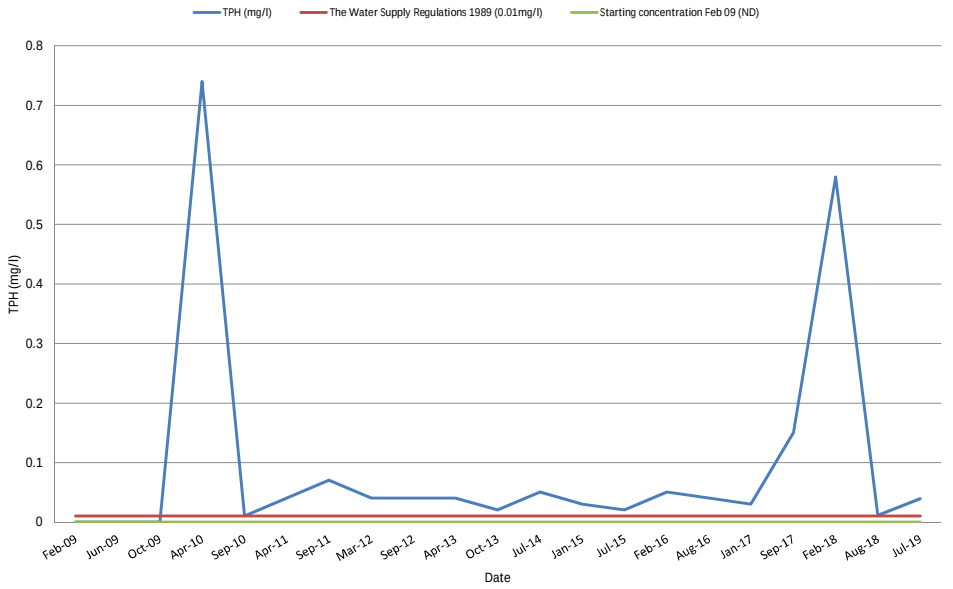
Borehole BH4

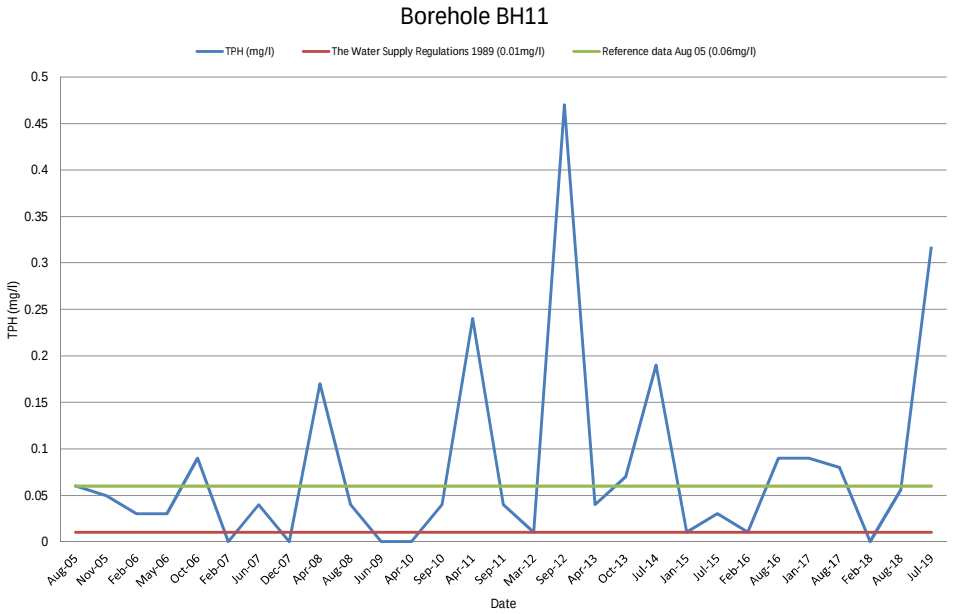


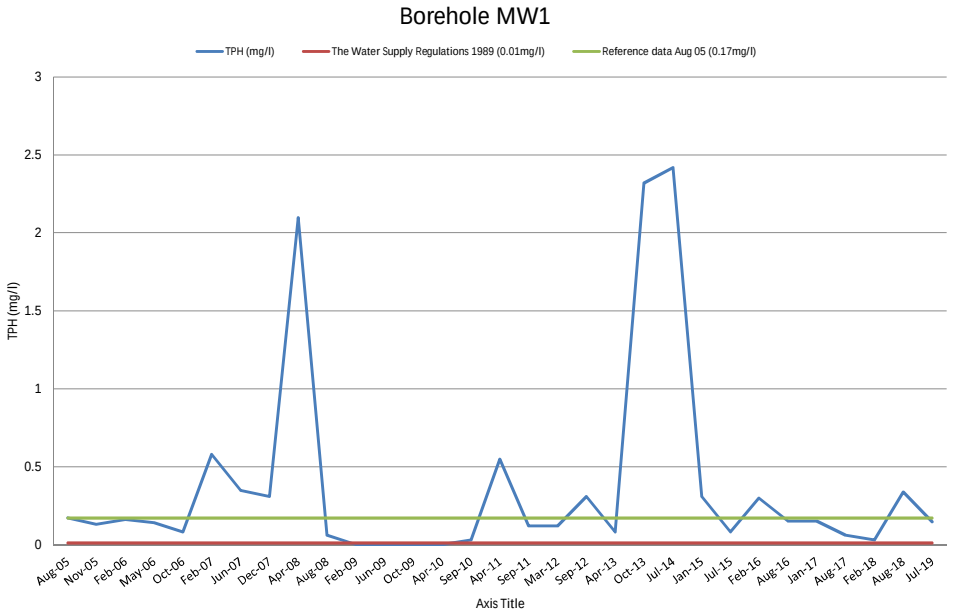
Borehole BH6

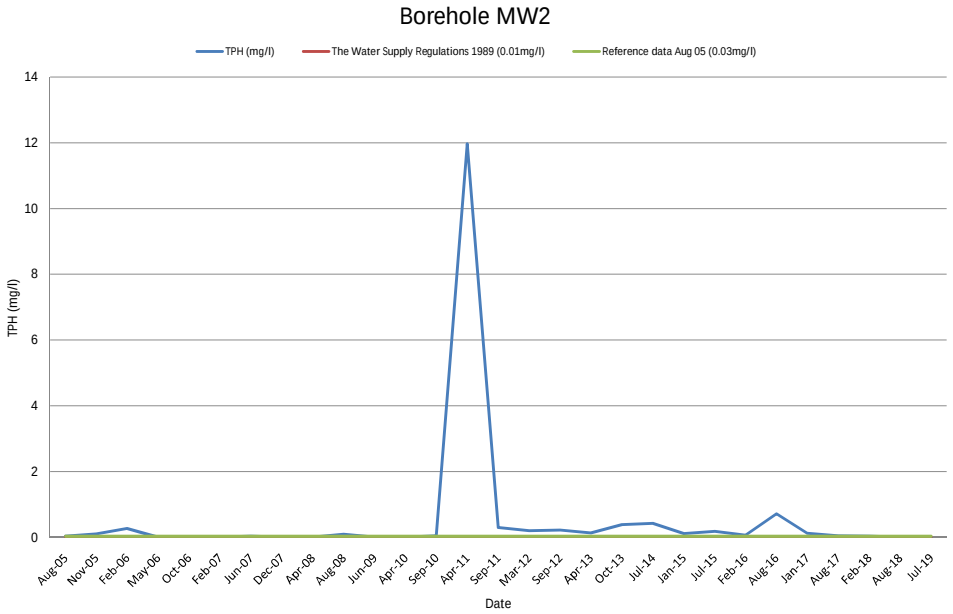


Borehole BHS6




Borehole BH11
TPH (mg/l)
The Water Supply Regulations 1989 (0.01mg/l)
Reference data Aug 05 (0.06mg/l)
TPH (mg/l)
Date


Borehole MW1
TPH (mg/l)
The Water Supply Regulations 1989 (0.01mg/l)
Reference data Aug 05 (0.17mg/l)
TPH (mg/l)
Axis Title


Borehole MW2
TPH (mg/l)
The Water Supply Regulations 1989 (0.01mg/l)
Reference data Aug 05 (0.03mg/l)
TPH (mg/l)
Date

Appendix 4

Laboratory Certificate of Analysis

Our Ref: EXR/287591 (Ver. 2)
Your Ref: 1700003424

August 2, 2019

Environmental Chemistry
SOCOTEC UK Limited
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Telephone: 01283 554400
Facsimile: 01283 554422

Rob Hodgson
Ramboll Environment and Health UK Ltd
8 Village Way
Cardiff
CF15 7NE

For the attention of Rob Hodgson

Dear Rob Hodgson

Sample Analysis - Hydro SPMP Round 31

Samples from the above site have been analysed in accordance with the schedule supplied.
The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

K Smith
Project Co-ordinator
01283 554434

TEST REPORT

1252

Report No. EXR/287591 (Ver. 2)

Ramboll Environment and Health UK Ltd
8 Village Way
Cardiff
CF15 7NE

Site: Hydro SPMP Round 31

The 9 samples described in this report were registered for analysis by SOCOTEC UK Limited on 19-Jul-2019. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 02-Aug-2019

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

On behalf of
SOCOTEC UK Lim
Becky Batham Operations Manager
Energy & Waste Services

Date of Issue: 02-Aug-2019

Tests marked '^' have been subcontracted to another laboratory.
Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.
SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Units :			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Method Codes :			ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPWATVAR	ICPWATVAR	ICPWATVAR	ICPWATVAR	KONENS	SFAPI
Method Reporting Limits :			0.001	0.0001	0.001	0.001	0.001	0.002	0.0001	0.001	0.001	0.002	0.01	0.01	1	3	0.01	0.02
UKAS Accredited :			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LAB ID Number EX/	**Client Sample Description**	**Sample Date**	**Arsenic as As (Dissolved)**	**Cadmium as Cd (Dissolved)**	**Chromium as Cr (Dissolved)**	**Copper as Cu (Dissolved)**	**Lead as Pb (Dissolved)**	**Manganese as Mn (Dissolved)**	**Mercury as Hg (Dissolved)**	**Nickel as Ni (Dissolved)**	**Selenium as Se (Dissolved)**	**Zinc as Zn (Dissolved)**	**Boron as B (Dissolved) a**	**Iron as Fe (Dissolved) a**	**Magnesium as Mg (Dissolved) a**	**Total Sulphur as SO4 (Dissolved) a**	**Ammoniacal Nitrogen as N**	**Cyanide (Total) as CN**
1990141	MW1	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001		<0.0001	<0.001	<0.001	0.022	0.03			29	0.34	<0.02
1990142	BH1	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001		<0.0001	0.001	<0.001	0.01	0.02			21	0.30	<0.02
1990143	BH4	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001	0.018	<0.0001	<0.001	0.001	<0.002	0.03	0.57	8	22	0.19	<0.02
1990144	BH6	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001	0.313	<0.0001	0.002	<0.001	0.004	0.02	0.29	6	35	0.12	<0.02
1990145	BH11	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001	0.525	<0.0001	0.005	0.002	0.007	0.06	0.86	10	35	1.6	0.05
1990146	BH12	18-Jul-19	<0.001	<0.0001	<0.001	<0.001	<0.001		<0.0001	0.003	<0.001	0.005	0.02			<3	0.10	<0.02
1990147	BHS6	18-Jul-19	<0.01	<0.001	0.013	0.066	<0.01	0.37	<0.001	<0.01	<0.01	<0.02	0.02	2.56	<1	30	0.47	<0.02
1990148	BHS1	18-Jul-19																
1990149	BHS4	18-Jul-19																

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name Ramboll Environment and Health UK Ltd

Contact Rob Hodgson

Hydro SPMP Round 31

Sample Analysis

Date Printed	**02-Aug-2019**
Report Number	**EXR/287591**
Table Number	**1**

Where individual results are flagged see report notes for status.

Units :			mg/l		mg/l	mg/l	mV	mg/l	pH units										
Method Codes :			TPHFID	TPHFID	WSLM10	WSLM13	WSLM25	WSLM27	WSLM3										
Method Reporting Limits :			0.01		5	0.2		5											
UKAS Accredited :			Yes	No	Yes	Yes	No	No	Yes										
LAB ID Number EX/	**Client Sample Description**	**Sample Date**	**TPH GC**	**Interpretation**	**Suspended Solids w**	**Total Organic Carbon w**	**Redox Potential mV w**	**Total Dissolved Solids w**	**pH units w**										
1990141	MW1	18-Jul-19	0.147						7										
1990142	BH1	18-Jul-19	38.3						6.8										
1990143	BH4	18-Jul-19	0.047		154	1.6	180.1	260	6.8										
1990144	BH6	18-Jul-19	0.037	Req	44	3.9	179.8	310	6.9										
1990145	BH11	18-Jul-19	0.316		890	2.1	141.7	440	7.1										
1990146	BH12	18-Jul-19	95.8						6.7										
1990147	BHS6	18-Jul-19	0.039	Req	65	73	173.6	780	7.8										
1990148	BHS1	18-Jul-19	0.129	Req															
1990149	BHS4	18-Jul-19	5.56	Req															

SOCOTEC

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name	**Ramboll Environment and Health UK Ltd**
Contact	Rob Hodgson

Hydro SPMP Round 31

Sample Analysis

Date Printed	**02-Aug-2019**
Report Number	**EXR/287591**
Table Number	**1**

Interpretation of GC/FID Chromatographic Data

Client:	Ramboll Environment and Health UK Ltd
Site:	Hydro SPMP Round 31
Report Number:	W287591
Date:	01/08/2019

Assessment Type	Standard Interpretation
Assessor:	C Oqvist
Analysis:	TPH by GC-FID

Sample ID	Client Description	Interpretation
EX1990144	BH6	Low level Mineral Oil style UCM in the range nC22-nC34. GC-MS suggested for further identification.
EX1990147	BHS6	Mineral Oil style UCM in the range nC22-nC34. GC-MS suggested for further identification.
EX1990148	BHS1	Mineral Oil style UCM in the range nC22-nC34. GC-MS suggested for further identification.

Where individual results are flagged see report notes for status.

Interpretation of GC/FID Chromatographic Data

Client:	Ramboll Environment and Health UK Ltd
Site:	Hydro SPMP Round 31
Report Number:	W287591
Date:	01/08/2019

Assessment Type	Standard Interpretation
Assessor:	C Oqvist
Analysis:	TPH by GC-FID

Sample ID	Client Description	Interpretation
EX1990149	BHS4	Large Mineral Oil style UCM in the range nC16-nC40+. GC-MS suggested for further identification.

Where individual results are flagged see report notes for status.

Analytical and Deviating Sample Overview

Customer Ramboll Environment and Health UK Ltd
Site Hydro SPMP Round 31
Report No W287591

Consignment No W157955
Date Logged 19-Jul-2019
In-House Report Due 26-Jul-2019

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	Matrix Type	Sampled	MethodID	CUSTSERV	ICPMSW										IGPWATVAR				KONENS	SFAPI	TPHFID
					Report A	Nickel as Ni MS (Dissolved)	Chromium as Cr MS (Dissolved)	Cadmium as Cd MS (Dissolved)	Copper as Cu MS (Dissolved)	Lead as Pb MS (Dissolved)	Zinc as Zn MS (Dissolved)	Manganese as Mn MS (Dissolved)	Arsenic as As MS (Dissolved)	Mercury as Hg MS (Dissolved)	Selenium as Se MS (Dissolved)	Total Sulphur as SO4 (Diss) VAR	Magnesium as Mg (Dissolved) VAR	Iron as Fe (Dissolved) VAR	Boron as B (Dissolved) VAR	Ammoniacal Nitrogen (Kone)	Cyanide (Total) as CN SFA	TPH GC
						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EX/1990141	MW1	Groundwater	18/07/19																			
EX/1990142	BH1	Groundwater	18/07/19																			
EX/1990143	BH4	Groundwater	18/07/19																			
EX/1990144	BH6	Groundwater	18/07/19																			
EX/1990145	BH11	Groundwater	18/07/19																			
EX/1990146	BH12	Groundwater	18/07/19																			
EX/1990147	BHS6	Groundwater	18/07/19																			
EX/1990148	BHS1	Groundwater	18/07/19																			
EX/1990149	BHS4	Groundwater	18/07/19																			

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.
Where individual results are flagged see report notes for status.

Analytical and Deviating Sample Overview

Customer Ramboll Environment and Health UK Ltd
Site Hydro SPMP Round 31
Report No W287591

Consignment No W157955
Date Logged 19-Jul-2019
In-House Report Due 26-Jul-2019

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	Matrix Type	Sampled	TPH Interpretation	Suspended Solids	Total Organic Carbon	Redox Potential mV	Total Dissolved Solids	pH units
MethodID				TPHFID	WSLM10	WSLM13	WSLM25	WSLM27	WSLM3
					✓	✓			✓
EX/1990141	MW1	Groundwater	18/07/19						
EX/1990142	BH1	Groundwater	18/07/19						
EX/1990143	BH4	Groundwater	18/07/19			E			
EX/1990144	BH6	Groundwater	18/07/19			E			
EX/1990145	BH11	Groundwater	18/07/19			E			
EX/1990146	BH12	Groundwater	18/07/19						
EX/1990147	BHS6	Groundwater	18/07/19			E			
EX/1990148	BHS1	Groundwater	18/07/19						
EX/1990149	BHS4	Groundwater	18/07/19						

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted - **Note: due date may vary**

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.
Where individual results are flagged see report notes for status.

Report Number : W/EXR/287591

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
ICPMSW	W1990147	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
WSLM10	EX/1990143 ,0145, 0147	Due to the sample matrix, the volume of sample analysed was lowered to complete the filtration process. As a result the detection limit has been raised.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	TPHFID	As Received	Determination of pentane extractable hydrocarbons in water by GCFID
Water	WSLM10	As Received	Determination of Suspended Solids in waters by gravimetry
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM25	As Received	Direct determination using Redox Potential Probe
Water	WSLM27	As Received	Gravimetric Determination
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l
Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile **TR** Denotes Tremolite
CR Denotes Crocidolite **AC** Denotes Actinolite
AM Denotes Amosite **AN** Denotes Anthophylite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols. This may have resulted in deterioration of the sample(s) during transit to the laboratory. Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
N.F No Flow
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : Ramboll Environment and Health UK Ltd
Site : Hydro SPMP Round 31
Report Number : W28_7591

Lab ID Number	Client ID	Description
EX/1990141	MW1	Groundwater
EX/1990142	BH1	Groundwater
EX/1990143	BH4	Groundwater
EX/1990144	BH6	Groundwater
EX/1990145	BH11	Groundwater
EX/1990146	BH12	Groundwater
EX/1990147	BHS6	Groundwater
EX/1990148	BHS1	Groundwater
EX/1990149	BHS4	Groundwater