RAMBOLL ENVIRON

ENVIRONMENT
& HEALTH

Sapa Extrusions Limited
Bedwas Plant
Pant Glas Industrial Estate
Bedwas
Caerphilly
CF83 8DR

Dear Ruth

SITE PROTECTION AND MONITORING PROGRAMME (SPMP), AUGUST 2016 (ROUND 26): ENVIRONMENTAL PERMIT REF. BX94551F

Date 02/09/2016

Ramboll Environ
8 Village Way
Tongwynlais
Cardiff
CF15 7NE
United Kingdom

T +44 292 054 3550
www.ramboll-environ.com

Ref LUK17-23298_1

Background

Sapa Extrusions Ltd. (formerly Hydro Aluminium Extrusions) has carried out regular groundwater monitoring at the installation since August 2005. Ramboll Environ has carried out twenty-two rounds of monitoring between August 2005 and August 2016; 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 has been decommissioned, including decontamination works (cleaning of press-pits, removal of oil storage tanks etc.) which are ongoing. However, the anodising plant is intended to be re-commissioned going forward, with processing trials intended to commence in October 2016.

Although the main manufacturing activities have been suspended, the Environmental Permit remains in place and as such, ongoing SPMP monitoring is required by Natural Resources Wales (NRW), unless otherwise agreed.

A Compliance Assessment Report (CAR), (Ref: CAR_NRW0020594) was issued by NRW on 23rd May 2016 following its review of the previous SPMP monitoring results (Ramboll Environ Report Ref: UK17-22794_01, February 2016). NRW's comments are summarised below.

- Agreement with Ramboll Environ's recommendation to remove the passive skimmer from BH12 based on the minor amounts of product recorded over the past two years; and that the likely source of contamination (P16 Press Pit) has been emptied.
- Recommendation to investigate the reason for discolouration in BH6 (sentry borehole). The groundwater has been black/ brown coloured for the last few monitoring rounds; however, the hydrocarbon concentration is not significantly elevated and the groundwater was not observed to have an oily sheen.
- Recommendation for continued measurement of the pH values across the site which have fluctuated over the monitoring period due to a previous spillage in the anodising plant. Although the majority of pH values have returned to more neutral levels, MW2 and BH6 continued to have slightly acidic values.
- Recommendation to reduce the frequency of monitoring to annually considering that manufacturing has ceased, unless any production activities resume. *Given that anodising activities are likely to resume in the near future, NRW may require monitoring to continue on a six monthly basis.*

This report details the results of the twenty-sixth round of groundwater monitoring which was undertaken on 4th August 2016. The monitoring has taken into account the aforementioned comments and recommendations made by NRW.

Scope of Works

A groundwater sample was recovered from each of the following eight SPMP monitoring wells (shown on Figure 1): BH1, BH4, BH6, BHS6, BH11, BH12, MW1 and MW2. The SPMP wells are currently monitored on a six monthly basis as agreed with NRW.

At each location, the depth to groundwater was recorded and, where present, the thickness of free product was monitored.

The groundwater samples 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 BH6 and BHS6 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 at these locations.

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 any groundwater contamination arising from potential sources over the lifetime of the Environmental Permit, it is appropriate to compare results with the Reference Data (collected by Ramboll Environ, August 2005).

A graphical representation of results over time is presented on the attached Figures.

Results

A full set of laboratory certificates and a summary table of the ongoing groundwater monitoring results (including Reference Data and results from M&A's monitoring) are attached to this letter and the main findings are summarised below.

Passive Skimmer

A passive skimmer was installed in BH12 on 11th February 2011 due to consistent measurements of free phase product (up to 7mm in thickness). The amount of floating product recovered by the skimmer was measured periodically and a total volume of 177ml of floating product has been recovered. However, over the past two years, no measurable layer of free product has been detected on the surface of the water in BH12 other than a slight oily sheen. Furthermore, the likely source of contamination (the adjacent P16 press pit) has been emptied as part of the decommissioning process. Accordingly, Ramboll Environ recommended that the passive skimmer was removed and NRW confirmed its agreement in an email dated 31st May 2016. The passive skimmer was removed from borehole BH12 during the August 2016 round of monitoring.

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 3.02m below ground level (bgl) (MW2) to 3.86m bgl (BHS6) and have fallen since the previous round of monitoring in February 2016.
- Concentrations of TPH ranged from 0.02mg/l in BH6 to 6.11mg/l in BH1. Increases were recorded in BH1 (from 5.2mg/l to 6.11mg/l); BH4 (from 0.02mg/l to 0.04mg/l); BH11 (from 0.01mg/l to 0.09mg/l); MW2 (from 0.06mg/l to 0.71mg/l); and BH12 (from 49m/l in July 2016 to 90.2mg/l). However, in each case concentrations are typical of those previously recorded at each location.
- The concentration of TPH has decreased in BH6 (from 14.4mg/l to 5.2mg/l); MW1 (from 0.3mg/l to 0.15mg/l); and BHS6 (from 0.05mg/l to 0.04mg/l).
- 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 during previous sampling occasions. A water sample was collected during the most recent monitoring round of August 2016, with a recorded TPH concentration of 90.2mg/l; a hydrocarbon odour and a slight oily sheen were observed during sampling. Previous dissolved phase hydrocarbon concentrations have ranged from 7.8mg/l (August 2005) to 1,000mg/l (December 2007).
- The groundwater sample recovered from BHS6 (the 'sentry borehole') was coloured black/brown which is consistent with previous monitoring rounds. However, the TPH concentration continues to be (0.04mg/l), and remains below the sentry borehole risk-based trigger concentration of 0.108mg/l. During the most recent round of monitoring, groundwater from borehole BHS6 was removed by submersible pump for approximately one hour to ascertain whether discoloration of groundwater would reduce with an increased volume of purged water. No visible change to the colour of purged water was observed during groundwater removal.
- Samples of groundwater from BHS6 and BH6 (located adjacent east) 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 these locations. The results are presented in Table 1 and are discussed further in the following section.
- pH values ranged from pH 6.3 (MW2) to pH 8.1 (BHS6). Prior to 2012, the pH values of BH6 and MW2 were consistently low (acidic). Throughout 2012 to 2015, the pH was generally more alkaline. However, the most recent rounds of monitoring (February and August 2016) have recorded a slight decrease in pH at monitoring locations BH6 and MW2. The pH value in MW2 (pH 6.3 in February

and August 2016) is only marginally below the lower limit identified in the Water Supply (Water Quality) Regulations 2000 (i.e. pH 6.5).

- Arsenic was detected above the laboratory LOD (1µg/l) in BHS6 at a concentration 8µg/l, i.e. below the UK DWS of 10µg/l and within the range of previously recorded values at this location.
- Boron was recorded at or above the LOD (<10µg/l) in BH1, BH4, BH12, MW1 (all 10µg/l), BH6 (70µg/l), and BHS6 (60µg/l). Recorded concentrations are well below the UK DWS of 1,000µg/l.
- Cadmium was detected at or above the laboratory LOD (<0.1µg/l) in BH6 (0.1µg/l) and BHS6 (0.3µg/l), which is below the UK DWS of 5µg/l.
- Concentrations of chromium were below the laboratory LOD (<1µg/l) in all monitoring wells except BHS6 at 15µg/l, which does not exceed the UK DWS of 50µg/l.
- Concentrations of copper were recorded above the laboratory LOD (<1µg/l) in monitoring wells BH6 (3µg/l), MW1 (1µg/l) and BHS6 (75µg/l), which do not exceed the UK DWS of 2,000µg/l.
- Lead was below the laboratory LOD (<1ug/l) in all monitoring wells except BH6 (1µg/l) and BHS6 (7µg/l), below the UK DWS of 25µg/l.
- Mercury was recorded above the laboratory LOD (<0.1µg/l) in monitoring well BHS6 (0.2µg/l), which does not exceed the UK DWS of 1µg/l.
- The concentration of nickel ranged from below the laboratory LOD (<1µg/l) in BH1, BH4 and MW1 to 6µg/l in BH6 (below the UK DWS of 20µg/l). Historically, elevated concentrations of nickel have been detected in MW2, located at the southern site boundary; however, concentrations have decreased over the monitoring period to date and are now below the screening criteria.
- Selenium was recorded at the laboratory LOD (<1ug/l) in monitoring wells MW1 and BHS6 (1µg/l), which is below the UK DWS of 10µg/l.
- Concentrations of zinc were recorded above the laboratory LOD (<2µg/l) in all monitoring wells except BH1 and ranged between 2µg/l in BH4 and 98µg/l in BH6. The maximum concentration detected does not exceed the UK DWS (5,000µg/l).
- Concentrations of ammonia ranged from below the laboratory LOD (<10µg/l) in BH4, BH6 and MW1 to 180µg/l in BHS6, which is below the UK DWS of 500µg/l.
- Cyanide was below the laboratory LOD (<20µg/l) in all monitoring wells.
- The concentrations of sulphate in groundwater ranged from <0.3mg/l in BH12 to 63.4mg/l in BHS6. Sulphate concentrations do not exceed the UK DWS of 250mg/l at any of the monitoring locations.

Groundwater Discolouration (BHS6 and BH6)

Table 1 below presents the results of additional analysis carried out on groundwater collected from BHS6 and BH6. Both are located to the south of the main Extrusions Building.

Table 1: Additional Analysis BHS6 and BH6

Determinand	BHS6*	BH6**
Total Suspended Solids (TSS) (mg/l)	172	296
Total Dissolved Solids (TDS) (mg/l)	1,000	320

Table 1: Additional Analysis BHS6 and BH6		
Determinand	**BHS6***	**BH6****
Total Organic Carbon (TOC) (mg/l)	110	13
Iron (total dissolved) (µg/l)	1,570	70
Redox Potential (mV)	240.8	360.3
pH	8.1	6.7
Notes: *BHS6 was noted to be dark brown/ black in colour and remained discoloured after 1 hour of pumping; no oily sheen. **BH6 was noted to be brown in colour; no oily sheen.		

The results indicate that TDS, TOC and dissolved iron concentrations were significantly higher in BHS6 than in BH6 (where the discolouration was less prominent). 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. Hydrocarbons were not detected significantly elevated concentrations at these locations and no oily sheen was observed on groundwater.

The iron concentration in BHS6 (1,570µg/l) is significantly elevated above the UK DWS (0.2µg/l). The UK DWS is considered to be conservative considering that groundwater is not abstracted for potable water in the area. For context, the Environmental Quality Standard (EQS) for inland surface water is 1,000µg/l. There are no known current or historical 'sources' of iron on-site and as such, the concentration (and resultant discolouration) is considered likely to be associated with a variation in the Made Ground or geology.

The concentrations of determinands in BHS6 over the monitoring period have decreased since the baseline concentrations recorded in April 2010. In April 2010, arsenic, chromium, mercury, nickel and selenium exceeded the respective screening criteria. TPH was also recorded at the maximum concentration for this location (0.74mg/l). These concentrations have all decreased significantly over the monitoring period to date and only TPH has slightly exceeded the UK DWS over the last six rounds of monitoring.

Conclusions and Recommendations

The results of the twenty-sixth (August 2016) round of groundwater monitoring have identified minor variations in TPH concentrations across the site; however, all are within the same order of magnitude compared with previous monitoring rounds. No significant increases or decreases have been identified.

The TPH concentration in the Sentry Borehole (BHS6) did not exceed the risk based target of 0.108mg/l, which is designed to be protective of the river from hydrocarbon (including free phase product) contamination in the west of the site. The results therefore indicate that although elevated TPH concentrations continue to be detected in the vicinity of BH12, the contamination is localised and is not migrating in groundwater to the south-east (in the direction of the river).

The passive skimmer has been removed from BH12 given that no measurable free phase product has been recorded over the past two years; however, the dissolved phase concentration of TPH remains elevated.

The pH values in BH6 and MW2 have historically been low (acidic) over the early monitoring period, with a gradual increase towards neutral values in more recent monitoring rounds (throughout 2012 to 2015, the pH was generally more alkaline). During the most recent round of monitoring, August 2016, a decrease in pH was recorded in borehole MW2 (pH 6.3). However, this is not considered to be a significant reduction in pH as the recorded value is only marginally lower than the screening value.

During recent monitoring rounds it had been noted that groundwater from BHS6 and BH6 is black/brown in colour. Additional analysis for dissolved solids and iron indicated that the most significant discolouration (BHS6) corresponds with a significantly elevated concentration of iron and TDS. The discolouration is localised and there are no known current or historical 'sources' on-site. The groundwater from borehole located further south (down-hydraulic gradient) was not observed to be discoloured. The discolouration is therefore not considered likely to be attributable to Sapa's permitted activities. Ramboll Environ recommends that the additional analysis (iron, TDS, TSS, TOC) is carried out on groundwater samples from both up-gradient and down-gradient of BHS6 for comparison during the next round of monitoring (BH11 and MW2 respectively) in order to confirm that the conditions are localised around BHS6.

NRW has indicated that while manufacturing is suspended, monitoring may be reduced to an annual frequency; however, if the anodising activities resume in the near future, the six monthly monitoring frequency is considered by Ramboll Environ to be appropriate going forward.

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

Yours sincerely,

Lucy Cleverley
Manager

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

Encl. Appendix 1, Figures

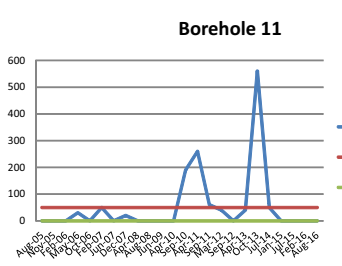
Appendix 2, Table of Groundwater Analysis Results

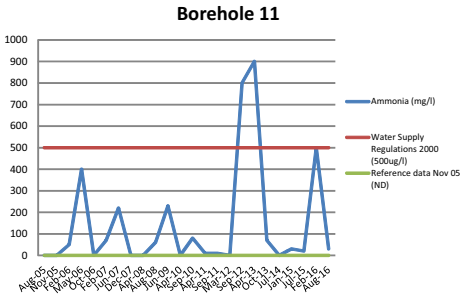
Appendix 3, Laboratory Certificate of Analysis

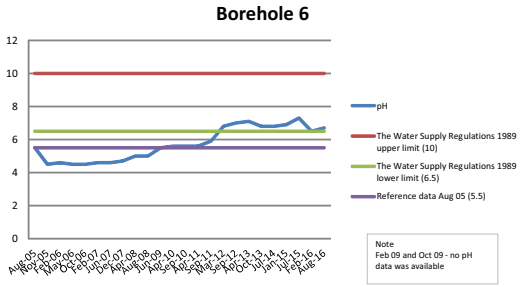
Appendix 1

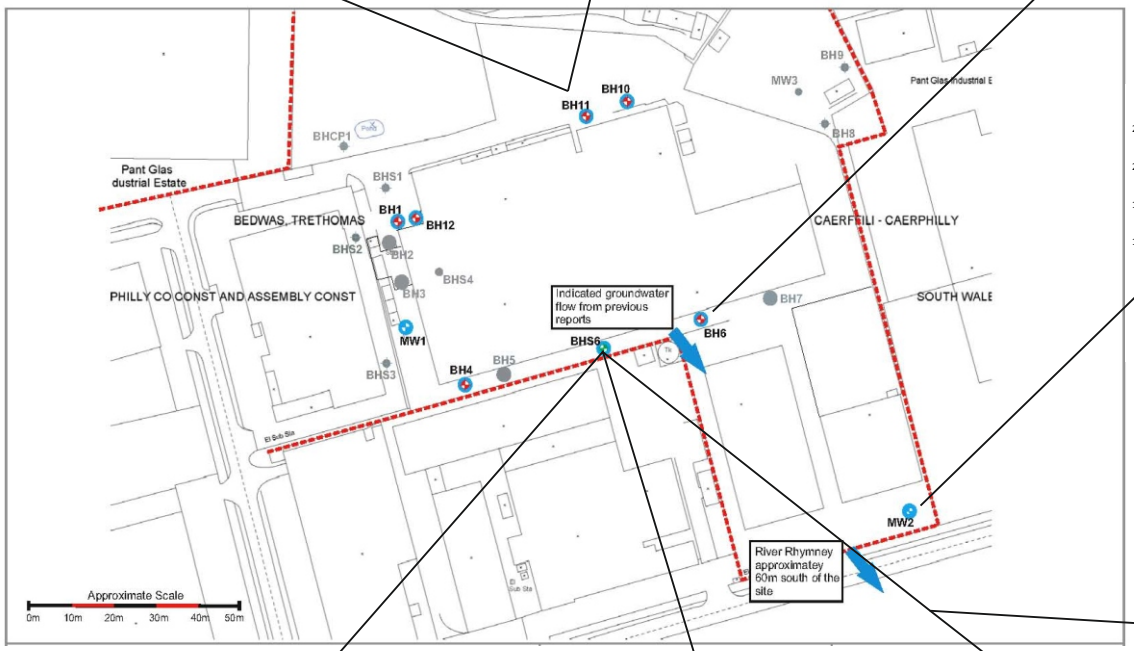
Figures

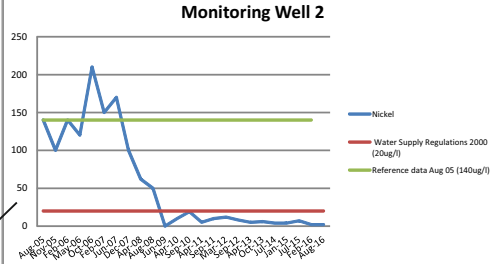
Contaminant Concentration Graphs

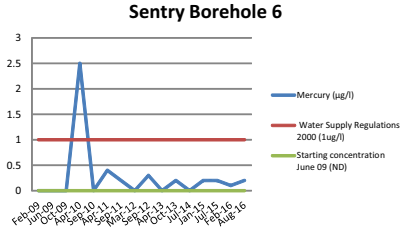


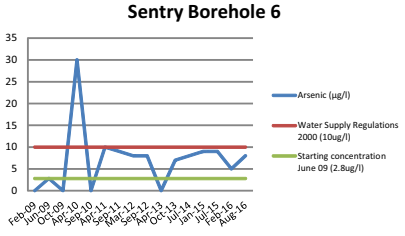


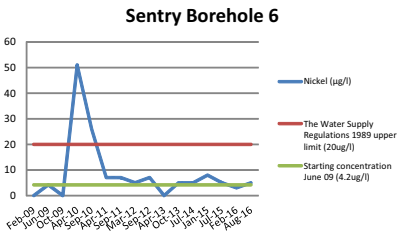


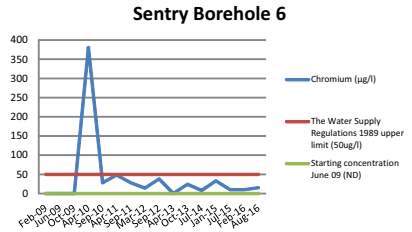












Legend

- Approximate Site Boundary
- Previously Installed Monitoring Well
- SPMP Monitoring Wells
- Previous locations
- ENVIRON Monitoring Well (installed 2005)
- Monitoring Well Location for Hydrocarbon Delineation

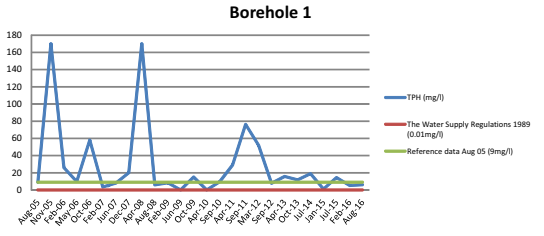
Title	Contaminant Concentration Graphs
Site	Sapa Extrusion Ltd, Bedwas Plant, Pantglas Industrial Estate, Bedwas, Caerphilly

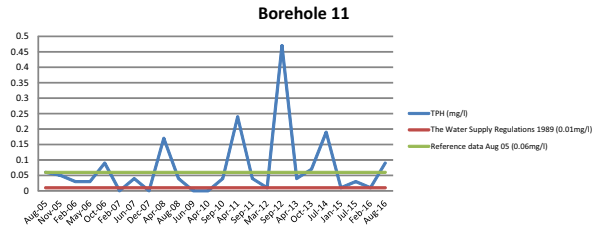
Client	Sapa Extrusion Ltd
Project No.	UK17-23298
Issue	1
Date	August 2016
Drawn by	RH

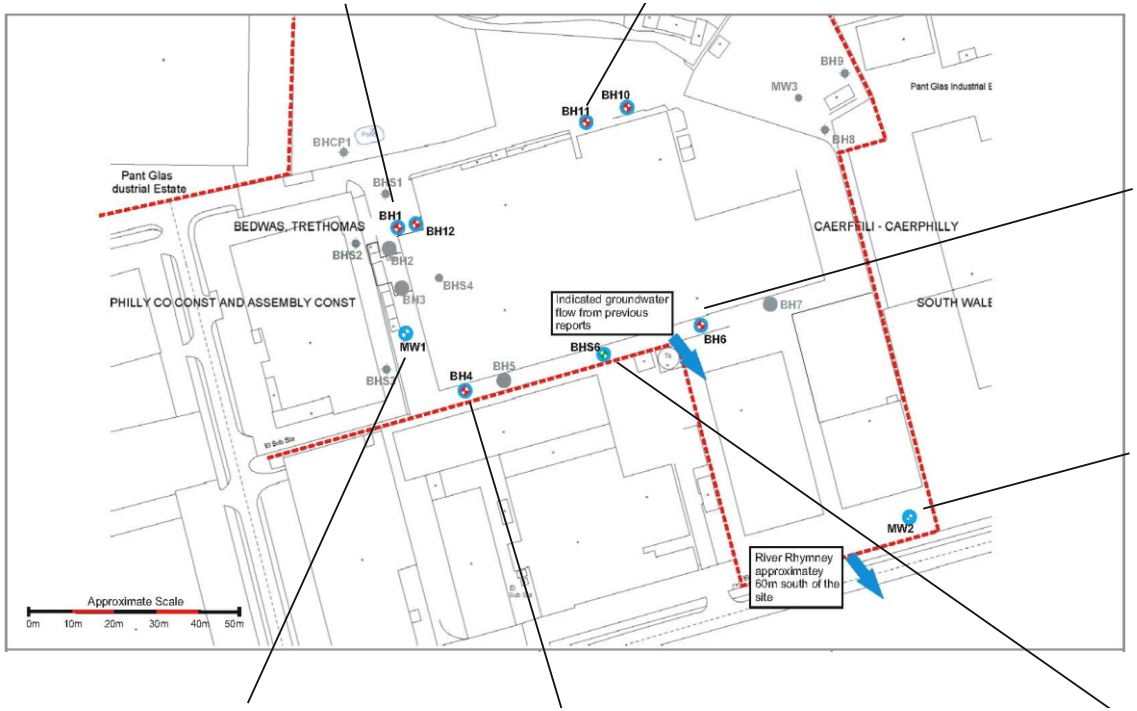
Scale NTS

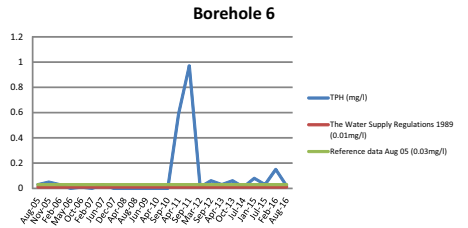
RAMBOLL ENVIRON

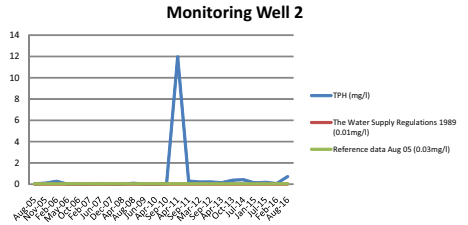
TPH Concentration Graphs

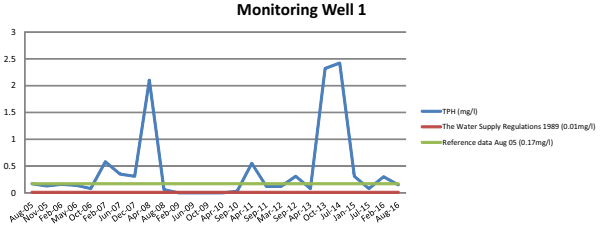


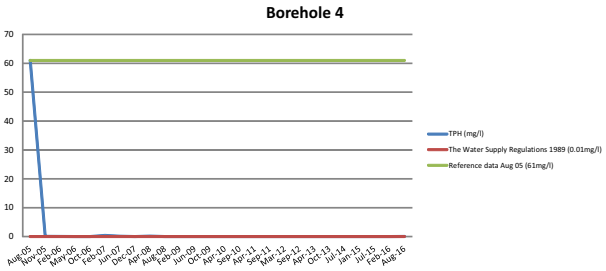


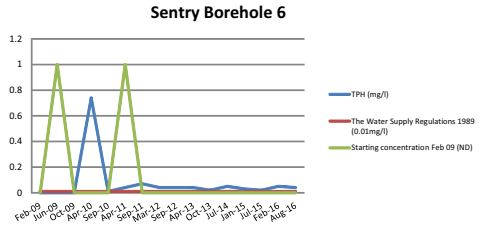












Legend

- Approximate Site Boundary
- Previously Installed Monitoring Well
- SPMP Monitoring Wells
- Previous locations
- ENVIRON Monitoring Well (installed 2005)
- Monitoring Well Location for Hydrocarbon Delineation

Title	TPH Concentration Graphs
Site	Sapa Extrusions Ltd, Bedwas Plant, Pantglas Industrial Estate, Bedwas, Caerphilly
Client	Sapa Extrusions Ltd
Project No.	UK17-23298
Issue	1
Date	August 2016
Drawn by	RH
Scale	NTS

RAMBOLL
ENVIRON

RAMBOLL ENVIRON

Appendix 2

Table of Groundwater Analysis Results

Sapa (UK17-23298) - Summary of Groundwater Analysis Results (August 2016)

Borehole Location	Date	Analysis															Water Level (m bgl)
		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)	
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
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
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
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
		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*	

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
No data available but data put in for graphs
Current SPMP monitoring locations

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

		Analysis															
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)
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*	6.5	NS*	3.26
	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*	6.4	NS*	3.12
	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	6.45	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	6.45	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
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
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	5.95	NA	2.78
	Apr-10	ND	0.5	NA	0.54	8	3.6	ND	ND	10	0.6	170	NA	NA	6.3	100	2.86
	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
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
		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*	

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
No data available but data put in for graphs
Current SPMP monitoring locations

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

RAMBOLL ENVIRON

Appendix 3

Laboratory Certificate of Analysis

Our Ref: EXR/224527 (Ver. 1)
Your Ref: UK17-23298

August 12, 2016

Environmental Chemistry
ESG
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Telephone: 01283 554400
Facsimile: 01283 554422

Rob Hodgson
Ramboll Environ
8 Village Way
Greenmeadow Springs
Cardiff
CF15 7NE

For the attention of Rob Hodgson

Dear Rob Hodgson

Sample Analysis - Sapa SPMP Round 26

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 Environmental Scientifics Group Ltd (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 ESG

JNColbourne

J Colbourne
Project Co-ordinator
01283 554547

TEST REPORT

UKAS TESTING
1252

Report No. EXR/224527 (Ver. 1)

Ramboll Environ
8 Village Way
Greenmeadow Springs
Cardiff
CF15 7NE

Site: Sapa SPMP Round 26

The 8 samples described in this report were registered for analysis by ESG on 05-Aug-2016. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 12-Aug-2016

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
ESG :
Declan Burns

Managing Director
Multi-Sector Services

Date of Issue: 12-Aug-2016

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.
ESG accepts no responsibility for any sampling not carried out by our personnel.

			Units :	pH 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
			Method Codes :	WSLM3	WSLM10	Calc_HD	ICPWATVAR	ICPWATVAR	ICPWATVAR	ICPWATVAR	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPWATVAR	ICPMSW	ICPWATVAR
			Method Reporting Limits :		5	7	3	1	1	0.01	0.001	0.001	0.0001	0.001	0.001	0.002	0.01	0.001	0.01
			UKAS Accredited :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LAB ID Number EXI	Client Sample Description	Sample Date		pH units w	Suspended Solids w	Total Hardness as CaCO3	Total Sulphur as SO4 (Dissolved) a	Calcium as Ca (Dissolved) a	Magnesium as Mg (Dissolved) a	Barium as Ba (Dissolved) a	Nickel as Ni (Dissolved)	Chromium as Cr (Dissolved)	Cadmium as Cd (Dissolved)	Copper as Cu (Dissolved)	Lead as Pb (Dissolved)	Zinc as Zn (Dissolved)	Iron as Fe (Dissolved) a	Arsenic as As (Dissolved)	Boron as B (Dissolved) a
1720202	BH56	04-Aug-16 10:15		8.1	172	<11	63.4	2.8	<1.0	0.52	0.005	0.015	0.0003	0.075	0.007	0.058	1.57	0.008	0.06
1720203	BH4	04-Aug-16 10:45		6.8		120	17.5	35.2	7.7	0.02	<0.001	<0.001	<0.0001	<0.001	<0.001	0.002		<0.001	0.01
1720204	BH6	04-Aug-16 11:30		6.7	296	70	32.6	17.7	6.3	0.15	0.006	<0.001	0.0001	0.003	<0.001	0.098	0.07	<0.001	0.07
1720205	BH11	04-Aug-16 11:45		6.8		162	27.0	43.9	12.6	0.10	0.003	<0.001	<0.0001	<0.001	<0.001	0.013		<0.001	<0.01
1720206	MW2	04-Aug-16 12:30		6.3		79	36.4	21.7	5.9	0.13	0.002	<0.001	<0.0001	<0.001	<0.001	0.009		<0.001	<0.01
1720207	MW1	04-Aug-16 13:45		6.6		132	19.8	39.3	8.3	0.02	<0.001	<0.001	<0.0001	0.001	<0.001	0.014		<0.001	0.01
1720208	H1	04-Aug-16 14:15		6.6		196	8.6	55.8	13.8	0.04	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.002		<0.001	0.01
1720209	BH12	04-Aug-16 14:45		6.5		196	<3.0	55.0	14.2	0.07	0.002	<0.001	<0.0001	<0.001	<0.001	0.007		<0.001	0.01

ESG

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name Ramboll Environ

Contact Rob Hodgson

Sapa SPMP Round 26

Sample Analysis

Date Printed	**11-Aug-2016**
Report Number	**EXR/224527**
Table Number	**1**

Where individual results are flagged see report notes for status.

		Units :	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mV	mg/l	mg/l						
		Method Codes :	ICPMSW	ICPMSW	ICPMSW	KONENS	SFAPI	WSLM13	TPHFID	WSLM25	WSLM27	ICPWATVAR						
		Method Reporting Limits :	0.0001	0.001	0.001	0.01	0.02	0.2	0.01		5	0.01						
		UKAS Accredited :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No						
LAB ID Number EXR	**Client Sample Description**	**Sample Date**	**Mercury as Hg (Dissolved)**	**Selenium as Se (Dissolved)**	**Vanadium as V (Dissolved)**	**Ammoniacal Nitrogen as N**	**Cyanide (Total) as CN**	**Total Organic Carbon w**	**TPH GC**	**Redox Potential mV w**	**Total Dissolved Solids w**	**Beryllium as Be (Dissolved) a**						
1720202	BH56	04-Aug-16 10:15	0.0002	0.001	0.005	0.18	<0.02	110	0.04	240.8	1000	<0.01						
1720203	BH4	04-Aug-16 10:45	<0.0001	<0.001	<0.001	<0.01	<0.02		0.04			<0.01						
1720204	BH6	04-Aug-16 11:30	<0.0001	<0.001	<0.001	<0.01	<0.02	13	0.02	306.3	320	<0.01						
1720205	BH11	04-Aug-16 11:45	<0.0001	<0.001	<0.001	0.03	<0.02		0.09			<0.01						
1720206	MW2	04-Aug-16 12:30	<0.0001	<0.001	<0.001	0.03	<0.02		0.71			<0.01						
1720207	MW1	04-Aug-16 13:45	<0.0001	0.001	<0.001	<0.01	<0.02		0.15			<0.01						
1720208	H1	04-Aug-16 14:15	<0.0001	<0.001	<0.001	0.08	<0.02		6.11			<0.01						
1720209	BH12	04-Aug-16 14:45	<0.0001	<0.001	<0.001	0.04	<0.02		90.2			<0.01						

ESG

Bretby Business Park, Ashby Road

Burton-on-Trent, Staffordshire, DE15 0YZ

Tel +44 (0) 1283 554400

Fax +44 (0) 1283 554422

Client Name	**Ramboll Environ**
Contact	Rob Hodgson

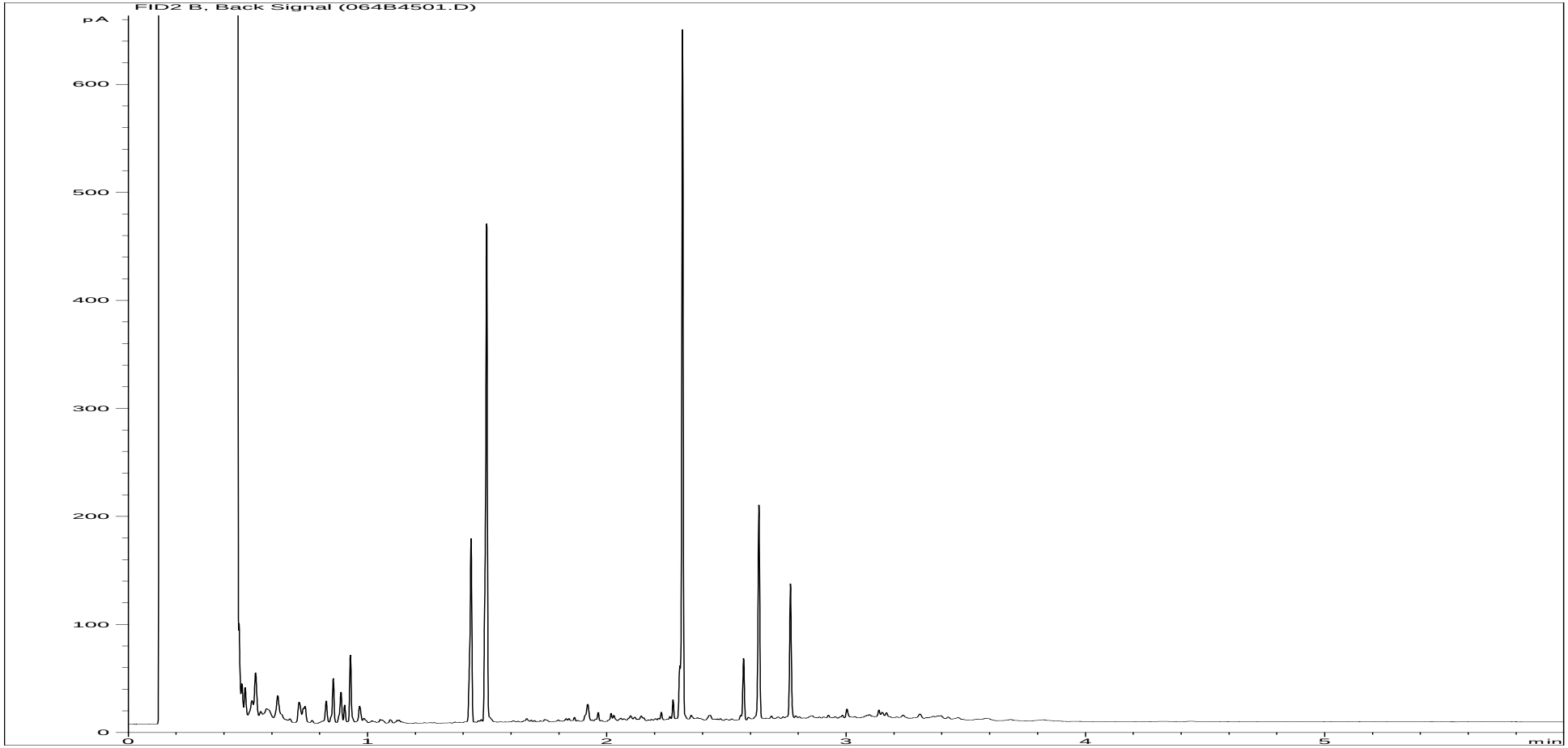
Sapa SPMP Round 26

Sample Analysis

Date Printed	**11-Aug-2016**
Report Number	**EXR/224527**
Table Number	**1**

Where individual results are flagged see report notes for status.

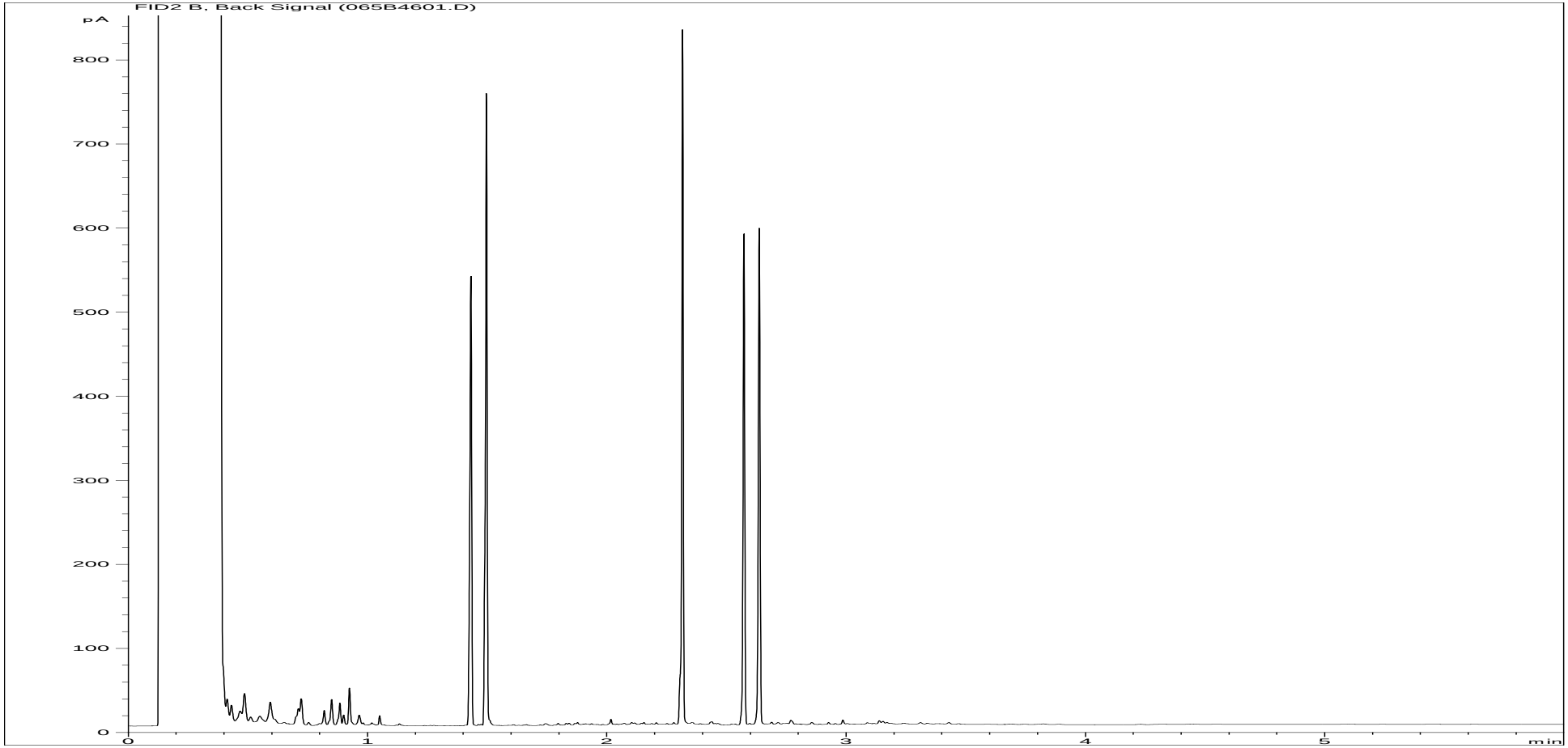
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720202	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH56
Acquisition Date/Time:	09-Aug-16, 21:25:46		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\064B4501.D		

Where individual results are flagged see report notes for status.

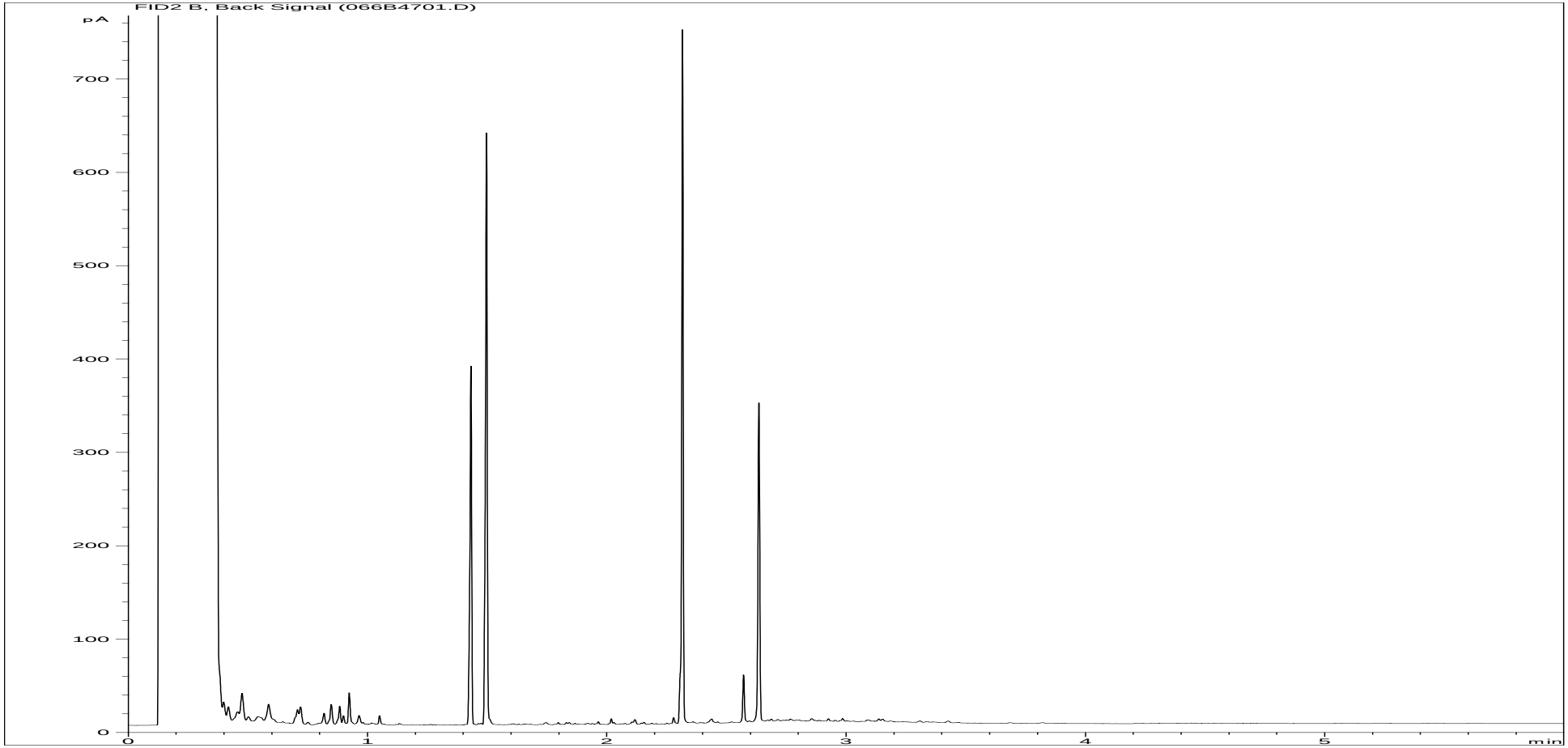
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720203	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH4
Acquisition Date/Time:	09-Aug-16, 21:37:40		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\065B4601.D		

Where individual results are flagged see report notes for status.

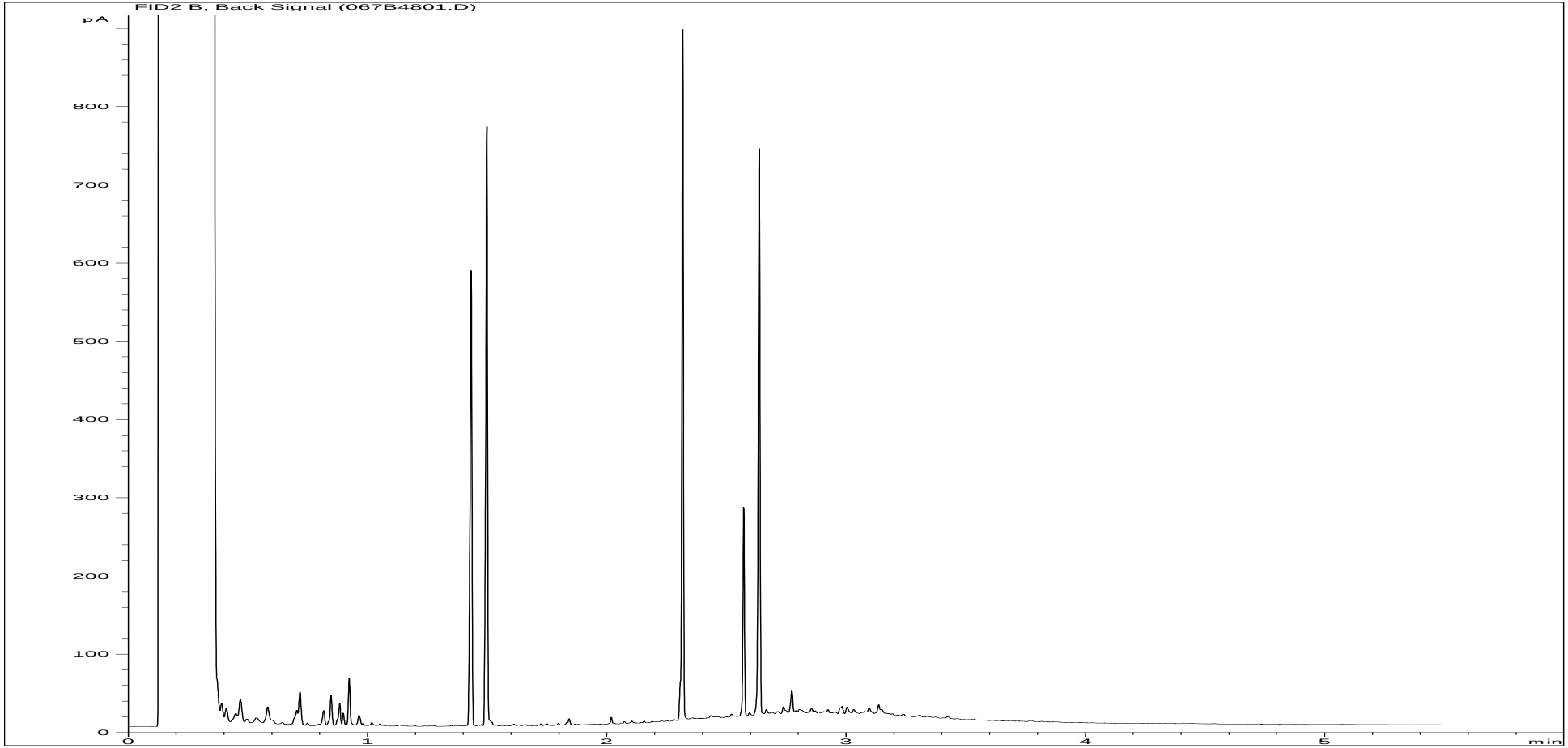
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720204	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH6
Acquisition Date/Time:	09-Aug-16, 21:49:33		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\066B4701.D		

Where individual results are flagged see report notes for status.

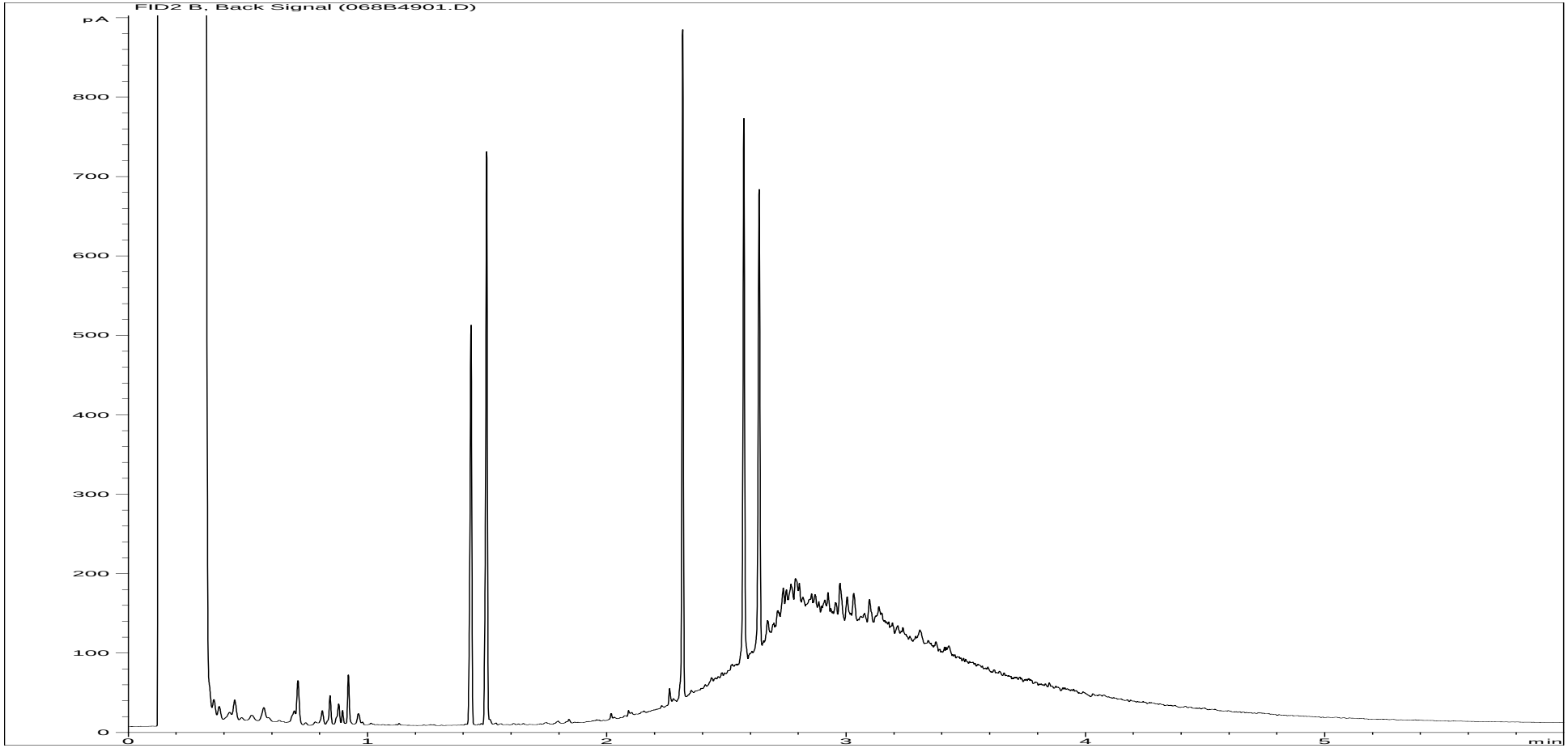
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720205	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH11
Acquisition Date/Time:	09-Aug-16, 22:01:05		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\067B4801.D		

Where individual results are flagged see report notes for status.

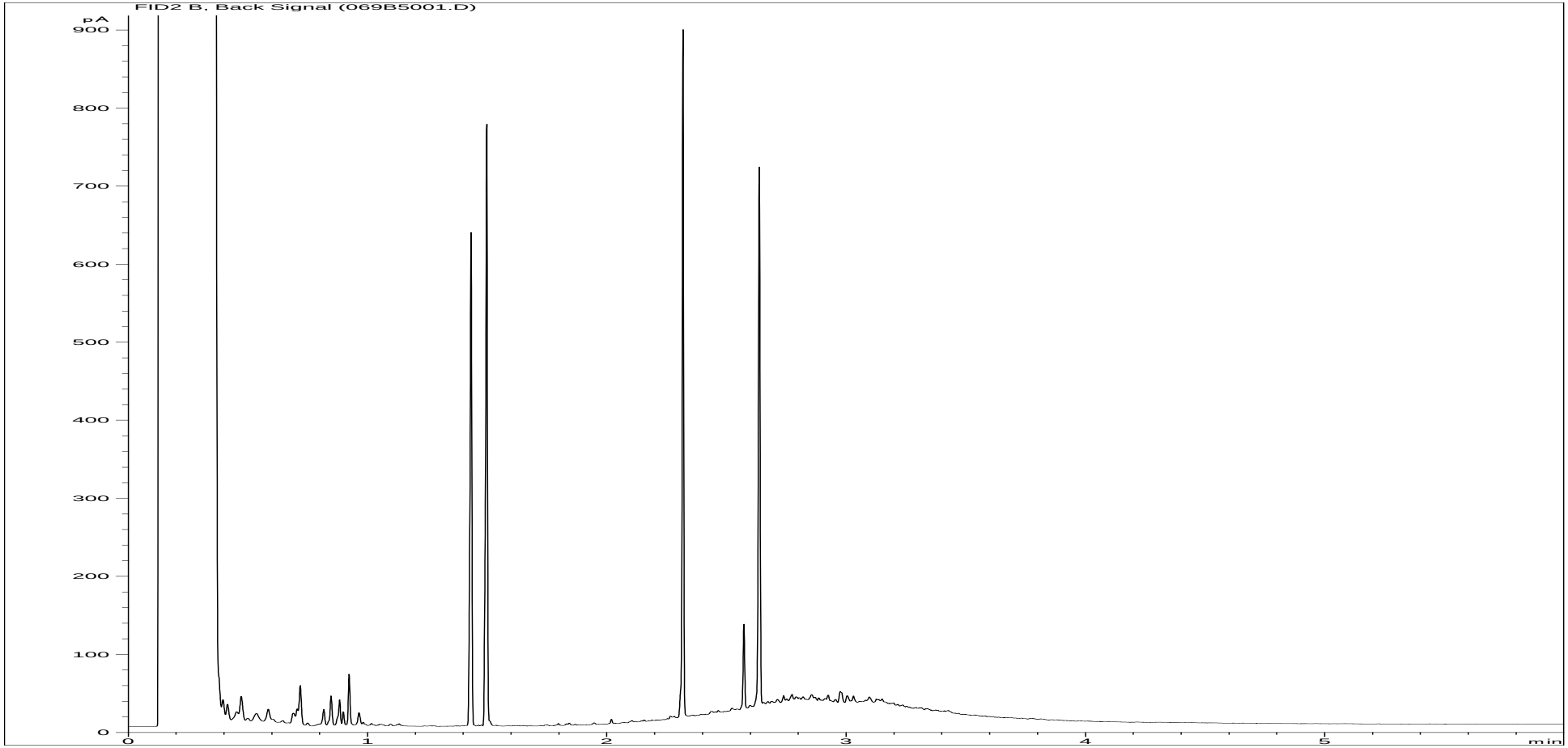
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720206	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	MW2
Acquisition Date/Time:	09-Aug-16, 22:13:02		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\068B4901.D		

Where individual results are flagged see report notes for status.

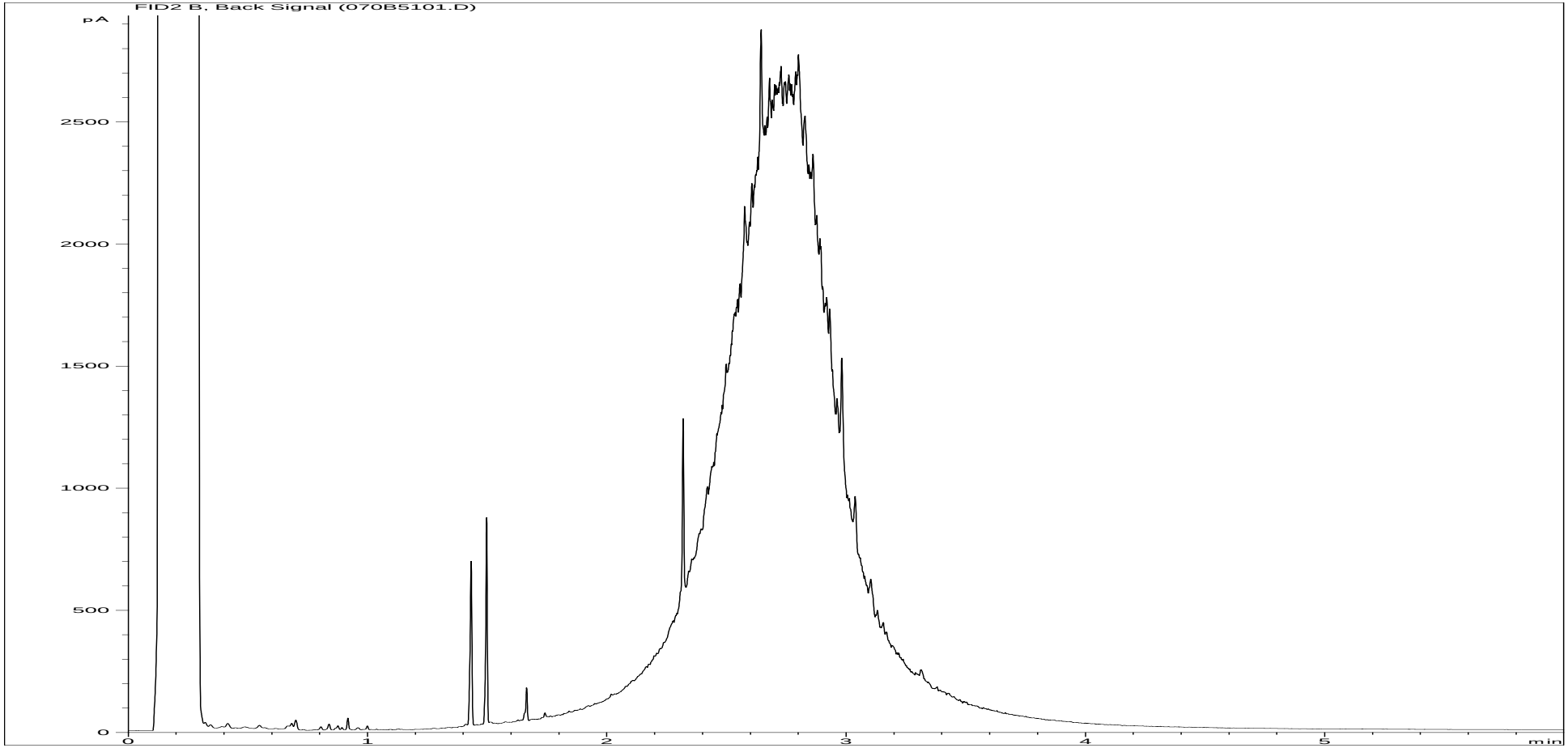
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720207	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	MW1
Acquisition Date/Time:	09-Aug-16, 22:24:58		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\069B5001.D		

Where individual results are flagged see report notes for status.

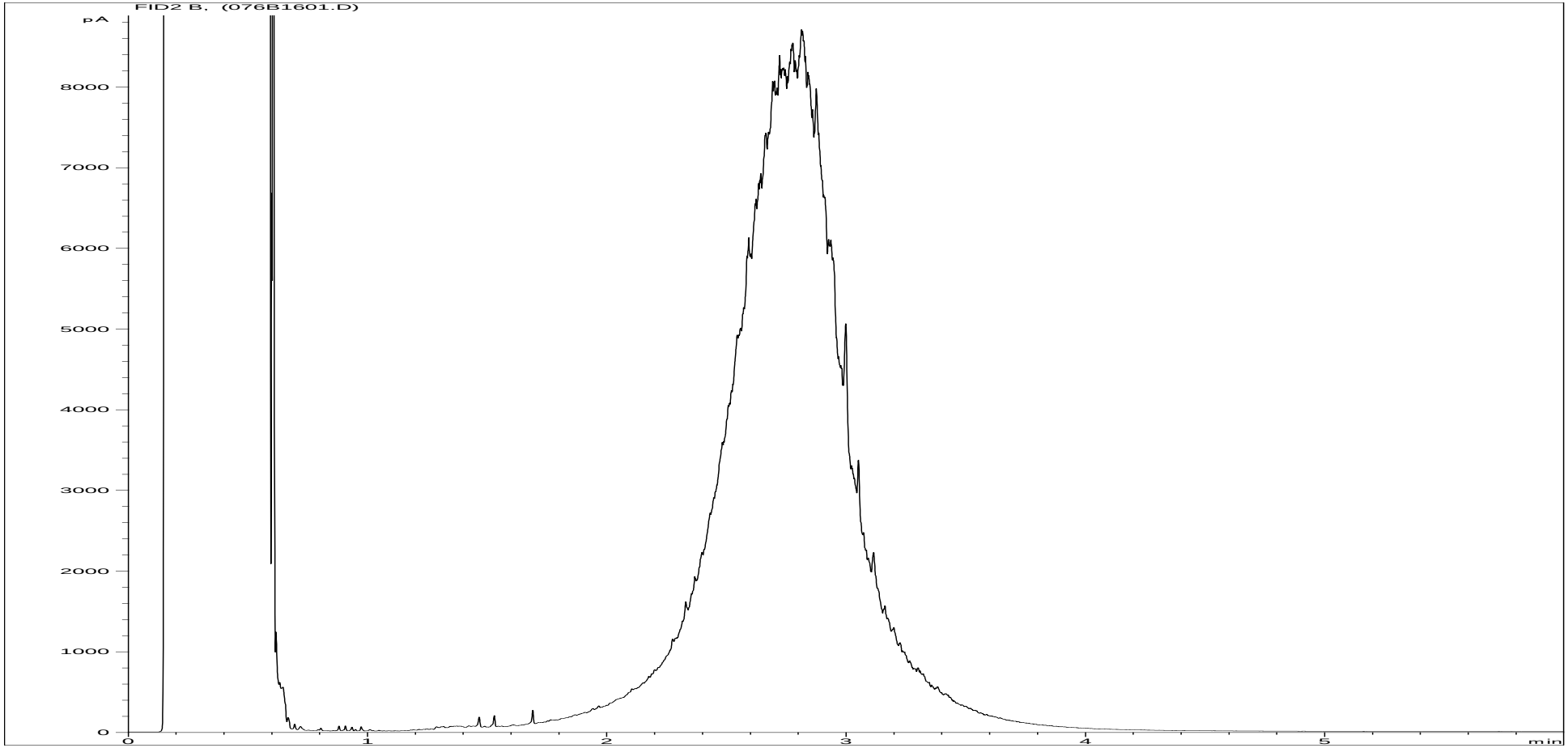
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720208	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	1	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	H1
Acquisition Date/Time:	09-Aug-16, 22:36:56		
Datafile:	D:\TES\DATA\Y2016\080916TPH_GC14\080916 2016-08-09 13-01-47\070B5101.D		

Where individual results are flagged see report notes for status.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX1720209	**Job Number:**	W22_4527
Multiplier:	0.005	**Client:**	Ramboll Environ
Dilution:	5	**Site:**	Sapa SPMP Round 26
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH12
Acquisition Date/Time:	11-Aug-16, 12:49:18		
Datafile:	D:\TES\DATA\Y2016\080816TPH_GC3\5ULTEMPLATE 2016-08-08 10-40-44\081116TPH_GC3\081116 2016-08-11 09-15-06\076		

Where individual results are flagged see report notes for status.

Sample Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

W224527

Customer Ramboll Environ
Site Sapa SPMP Round 26
Report No W224527

Consignment No W107581
Date Logged 05-Aug-2016

Report Due 12-Aug-2016

ID Number	Description	Matrix Type	Sampled	MethodID	Calc_HD	CUSTSERV	ICPMSW										ICPWATVAR					
					Total Hardness as CaCO3 (CALC)	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)	Arsenic as As MS (Dissolved)	Mercury as Hg MS (Dissolved)	Selenium as Se MS (Dissolved)	Vanadium as V MS (Dissolved)	Total Sulphur as SO4 (Diss) VAR	Calcium as Ca (Dissolved) VAR	Magnesium as Mg (Dissolved) VAR	Barium as Ba (Dissolved) VAR	Iron as Fe (Dissolved) VAR	Boron as B (Dissolved) VAR
					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EX/1720202	BH56	Groundwater	04/08/16																			
EX/1720203	BH4	Groundwater	04/08/16																			
EX/1720204	BH6	Groundwater	04/08/16																			
EX/1720205	BH11	Groundwater	04/08/16																			
EX/1720206	MW2	Groundwater	04/08/16																			
EX/1720207	MW1	Groundwater	04/08/16																			
EX/1720208	H1	Groundwater	04/08/16																			
EX/1720209	BH12	Groundwater	04/08/16																			

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

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.

Sample Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

W224527

Customer Ramboll Environ
Site Sapa SPMP Round 26
Report No W224527

Consignment No W107581
Date Logged 05-Aug-2016

Report Due 12-Aug-2016

ID Number	Description	Matrix Type	Sampled	MethodID	ICPWATVAR	KONENS	SFAPI	TPHFID	WSLM10	WSLM13	WSLM25	WSLM27	WSLM3
					Beryllium as Be (Dissolved) VAR	Ammoniacal Nitrogen (Kone)	Cyanide (Total) as CN SFA	TPH GC	Suspended Solids	Total Organic Carbon	Redox Potential mV	Total Dissolved Solids	pH units
						✓	✓	✓	✓	✓			✓
EX/1720202	BH56	Groundwater	04/08/16										
EX/1720203	BH4	Groundwater	04/08/16										
EX/1720204	BH6	Groundwater	04/08/16										
EX/1720205	BH11	Groundwater	04/08/16										
EX/1720206	MW2	Groundwater	04/08/16										
EX/1720207	MW1	Groundwater	04/08/16										
EX/1720208	H1	Groundwater	04/08/16										
EX/1720209	BH12	Groundwater	04/08/16										

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

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/224527

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM10	EX/1720202,EX/1720204	Due to the sample matrix, the volume of sample analysed was lowered to complete the filtration process.
TPHFID	EX1720209	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted to improve the signal to noise ratio but in doing so, the detection limit for this test has been elevated.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Water	Calc_HD	As Received	Calculation based on Dissolved metals analysis by ICPOES
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

Where individual results are flagged see report notes for status.

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 Environ
Site : Sapa SPMP Round 26
Report Number : W22_4527

Lab ID Number	Client ID	Description
EX/1720202	BH56	Groundwater
EX/1720203	BH4	Groundwater
EX/1720204	BH6	Groundwater
EX/1720205	BH11	Groundwater
EX/1720206	MW2	Groundwater
EX/1720207	MW1	Groundwater
EX/1720208	H1	Groundwater
EX/1720209	BH12	Groundwater