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Phase 2 Development Enivroparks, Hirwaun

Geo-environmental Assessment Report

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Submitted by Pell Frischmann

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1. INTRODUCTION

1.1 TERMS OF REFERENCE

A 8 ha parcel of land to the northwest of the town of Hirwaun is being developed as a sustainable waste resource recovery and energy production plant. The proposed development, which is located on the edge of the existing Hirwaun Industrial Estate, is being implemented in three phases. The area incorporating all three phases of the proposed development is hereafter referred to as the 'development area'.

Phase 1 of the development was not taken to completion as was originally intended. The Phase 2 development therefore encompasses the completion of the Phase 1 works as well as the addition of new Phase 2 infrastructure. This report relates to the Phase 2 development, which is hereafter referred to as 'the site'. The areal extent of the site is shown in Drawing ENV_EPT_GEN_DR_A_6011 P7 which is included as Appendix A to this report.

Pell Frischmann has been commissioned by Enviroparks (Wales) Limited to compile and issue an Environmental Statement (ES) Technical Appendix report which, as far is as is reasonably possible using the existing datasets of geochemical data, fulfils the function of a contemporary contaminated land assessment report for the proposed Phase 2 site at Enviroparks Hirwaun.

1.2 DATA SOURCES

Within the production of this report, the following data sources have been utilised:

- Phase 1 Environmental Desk Study, Hirwaun Ecopark, ERM Report, October 2007.
- Hirwaun Industrial Estate Development, Interpretative Report On Site investigation, Soil Mechanics, Report No. H8076, January 2009.
- Enviroparks, Hirwaun – Supplementary Geotechnical & Geo-Environmental Report G345 Enviropark_LR01 October 2013.

1.3 OBJECTIVES

Further to the conclusions of the 2007 desk study, and following the implementation of the two phases of ground investigation (2009 and 2013, as above), the objectives of this Geo-environmental Assessment Report are:

1. To present a geo-environmental review and summary of the ground and groundwater conditions which have been encountered,
2. To interpret the geochemical data arising from the ground investigation, including a quantitative risk assessment of potential contaminants,
3. To update the Conceptual Site Model for the site, and
4. To draw conclusions on 'suitability for use' of the site for the proposed development under the current planning regime.

2. BACKGROUND INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The site is located to the North-West of Hirwaun on the edge of Hirwaun Industrial Estate. The approximate centre of the site is located at OS GB National Grid Reference 293880E 206790N. The access to the site is gained from the east of the Sste, via. Ninth Avenue.

The Enviroparks Hirwaun development area previously comprised an area of approximately level ground that had been prepared as a development platform by regrading the ground surface. The full development area is approximately rectangular in shape and covers an area of approximately eight hectares. It is approximately 250 m to 300 m across, at its widest.

The development area boundary is defined by:

- a track at the lower edge of the Penderyn Reservoir embankment to the north;
- Ninth Avenue to the east;
- Fifth Avenue to the south; and
- an unnamed stream to the west.

The entrance to the development area was previously established from the southern boundary, from Fifth Avenue. However, during the Phase 1 development work the access was moved to the east of the site and is now made from Ninth Avenue.

The land surrounding the development area is used for the Penderyn Reservoir and farm fields to the north, farm fields and woodland to the west and by industrial units in the south and east.

The Phase 1 building (Fuel Preparation Hall) is now located in the southwestern portion of the overall development area. A concrete apron is located to the north of the building, which joins a concrete access road that runs from east to west across the middle of the site before turning to the south along the western site boundary and joining Fifth Avenue.

2.2 PROPOSED DEVELOPMENT

Pell Frischmann understands that the proposed Phase 2 development will comprise the construction of a Fuel Storage Hall, a Gasification Hall and a Balance of Plant Yard. The layout is showing in drawing ENV_EPT_GEN_DR_A_6011 P7 in Appendix A.

The Fuel Storage Hall will connect to the west of the Phase 1 Fuel Preparation Hall in the south west of the site. The Gasification Hall will be located to the north of the Fuel Storage Hall.

The yard area to the west of the Gasification Hall is the Balance of Plant Yard. A swale will be located along the southern site boundary adjacent to Fifth Avenue.

2.3 DESK STUDY

A Phase 1 Environmental Desk Study report was produced for the Enviroparks Hirwaun site by ERM in October 2007. Key information which was identified and reported by the desk study is summarised in the following sections (updated in places, following the more recent phase of ground investigation reporting).

2.4 SITE HISTORY

The desk study collated historical mapping information and revealed that the history of land use on and around the site was largely industrial.

The mapping indicates that the development area was formally used as an ordnance factory during the Second World War, although all buildings associated with the plant were demolished in the late 1960s early 1970s.

The development area then remained vacant until the late 1990s, when the Welsh Development Agency (WDA) re-profiled the site, creating the current site profile and adding some herring bone drains and open ditches to control surface water.

A small refuse tip which is recorded on the 1964 OS edition is likely to be associated with the ordnance factory. This refuse tip is outside the Phase 2 site area

2.5 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

The general geology of the site is shown on the British Geological Survey (BGS) 1:50,000 geological map of Merthyr Tydfil (Sheet 231). Further geological information has been obtained from the BGS website.

The site is shown to be underlain by superficial deposits of Alluvium (across the southern part) and Glacial Till (across the northern part). These are underlain by bedrock of the Lower Coal Measures.

Alluvium is described by the BGS as usually being composed of ‘soft to firm consolidated, compressible silty clay, with layers of silt, sand, peat and basal gravel’.

The Glacial Till is described by the BGS as typically being ‘gravel, cobble and boulders within a clay matrix’.

The Lower Coal Measures is a sequence of mainly mudstones and sandstones with rare coal seams. The Lower Coal Measures is described as ‘grey, (productive) coal-bearing mudstones/siltstones, with seatearths and minor sandstones’.

An unnamed coal seam is shown by the geological map to outcrop with an east to west strike through the centre of the site. However, a 1993 coal mining report has been made available to Pell Frischmann, which states that it is extremely unlikely that mining has been undertaken under the site in the past, or will be in the future. We understand that an updated coal mining report has been commissioned by the Phase 1 contractor, but it is not available to us at the time of preparation of this report.

In relation to site hydrogeology, the following aquifer designations are reproduced from the desk study:

- Lower Coal Measures - Secondary A Aquifer

With regard to site hydrology, an unnamed stream flows from north to south along the western site boundary. This stream flows into the River Camnant approximately 50m to the southwest of the site. The River Camnant in turn joins the River Sychryd approximately 500m to the west of the site.

2.6 RECORDS OF POLLUTION, CONTAMINATED LAND AND RADON

The nearest recorded pollution event recorded by the desk study was located 16 m to the west of the site. The event relates to a release of sewage effluent to controlled waters from the Hirwaun Industrial Estate Sewage Works. This event was categorised as 'significant'.

There are no sites determined as Contaminated Land under Part 2A EPA 1990 within 500m of the site.

The desk study reported that the site is not located within a radon-affected area.

2.7 ENVIRONMENTALLY SENSITIVE DESIGNATIONS

The desk study identified three Sites of Special Scientific Interest (SSSI) within 1km. These are the Cores Bryn-Y-Gaer, which is located 114m to the East and the twin sites of Woodland Park and Pontpren, which are located 868m to the East.

3. PRELIMINARY RISK ASSESSMENT

3.1 PHASE 1 CONCEPTUAL SITE MODEL

Based on the desk study findings, a Phase 1 (preliminary) conceptual site model (CSM) was set out in the 2007 ERM report. It is reproduced below, as a precursor to the preliminary risk assessment within this report:

Source

"The following potential contamination risks have been identified as moderate to high following the assessment of the available information:

The Made Ground at the site is thought to be reworked natural material created during the construction of the Ordnance Factory that was locate on the site. There is a possibility that local contamination could have occurred during the site's operational history from structures such as storage tanks.

The refuse tip (locate offsite) *identified in the 1964 map could be a possible source of contamination as the contents of the tip are unknown.*

Pathways

Leaching to groundwater
Vapour migration
Inhalation
Dermal contact

Receptor

*The Stream (*Controlled Waters*)*
*Site visitors (*construction workers, future users*).*

3.2 PRELIMINARY RISK ASSESSMENT METHODOLOGY

As above, the 2007 ERM desk study report included a did not include a preliminary risk assessment. In order to comply with current best practice, we have retrospectively undertaken a primary risk assessment based on the contaminant sources and receptors detailed in the 2007 CSM.

This assessment is qualitative only and based on the potential presence of a pollutant linkage. A pollutant linkage is the relationship between a contaminant source, a pathway and a receptor. Unless all three elements of a pollutant linkage are present, a risk is not considered to exist.

The potential pollutant linkages (PLs) are presented in conjunction with an updated CSM in Table 2 (overleaf, 2 pages), along with a qualitative assessment of the potential risk associated with each of the potential PLs. The assessment of potential risk is based on considering a product of the 'severity of the consequence' and the 'probability of the likelihood' as detailed in the Risk Matrix overleaf (Table 1). The matrix is based on the guidance within the CIRIA Report C552 (Rudland *et al* 2001).

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to site demolition and redevelopment workers consideration of occupational health and safety issues is beyond the scope of this report and will need to be considered separately in subsequent construction stage health and safety planning.

Table 1: Risk Matrix and Key for Table 2

		Consequence			
Probability	*product*	**Severe**	**Medium**	**Mild**	**Minor**
	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Very low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Very low risk	Very low risk	Very low risk
	No Linkage	No risk			

3.3 PHASE 1 POTENTIALLY COMPLETE POLLUTANT LINKAGES

The Phase 1 CSM has identified a number of potential PLs at the site. In this instance, the key potential PLs and associated risks predominantly relate primarily to on-site contaminant sources.

At Phase 1 stage, these linkages remain as *potential* linkages until such time as data collection or other further work either proves them to exist or to be absent. The risk assessment is updated later in the report, in response to the 'Phase 2' ground investigation findings.

Table 2: Phase 1 Conceptual Site Model (and Preliminary Risk Assessment of Source-Pathway-Receptor Pollutant Linkages)

Source(s)	Possible Pathway(s)	Receptor(s)	Probability	Consequence	Risk Level	Comments
Organic contaminants such as petroleum hydrocarbons and PAHs associated with on-site historical land uses.	Ingestion, inhalation or direct contact. Inhalation of fugitive dust. . Leaching through unsaturated zone. Surface run-off, base flow from contaminated groundwater.	End users of the site. Neighbours. Controlled waters.	High Likelihood	Medium	High	Potential sources of this type of contamination have been identified at the site. Given the industrial history background of the site it is considered highly likely that organic contaminants could exist in the Made Ground, shallow soils and groundwater beneath the site. Construction workers and site neighbours may be at risk from the emission of fugitive dusts particularly during the construction process. These risks can be controlled through appropriate means during the construction.
Metals, Metalloids and other inorganic contaminants	Ingestion, inhalation or direct contact. Inhalation of fugitive dust. Leaching through unsaturated zone. Surface run-off, base flow from contaminated groundwater.	End users of the site. Neighbours. Controlled waters.	Likely	Medium	Moderate	The former land use at the site could have introduced contaminants of this type to the land. Construction workers and site neighbours may be at risk from the emission of fugitive dusts particularly during the construction process. These risks can be controlled through appropriate means during the construction.

Source(s)	Possible Pathway(s)	Receptor(s)	Probability	Consequence	Risk Level	Comments
Elevated concentrations of ground gases (methane & carbon dioxide) from biodegradable matter in the Made Ground.	Migration through soils or groundwater to indoor air.	End users of new buildings Users of off-site properties New buildings Adjacent properties	Likely	Medium	Moderate	The main risk from potential ground gases is likely to be posed by biodegradable matter and potential hydrocarbon vapours within areas of Made Ground and the Alluvium on the site or in the surrounding area.
Asbestos fibres from insulation or asbestos-containing materials in the Made Ground.	Fugitive dust.	End users of the site Neighbours.	Low	Severe	Moderate	Made Ground is present on site and may be asbestos bearing.
Radon	Migration through soils or groundwater to indoor air.	End users of new buildings.	Unlikely	Severe	Low	The site is not located in a Radon Affected Area as less than 1% of properties are above the Action Level for radon. No radon protective measures are necessary at the site, in line with recommendations described in publication BR211 by the Building Research Establishment.
Sulphates present in the Made Ground, and natural geology	Direct contact with dissolved sulphates.	Buried concrete.	Likely	Medium	Moderate	Made Ground and natural strata has the potential to be sulphate bearing.

4. GROUND INVESTIGATION

4.1 GROUND INVESTIGATION PHASING

Two ground investigations (GI) have been undertaken for the Enviroparks Hirwaun development. The first was undertaken by Soil Mechanics in 2008 (reported 2009) and covered the full development area (Phase 1/2 and Phase 3 development areas). The second was undertaken by Quantum Geotechnical in 2013 and primarily targeted what was, at that time, the Phase 1 development area. The GI methodologies are summarised in the following sections.

4.2 SOIL MECHANICS 2009

A scheme-specific ground investigation for the project was scheduled by Pell Frischmann during 2008. The ground investigation (GI) was designed as an integrated investigation, covering both geotechnical and geo-environmental disciplines.

At ground investigation scheduling stage, the scope of the geo-environmental investigation work which was proposed was derived from consideration of the size of the site and the desk study findings and conclusions. The locations of the investigatory holes were determined by reference to the conditions identified in the desk study. No specific sampling statistics or grid were utilised in this instance.

The geo-environmental objectives of the work, which primarily relate to the characteristics and geochemistry of the near surface strata, were addressed by scheduling the collection of samples from the shallow sections of cable percussive boreholes and from the formation of trial pits.

4.2.1 Fieldwork

Soil Mechanics carried out the GI fieldwork between 14 August and 23 September 2008. The fieldwork which was undertaken is summarised in Table 3:

Table 3: Summary of Ground Investigation Fieldwork

Activity	Total No.	No. of Holes in Phase 2 Area	Exploratory Holes in Phase 2 area	Max. Depth	Installations/ Notes
Cable Percussion Boreholes	9	6	BH101, BH102, BH103, BH104, BH105, and BH107	10.9 m bgl	Monitoring wells installed in,BH101, BH102, BH103 and BH105 for ground gas and groundwater monitoring.
Rotary Follow-on	5	4	BH101R, BH103R, BH105R, and BH107R.	18.0 m bgl	
Trial Pits	19	11	TP1, TP1A and TP2 - TP10,	3.8 m bgl	

Full details of the ground investigation work are set out in the contractor's report on the investigation, which is included in full within Appendix C. The approximate position of the ground investigation exploratory hole locations are shown on the Exploratory Hole Location Plan within the report.

4.2.2 Geochemical Laboratory Analysis

Fifty-three of the geo-environmental samples which were obtained from the exploratory holes during the fieldwork were sent for geochemical analysis. Thirty-five of these samples were recovered from the Phase 2 site. Laboratory geochemical analysis was carried out by TES Bretby. The analysis suites (see following Table 4) were compiled based on the findings of the desk study.

Table 4: Geochemical Analysis Suites

Determinants	Soil samples analysed	Soil samples analysed in Phase 2 Area	Water samples analysed	Water samples analysed in Phase 2 area
Petroleum Hydrocarbons – Banded TPH	53	35	5	3
Polycyclic Aromatic Hydrocarbons (PAH) – Total	53	35	5	3
Phenols	53	35	5	3
pH	53	35	5	3
Total Cyanide	53	35	5	3
Free Cyanide	53	35	5	3
Thiocyanate	53	35	5	3
Antimony	53	35	5	3
Arsenic	53	35	5	3
Barium	53	35	5	3
Beryllium	53	35		
Boron	53	35	5	3
Cadmium	53	35	5	3
Chromium	53	35	5	3
Chromium VI	53	28	5	3
Copper	53	35	5	3
Molybdenum	53	35	5	3
Mercury	53	35	5	3
Nickel	53	5	5	3
Lead	53	35	5	3
Selenium	53	35	5	3
Zinc	53	35	5	3
Asbestos screen & ID	31	21		
BTEX	53	35	5	3
PCB	5	3		
COD			5	3
BOD			5	3

The environmental samples were recovered from between 0.3m and 3.3m below ground level and are representative of the Made Ground and Glacial Till Deposits.

The samples were taken, stored and transported in general accordance with BS 10175:2011.

Copies of geochemical analysis results are included in the Soil Mechanics report presented in Appendix C. The results are reviewed, assessed and discussed further in subsequent Chapters 5, 6 and 7.

4.3 QUANTUM GEOTECHNICAL 2013

Further GI which was specifically for the Phase 1 development works was scheduled by Waterman and undertaken by Quantum Geotechnical (hereafter referred to as Quantum) during 2013. The GI was designed to determine the extent the Alluvium, the extent of a hydrocarbon hotspot and also inform the design of the foundations and floor slab for the Phase 1 structure.

4.3.1 Fieldwork

Quantum carried out the ground investigation fieldwork between 11th and 16th September 2013. The fieldwork which was undertaken is summarised in Table 5:

Table 5: Summary of Ground Investigation Fieldwork

Activity	No.	No. of holes in Phase 2 Area	Max. Depth	Exploratory Holes in Phase 2 area	Installations / Notes
Dynamic Probe	12	12	-	None	None
Trial Pits	19	6	3.00 m bgl	TP101-TP106	None

Full details of the GI work are set out in the contractor's report on the investigation, which is included in full within Appendix D. The approximate position of the ground investigation exploratory hole locations are shown in the Exploratory Hole Location Plan within the report.

4.3.2 Geochemical Laboratory Analysis

Ten geo-environmental samples were obtained from the exploratory holes during the fieldwork from between 1.0m and 2.0m below ground level. These samples were sent to I2 Analytical. Five of the were samples tested for speciated PAHs. The other five samples were tested for speciated TPH.

In conjunction with the 2007 data, the 2013 results are reviewed, assessed and discussed further in subsequent Chapters 5, 6 and 7.

5. GROUND AND GROUNDWATER CONDITIONS

5.1 GROUND CONDITIONS

5.1.1 Summary

The geological succession encountered during the two ground investigations was generally as predicted by the BGS geological map.

With the inclusion of the shallow/surfacing materials, the following table summarises the ground conditions findings at the site:

Table 6: Strata Encountered

Stratum Description	Depth to Top* (m bgl)	Depth to Base* (m bgl)	Thickness (m)
Made Ground	-	2.0	2.0
Alluvium	3.0	3.5	0.5
Glacial Till	2.0	8.6	6.6
Lower Coal Measures	9.5	Not proven	Not proven

(*Note: the depths are averages of the available datasets, to provide a simplified summary)

Full strata details are set out in the contractor's reports on the investigations, which are included in full within Appendix C and D respectively. The geological strata in the table above are described in further detail below.

5.1.2 Made Ground

Made Ground was located in all of the exploratory holes undertaken in the site. The thickness of the Made Ground which was encountered, varied from 0.3m to 3.6m. Nine of the trial pits terminated within the Made Ground.

In general, the Made Ground was granular in nature, typically described as *medium dense to dense red, brown and grey very clayey sandy gravel with low cobble content*. The gravel and cobble component is recorded to include sandstone, quartzite and brick fragments. Occasional anthropogenic materials including wire, glass, steel, brick, slag and concrete were observed.

Within the south western area of the site, a thin layer (0.1 m - 0.3 m) of cohesive soil was encountered, described as *soft brown sandy slightly gravelly silty clay*.

In the south-eastern area of the proposed development, four of the exploratory holes (TP1A, TP2, TP4 and TP5) encountered cohesive soils. These were recorded to be present to a maximum thickness of 1.5 m and were described as *soft black grey and brown sandy slightly gravelly silty clay with low cobble content*. The cobbles were comprised of sandstone and quartzite.

5.1.3 Alluvium

Alluvium was only encountered in a single trial pit (TP6). It was present between 3.0 m and 3.5 m bgl, and it's the base was not proven.

The Alluvium was described as *soft to firm grey brown to black clayey SILT with rare small pockets of woody peat and many roots and rootlets*.

The trial pits TP101-TP106 undertaken by Quantum in 2013 were commissioned with the intention of defining the extent of the soft 'peaty' Alluvium. No cohesive or 'peaty' Alluvium was recorded in any of the pits.

5.1.4 Glacial Till

The ground investigation findings indicate the Glacial Till to be present below the site. All five of the cable percussive boreholes encountered Glacial Till. Four of the five boreholes fully penetrated the Glacial Till, proving respective thicknesses of 8.30 m (BH101), 5.5 m (BH102), 8.50 m (BH103) and 7.0 m (BH105). In BH104 the base of the Glacial Till was not proven but was recorded to be a minimum of 8.3 m thick.

The Glacial Till was generally described as *loose to dense dark grey and brown clayey sandy gravel with low cobble content*. The gravel and cobble content is described as sub-angular to sub-rounded sandstone and quartzite.

5.1.5 Lower Coal Measures

Strata of the Lower Coal Measures were encountered in the boreholes that were extended using rotary coring methods.

The first core runs in the Lower Coal Measures (between 10m and 12m in BH103R and between (9m and 10m in BH105R) resulted in poor core recovery. The driller described the material as broken sandstone with joints filled with brown sandy clay. We interpret this to represent an initial weathered zone of the Lower Coal Measures that comprises weaker and more fractured sandstone.

Below the initial weathered layer, the Lower Coal Measures strata typically comprised very strong grey fine grained sandstone with orange brown staining on discontinuity surfaces. The discontinuities were typically sub-horizontal and closely to medium spaced.

5.2 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

No direct visual or olfactory evidence of contamination was noted in any of the exploratory hole locations undertaken across the site during the ground investigation.

5.3 GROUNDWATER

On completion of boring, slotted 50 mm diameter standpipes were installed into four of the boreholes (BH101, BH102, BH103 and BH105) for groundwater and ground gas monitoring.
Groundwater level readings were made in the monitoring standpipes on four subsequent visits.

Boreholes 101, 102, 103 and 105 indicate a shallow groundwater regime, with phreatic surface generally located 2m bgl, towards the top of the Glacial Till and base of the Made Ground.

The groundwater level in BH109 (located outside of Phase 2) is typically 0.13 m bgl. The response zone within the monitoring well ranges from 1.5 m bgl to 3.0 m bgl and extends through the Made Ground and into the natural strata. The groundwater monitoring may be indicative of sub-artesian ground water conditions.

These sub-artesian groundwater conditions appear to be a local issue rather than site wide.

The results of the groundwater monitoring are summarised in the following table:

Table 7: Groundwater Summary – Phase 2 Development Area

Monitoring Well	Average m bgl	Max m bgl	Min m bgl	Average m aOD	Max m aOD	Min m aOD
BH101	2.35	2.42	2.27	196.89	196.82	196.97
BH102	2.20	2.25	2.12	196.96	196.91	197.04
BH103	2.11	2.13	2.10	197.66	197.64	197.67
BH105	2.05	2.06	2.04	197.48	197.47	197.49

The full groundwater level monitoring results are all presented in the Soil Mechanics report in Appendix C.

5.4 GROUND GAS

Ground gas monitoring was undertaken alongside the groundwater monitoring during and after the fieldwork period.

The results of the Ground Gas monitoring are summarised in the following table:

Table 8: Ground Gas Summary

Date	Unit	BH103	BH105
Max. CH_4	%	1.2	0.7
Av. CH_4	%	0.33	0.25
Max. CO_2	%	1.4	0.7
Av. CO_2	%	0.93	0.18
Min. O_2	%	17	19.8
Av. O_2	%	19.1	17.88
Max. Flow	l/h	0.3	0.1
Av. Flow	l/h	0.15	0.08
Atm. Pressure	mb	978-1013	978-1013

Further consideration with regard to ground gas is presented in Section 6.4 of this report.

The full ground gas monitoring results are presented in the Soil Mechanics report in Appendix C.

5.5 GEO-ENVIRONMENTAL LABORATORY ANALYSIS RESULTS

5.5.1 Soil Chemistry

The results of the geo-environmental chemical analysis on soil samples are presented in the Soil Mechanics and Quantum reports in Appendix C and D of this report.

The soil analysis results are reviewed in subsequent Section 6.2 of this report.

5.5.2 Asbestos

Twenty-one samples recovered from the shallow soils across the Phase 2 development area were subjected to asbestos screening. No asbestos fibres were recorded in any of the tested samples.

5.5.3 Groundwater Chemistry

The results of the geo-environmental chemical analysis on soil samples are also presented in the Soil Mechanics report in Appendix C of this report.

The groundwater analysis results are reviewed in subsequent Section 6.3 of this report.

6. RISK ASSESSMENT

6.1 CONTAMINATION RISK ASSESSMENT

Pell Frischmann have used the geochemical results from the ground investigation to implement a ground contamination risk assessment in accordance with current guidance and best practice. The assessment is reported in the following sections.

6.2 GENERIC QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH

A generic quantitative risk assessment (GQRA) has been undertaken using the geochemical results for the soil samples retained during the ground investigation in order to assess any human health liabilities associated with potential in-ground contaminants at the site.

The approach to human health risk assessment adopted in this report is consistent with the Environment Agency's Model Procedures (CLR11), CL:AIRE statistics guidance and other relevant guidance (including SP1010, SR3, BS10175:2011 and the NPPF). Further information on the methodology can be provided on request.

As set out in Section 2.2, Pell Frischmann understands that it is intended to redevelop the site with a new sustainable waste resource recovery and energy production plant.

In order to formulate a reasonably conservative baseline for the site, the assessment of the available data has been undertaken using the relevant land uses provided in DEFRA's SP1010 Category 4 Screening Level (C4SL) guidance and LQM/CIEH Suitable 4 Use Level (S4UL) guidance documents. Given the proposed use as a waste to energy plant, the C4SL and S4UL 'Commercial' guidelines have been applied to the entire site (using a 1% SOM value where appropriate, to provide an initial conservative assessment).

The C4SL's have been used where available. Where they are not available, the LQM/CIEH published S4UL's are utilised.

6.2.1 Data Assessment

The results of the laboratory geochemical soil analysis have been statistically analysed to ensure a true representative assessment of the site is made and to allow a comparison with the appropriate assessment criteria described above.

The statistical analysis has been undertaken in accordance with the report: Guidance on Comparing Soil Contamination Data with a Critical Concentration, published by the Chartered Institute of Environmental Health through CL:AIRE (Contaminated Land: Applications In Real Environments) in May 2008.

In order to undertake the statistical assessments, the ESI Contaminated Land Statistics Calculator software has been utilised. This software has been developed in accordance with the CL:AIRE guidance.

The site is being assessed under the current planning regime and as such the following hypotheses have been used to statistically assess the data:

H_0: the level of contamination *is the same as, or higher than*, the critical concentration; and
H_1: the level of contamination *is lower than* the critical concentration.

If H_0 cannot confidently be rejected, then further assessment or remediation may be required. However, if H_0 can confidently be rejected in favour of H_1, it can be concluded that there is good evidence that no further action is required.

6.2.2 Non-detects Methodology

Non-detects are results that are reported by the laboratory as 'less than' a specified minimum value, usually the method detection limit (MDL). The ESI Contaminated Land Statistics Calculator allows non-detects to be set either at method detection limit or at half the MDL. As part of this conservative screening exercise all non-detects were detects set at the MDL.

6.2.3 Outlier Methodology and Initial Data Review

According to the CL:AIRE guidance, statistical outliers can only be excluded from the dataset where:

- They are obviously and demonstrably the result of an error that can be identified and explained; or
- They clearly indicate that more than one soil population exists within the dataset and this can be justified by (or informs the further development of) the CSM.

In all other cases, outlying data should be assumed to be genuine and reflective of the full range of soil concentrations to which receptors may be exposed.

For this assessment,the ESI Contaminated Land Statistics Calculator, which uses the Grubb's test, has been utilised to assess the data for statistical outliers. The data sheets for the statistical assessment can be found in Appendix E.

The analysis of the data set indicates that statistical outliers may be present within the Made Ground at the site. However, Made Ground is typically heterogeneous in nature and it is more conservative to include statistical outliers in the assessment. Consequently, a conservative approach has been adopted and no outliers have been removed from the dataset.

6.2.4 Risk Estimation (incl. statistical analysis) – Commercial

A total of thirty-five soil samples recovered during the ground investigation were scheduled for chemical analysis. These samples were analysed for a range of determinants including metals, PAH's and petroleum hydrocarbons.

Metals - Statistical Assessment

With regards to human health, based on an Upper Confidence Limit (UCL - 95th percentile) exceedance of the GAC, no pervasive metal contaminants of potential concern have been identified which require further assessment and/or remediation.

Based on the analysis the Null hypothesis (H_0) can be rejected for metals.

Polycyclic Aromatic Hydrocarbons

The polycyclic aromatic hydrocarbon (PAH) analysis undertaken to date are predominantly reported as total PAH and are not speciated. There are currently no C4SL or S4UL which Total PAH results can be compared against.

The reported total PAH concentrations are generally low and are considered unlikely to represent a significant risk. Additionally, where some Speciated PAH testing analysis has been reported (Phase 1 development) the concentrations were below the relevant thresholds. However, in the absence of site wide speciated PAH results the H_0 for PAHs cannot confidently be rejected.

Petroleum Hydrocarbons

The results of the banded TPH analysis (which is not spilt into Aliphatic and Aromatic fractions) have been compared against the lowest S4UL (Aliphatic and Aromatic) for the respective band. This comparison reported no exceedance of the S4ULs, therefore, no pervasive petroleum hydrocarbon fractions of potential concern have been identified which require further assessment and/or remediation.

Based on the analysis the Null hypothesis (H_0) can be rejected for hydrocarbons.

Polychlorinated Biphenyls

The results of all three of the samples tested for polychlorinated biphenyls (PCBs) were below the laboratory limit of detection.

Based on the analysis the Null hypothesis (H_0) can be rejected for PCBs.

6.2.5 Risk Evaluation – Soils

In summary, following statistical analysis of the samples obtained during the site investigation, potentially pervasive risks to human health have been identified from PAHs within the soils. However, the risk arises more from an absence of suitable data to allow assessment using current criteria than from actual measured concentrations.

In order to further inform this assessment of risk it is recommended that a limited ground investigation is undertaken to obtain soil samples and to enable speciated PAH analysis to be undertaken. The results of the analysis can then be compared against published C4SL or S4UL thresholds.

6.3 GENERIC RISK ASSESSMENT – CONTROLLED WATERS

Groundwater was encountered during the ground investigation. Groundwater samples obtained from BH101, BH103 and BH105 were subjected to chemical analysis that included a suite of metals, PAHs and petroleum hydrocarbons.

The risks to groundwater and surface water from contaminants on site have been assessed according to the remedial targets methodology (RTM) prescribed by the Environment Agency (2006). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Agency's 'limit' pollution objective.

Acceptable water quality targets (WQT) are defined for protection of human health (based on drinking water standards (DWS)) and for protection of aquatic ecosystems (environmental quality standards (EQS)).

For the purposes of this report, the ground investigation data is compared with the various targets as set out according to the source-pathway-receptor scenario presented in subsequent Table 12, on the basis that the Lower Coal Measures that underlies the site is designated as Secondary A Aquifer.

The area is not within a Source Protection Zone (SPZ). However, the groundwater body may be used for human abstraction and may also contribute to the Cammant and the River Sychryd base flow (and hence poor groundwater quality has the potential to impact upon ecosystems).

Table 9: Summary of Water Quality Risk Assessment Protocol

Water Body Receptors	Secondary Receptors	Example Contaminant linkages	RTM Level and Data Used	Water Quality Targets
Groundwate Surface water	Human health (abstraction) Aquatic ecosystem	Contaminants from site leach or seep into groundwater body and this feeds surface water by base flow. The surface water may be used for human consumption and is an aquatic ecosystem.	RTM Level 2 - Groundwater	DWS EQS (inland)

The results of the remedial targets methodology assessment are summarised in Table 10 overleaf.

There are no water quality standards for petroleum hydrocarbons in water. However, because of the sensitivity of the water environment to petroleum hydrocarbons, an initial screening exercise is also included in Table 10 irrespective of the assessment scenario(s) stated in Table 9.

Table 10: Chemicals of potential concern for which further assessment is required (Controlled Waters)

Chemical of Potential Concern	Water Quality Target (ug/l)	Basis for Water Quality Target	No. of Samples	Range of Concentrations (ug/l)	Max. < Criterion
As	50	EQS Inland	3	2 – 14	PASS
B	2000	EQS Inland	3	30-80	PASS
Cd	0.25	EQS Inland	3	<0.01 – 0.03	PASS
Cr (total)	4.7	EQS Inland	3	0.1 – 0.2	PASS
Cr (VI)	0.6	EQS Inland	3	<10	**FAIL**
Cu	10	EQS Inland	3	3 – 6	PASS
Hg	0.05	EQS Inland	3	<0.1	**FAIL**
Ni	20	EQS Inland	3	2 - 15	PASS
Pb	7.2	EQS Inland	3	<1 –3	PASS
Zn	125	EQS Inland	3	19 - 95	PASS
Cyanide (total)	1	EQS Inland	3	<40	**FAIL**
Phenols	7.7	EQS Inland	3	<50	**FAIL**
Sulphate	400,000	EQS Inland	3	16000 - 32000	PASS
PAH Benzo(a)pyrene	0.05	EQS Inland	3	<0.01	PASS
PAH naphthalene	2.4	EQS Inland	3	0.01-0.065	PASS
PAH sum of benzo(b)fluoranthene benzo(k)fluoranthene	0.03	EQS Inland	3	<0.02	PASS
TPH	10^	None	3	20 - 40	**FAIL**

From Environment Agency (2002c) Appendix A and Agency web site (annual average basis), Water Quality Regulations 2001 and WHO 2004.
*depends on water hardness and fish type. The site is in a hard to very hard water area according to www.britishwater.co.uk; an appropriate EQS has been used.
^ The Water Supply Regulations 1989 and the Private Water Supply Regulations 1991 both contained a prescribed concentration of 10 µg/l for "dissolved or emulsified hydrocarbons (after extraction with petroleum ether); mineral oils". This was removed when these Regulations were updated in 2000 (consolidated 2007) and 2009, respectively. However 10 µg/l is used in this report as an initial screening assessment as it is frequently the preferred approach of the Environment Agency.

6.3.1 Risk Evaluation of Controlled Waters

After review, five chemicals of potential concern are recorded to exceed the assessment criteria, these being chromium VI, mercury, phenols, cyanide and total petroleum hydrocarbons.

The exceedance for chromium VI, mercury, phenols and cyanide are only apparent because the laboratory method detection limit (MDL) is above the relevant EQS value used. The MDL used for the chromium VI, mercury, phenols and cyanide

analysis is not sufficiently low enough to completely discount the risk associated with it.

Based on the current hydrocarbon analysis all three of the samples exceed the threshold. As such, the risk from hydrocarbons cannot be discounted. The total petroleum hydrocarbon (TPH) analysis that has been undertaken is a coarse test that combines all the hydrocarbon fractions into a single result. This test can result in natural organics such as humic acid being reported within the TPH result.

The current benchmark for hydrocarbon analysis follows the Criteria Working Group (CWG) method which splits the results into carbon bands (e.g. C10-C12) and also into aliphatic and aromatic fractions. The more thorough analysis method tends to strip out the natural organics so it is less likely to report background hydrocarbons.

Notwithstanding the limitations of the dataset, given the site setting and the development context (i.e. lack of human abstractors and low contaminant concentrations), it is considered that the overall risk posed to Controlled Waters by the ground conditions at the site is likely to be low.

To conclude on this aspect, we recommend that further groundwater samples are recovered and sent for analysis. The analysis should target chromium VI, mercury, phenols, cyanide and hydrocarbons (TPH CWG method) and should be undertaken to current standards with a MDL below the relevant threshold value. The results of this analysis will then be assessed to improve confidence in the assessment of risk to Controlled Waters.

6.4 GROUND GASES - CARBON DIOXIDE AND METHANE

The risks associated with the ground gases methane (CH_4) and carbon dioxide (CO_2) have been assessed using BS 8485:2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings,* guidelines from CIRIA 665 (Wilson et al 2007) and the NHBC (Boyle and Witherington 2007).

Qualitatively, it is judged from the available soil descriptions in the ground investigation exploratory hole records that the gas generation potential at the site is likely to be low (i.e. the Made Ground which was recorded across the site had a low organic content).

Current UK best practice guidance suggests that the ground gas assessment and characterisation for a site is dealt with separately for different types of development. In the above guidance:

- **'Situation A'** covers all forms of development (residential and industrial/commercial developments), other than low rise residential development; and
- **'Situation B'** is defined as the specific development of low-rise (one to three storeys in height) housing with beam and block floors, vented sub-floor void and gardens.

Given the industrial nature of the development proposals, the site is characterised as Situation A.

The sensitivity of the development can be considered low (in line with CIRIA 665 which considers industrial developments to be of low sensitivity).

Based on BS 8485:2015 the proposed development would comprise Type D (Industrial) buildings.

One of the assumptions in using the above guidance is that the worst-case ground gas regime has been identified on the site, for either CH_4 or CO_2, at the worst-case temporal conditions that the site may be expected to encounter (such as immediately following rapid changes in atmospheric pressure or prolonged rainfall).

To this end, the idealised frequency of monitoring is suggested in CIRIA 665 Tables 5.5a and 5.5b. These tables are adapted from Wilson and Haines (2005) Table 3 which gives examples of ground conditions with the various gas generation potentials, ranging from inert Made Ground (very low potential) to post 1960s domestic landfill (very high potential).

In this respect, it is judged from the available soil descriptions in the ground investigation exploratory hole records that the gas generation potential at the site is likely to be low (i.e. the Made Ground which was recorded across the site had a low organic content).

It is considered that the post-fieldwork monitoring visits which have been carried out are likely to have detected a worst case scenario with regards to gas generating potential at the site as they have been undertaken at low atmospheric pressure conditions.

For a particular site, BS 8485:2015 and the other references quoted above require identification of the gas flow rate from monitoring wells and the associated concentrations of carbon dioxide and methane, in order to generate a Gas Screening Value (GSV) for the site.

Gas monitoring of the monitoring wells was undertaken on four occasions. During each gas monitoring visit, each well was monitored for methane, carbon dioxide, oxygen, hydrogen sulphide and carbon monoxide, with measurements of barometric pressure and flow rates also noted. The full results of the gas monitoring are included in the Soil Mechanics report presented in Appendix C.

Four monitoring visits have been undertaken, the results of which indicate:

- methane concentrations of up to 1.2% v/v;
- carbon dioxide concentrations of up to 1.4% v/v;
- oxygen concentrations of between 17% v/v and 21% v/v; and
- gas flow measurements were recorded up to 0.3l/hr.

To generate a worst case GSV for the site, it is assumed that the flow rate is 0.3l/hr and the maximum methane and carbon dioxide concentration is used in the calculation. The GSV for methane is calculated to be 0.0036. The GSV for carbon dioxide is calculated to 0.0042.

In general accordance with BS 8485:2015 and based in the calculated GSVs, the site may be classified as Characteristic Situation 1 (CS1). However, BS 8485:2015

suggests that consideration should be given to upgrading to Characteristic Situation 2 (CS2) if the methane concentration exceeds 1%.

Should the Characteristic Situation be raised to CS2 then gas protection measures with at minimum gas protection score of 1.5 points would be required.

A cast in situ monolithic reinforced slab with minimum penetrations, such as is proposed for the Phase 2 structures, would provide the necessary 1.5 gas protection points.

The proposed development is designed to accept and process methane producing waste. In order to be compliant with Dangerous Substances and Explosive Atmospheres Regulations (DESEAR), the proposed scheme will have to be designed with appropriate gas control measures to mitigate the risks from methane, carbon dioxide and depleted oxygen.

Based on the low gas concentrations, the low flow rates, the CS1 GSV, the proposed floor construction and the intrinsic gas control measures that will be included within the development, we consider that the risk to future users of the proposed Phase 2 development from ground gas is very low.

7. PHASE 2 GEO-ENVIRONMENTAL ASSESSMENT CONCLUSIONS

7.1 GEO-ENVIRONMENTAL RISKS TO THE PROPOSED DEVELOPMENT

Table 11 below provides a summary of the findings of the generic risk assessment set out in Chapter 6.

Table 11: Risk Assessment Potential Pollution Linkage Summary

Receptor Group	Pollution Source
Human Health	Polycyclic Aromatic Hydrocarbons (PAH) within the Made Ground on the site may pose a risk to human health. Further sampling and analysis is recommended. Hydrocarbon concentrations within the Made Ground on the site may pose a risk to potable water supplies. No other potentially pervasive risks to human health have been identified.
Controlled Waters	Five chemicals of potential concern are recorded to exceed the preliminary assessment criteria. In combination with the site setting and the development proposals, the result indicate that the risk to Controlled Waters from the site is Low. Further sampling and analysis is recommended.

7.2 HEALTH AND SAFETY OF CONSTRUCTION WORKERS

Construction workers are more likely than end-users to come into direct contact with contaminants in the ground due to the nature of their work. Any associated exposure would be more likely to be acute than chronic.

In consequence, a Contractor engaged in groundworks at the site must be aware of the sample contaminant concentrations which have been recorded within the ground investigation, to inform their method statements and risk assessments. Appropriate PPE, good hygiene practices and dedicated welfare facilities should be adopted. In particular, a no 'hand to mouth contact' regime should be promoted and enforced to reduce the accidental ingestion of soils. Dust masks should also be worn whenever excavation work generates any airborne dust.

7.3 UPDATED CONCEPTUAL SITE MODEL

In the Phase 1 assessment, a preliminary CSM was developed which summarised the potential pollution linkages identified by the desk based review.

The CSM has been updated in Table 12 (overleaf) to reflect the findings of the ground investigation and the associated risk assessment set out within this report.

Table 12: Updated Conceptual Site Model

Source	Pathway	Receptor	Probability	Consequence	Risk Rating	Mitigation	Post Mitigation Risk Rating
PAH contaminants in the shallow soils at the site.	Ingestion of soil and/or dust. Dermal contact with soil and/or dust. Inhalation of dust.	Future site users.	Likely	Medium	Moderate	*Mitigation required:* Further sampling and analysis for PAHs is recommended. Further assessment required.	Not known
Ground gases in the Made Ground at the site.	Inhalation of ground gases.	Future site users.	Low	Medium	Low	*Mitigation required:* Cast in situ monolithic reinforced floor slab. Monitoring ventilation and gas control measures.	Very Low
Metals, PAH and petroleum hydrocarbon contaminants in the shallow soils at the site.	Dermal contact, ingestion and/or inhalation of dust and/or vapours.	Construction workers and neighbours of the site	Likely	Severe	High	*Mitigation required:* PPE, risk assessments and method statements	Low
Organic contaminants in the soil and groundwater on site	Direct contact with potable water supply pipe.s	Future users	Likely	Medium	Moderate	*Mitigation required:* Barrier pipe should be used for the potable water supply.	Very Low
Metals and petroleum hydrocarbon contaminants in the groundwater at the site.	Leaching and /or percolation to underlying strata.	Controlled waters	Likely	Medium	Moderate	*Mitigation required:* Further groundwater sampling and analysis is recommended. Further assessment required.	Not known
Potential radon on-site and migrating from off-site	Radon intrusion into proposed buildings and structures on site	Future users	Unlikely	Severe	Low	The site is not located within a radon affected area as less than 1% of homes are above the action level for radon. No mitigation is required.	NA

8. GEO-ENVIRONMENTAL ASSESSMENT RECOMMENDATIONS

Further to the collective site investigation findings to date, the following recommendations are made in relation to the continued progress of the development scheme:

1) Further soil sampling and analysis of the Made Ground for speciated PAHs is recommended.
2) Further groundwater sampling and analysis is recommended;
3) Further assessment is required to assess the findings of the additional soil and ground water sampling and analysis;
4) Protective water supply pipework (barrier pipe) is likely to be required; and
5) Appropriate implementation of construction phase health and safety measures by all contractors involved in excavations and groundworks.

9. UNCERTAINTIES AND LIMITATIONS

This report details the findings of site investigation work carried out by Soil Mechanics in 2008 and Quantum in 2013. The report has been prepared by Pell Frischmann on the basis of the above and other available third party information on the site conditions. Information provided by third parties has been used in good faith and is taken at face value; however, Pell Frischmann cannot guarantee its accuracy or completeness. Although every reasonable effort has been made to gather all relevant information, all potential environmental constraints or liabilities associated with the site may not have been revealed.

The report has been prepared for the exclusive benefit of Enviroparks (Wales) Ltd and those parties designated by them for the purpose of communicating geo-environmental assessment recommendations for the site. The report content should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

The work has been carried out in general accordance with recognised best practice as detailed in guidance documents such as the CLR 11 Model Procedures (Environment Agency 2004), BS5930:2015 and BS10175:2011. Important aspects of the risk assessment process are transparency and justification. The rationale behind the assessments can be provided upon request. Unless otherwise stated, no assessment has been made for the presence of radioactive substances or unexploded ordnance.

The risk assessment process outlines potential risks to groundworks and other redevelopment workers. However, detailed consideration of occupational health and safety issues is beyond the scope of this report.

Notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds such as Japanese knotweed, this report does not constitute a formal survey of these potential hazards.

APPENDIX A

PROPOSED DEVELOPMENT PLANS



ALL DIMENSIONS TO BE CHECKED ON SITE.
DO NOT SCALE THIS DRAWING.
ALL DISCREPANCIES TO BE REPORTED IMMEDIATELY.
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KEY:

1. VISITORS CENTRE (791sqm GEA)
2. EXISTING GATEHOUSE (103sqm GEA)
3. EXISTING FUEL PREPERATION AREA (5200sqm GEA)
4. HV SUBSTATION (220sqm GEA)
5. BIOMAX AREA (2742sqm GEA)
6. PROPOSED B2 HIGH ENERGY USE UNIT 10,240sqm (INC OFFICE CONTENT)
7. WATER TREATMENT PLANT
8. FUEL STORAGE HALL (2110sqm GEA)
9. TURBINE HALL (380sqm GEA)
10. GASIFICATION HALL (6270sqm GEA)

KEY

- RED LINE AREA = 12.4 acres / 50,010 sqm
- LAND WITHIN APPLICANTS CONTROL
- TOTAL SITE AREA = 21,1 acres / 85,511 sqm
- GRASS
- SHRUBS & HEDGES
- PROPOSED LANDSCAPE BUFFER TO BBNP
- GRASSCRETE
- EXISTING BUILDINGS
- ENVIROPARKS SIGN SET IN STONE GABION FILLED WITH LOCAL STONE
- GREEN WALL WITH LOCAL STONE GABION BASE
- EXISTING BUILDINGS
- PROPOSED BUILDINGS
- TARMAC ROAD SURFACE
- BRUSHED CONCRETE SURFACE
- LIGHT GREY BLOCK PAVING TO ROADS
- BLOCK PAVING TO PARKING
- BLOCK PAVING TO PEDESTRIAN AREAS
- GANGWAY
- CONCRETE PAVING SLABS
- CYCLE SHELTER (10 CYCLE SPACES)
- POST & RAIL FENCE
- 2.4m HIGH SECURITY FENCE
- INDICATIVE LOCATION OF NEW TREES
- GATE

IMPORTANT NOTES: ALL LANDSCAPING SHOWN INDICATIVE ONLY. REFER TO LATEST LANDSCAPE DRAWINGS.

LAYOUT OF SUDS PONDS SHOWN INDICATIVE ONLY. REFER TO DETAILED SUDS DESIGNER DRAWINGS.

No.	Revision Description	Date	By
P7	Additional notes added	24/02/17	DJS
P6	Various amendments following client meeting dated 09/02/17	22/02/17	DJS
P5	Site Areas updated	17/01/17	DJS
P4	Revision clouds removed for clarity	13/01/17	DJS
P3	Motocycle parking and path amended following client comments	12/01/17	DJS
P2	Various amendments following clients comments dated 04/01/17 & updated FBW site model dated 10/01/17	11/01/17	DJS
P1	Issue for Planning	19/12/16	MT

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PROJECT
Enviroparks - Hirwaun Ind. Est Gasification Hall

TITLE
Proposed Overall Site Plan

Drawn : MT Date : 08/12/16 Checked : MT

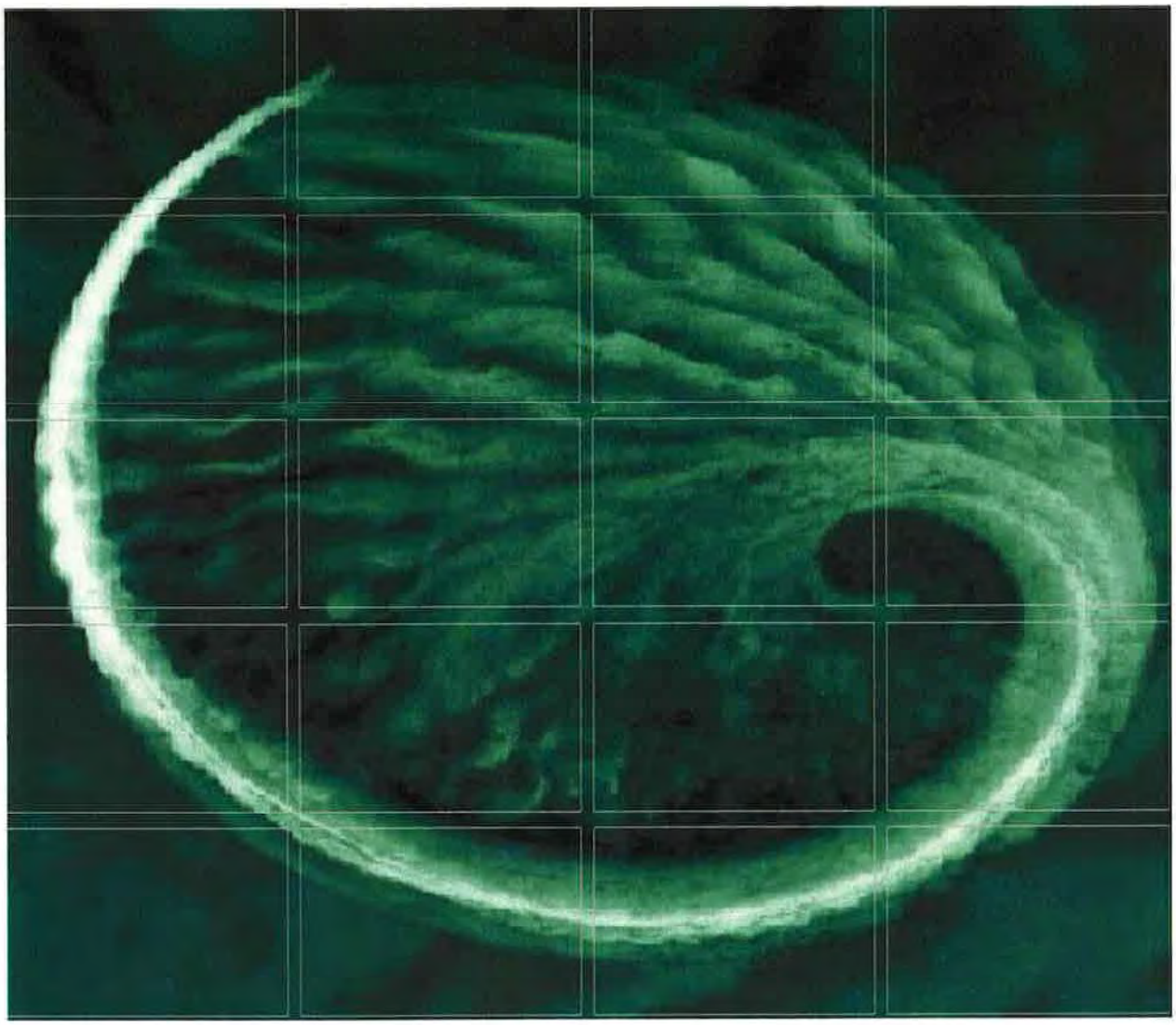
Scale : 1:500 Original sheet size : A0

DRAWING STATUS
- ■ Planning
- ☐ Tender
- ☐ Design Development Pre-Construction
- ☐ Construction
- ☐ Record

Drawing No ENV_EPT_GEN_DR_A_6011 Revision P7

APPENDIX B

ERM, PHASE 1 ENVIRONMENTAL DESK STUDY



Hirwaun Ecopark

Phase 1 Environmental Desk Study

Final Report

November 2007

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Delivering sustainable solutions in a more competitive world

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Hirwaun Ecopark: *Phase 1 Environmental Desk Study*

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resources devoted to it by agreement with the client.

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this report, or any part
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own risk.

Environmental Resources Management Limited
Incorporated in the United Kingdom with registration number 1014622
Registered Office: 8 Cavendish Square, London, W1G 0ER

EXCUTIVE SUMMARY

hase I Environmental Assessment of the proposed Ecopark un Industrial Estate, near Aberdare in South Wales.

cted to historical potentially contaminative land use:

tory during Second World War; and
the site was a former refuse tip.

- *ed material is unknown.*

ERM anticipates given the scale and time of the former operations that land contamination related issues will be minor and readily resolvable in the context of the proposed development.

Some limited site investigation, costing in the order of £20,000 should be undertaken to provide further information on the contaminant sources. If appropriately scoped this information could be used to support the Application Site Report for the Pollution Prevention and Control permit application.

It is additionally noted that the Brecon Beacons National Park Authority is in part responsible for determining planning applications for the site. Engagement of this stakeholder is required in order to progress the development.

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1 INTRODUCTION

1.1 BACKGROUND

Environmental Resources Management Limited (*ERM*) was commissioned by Marlborough Developments to undertake a Phase I environmental assessment of a development site at Hirwaun Industrial Estate.

ERM understands the Marlborough Developments require a study to be undertaken prior to the acquisition of the site from the Welsh Assembly Government as part of the plans to developing the site into an Ecopark.

1.2 METHODOLOGY

Public register information used in this report has been obtained via a bureau search carried out by Landmark Information Group[1]. Commercially available historic ordnance survey maps have been used to assess former land use at the site; they have allowed an interpretation of potential contamination to be made. Other relevant information has been reviewed where readily available[2,3].

1.3 STRUCTURE OF THE REPORT

The remainder of this report has been structured as follows:

- *Section 2* includes the desk study review based on previous reports and published sources.
- *Section 3* summarises the information on site operations and history obtained from the site visit.
- *Section 4* provides the preliminary risk assessment for the site.
- *Section 5* summarises the main findings of the study.

Supporting information is presented in the following annexes:

- *Annex A* – Envirocheck report

(1) [1] Enviroincheck Report – Hirwaun – 26th October 2007

(2) [2] 17 Acre Site, Hirwaun Industrial Estate. Interpretive Report on Ground Investigation. July 1995 (155102)

(3) [3] 17 Acre Site at The Hirwaun Industrial Estate. September 1995 (Ref:P329.01)

2 SITE DESCRIPTION AND HISTORICAL LANDUSE

2.1 SITE LOCATION AND SURROUNDING LAND USE

The site is located to North-West of Hirwaun and to the north of Fifth Avenue, on the edge of Hirwaun Industrial Estate, and has been prepared as a development platform. The approximate National Grid reference (NGR) for this site is 293880, 206790. The southern area of the site is down gradient of a 1:200 slope that was engineered to promote the drainage of the site. The location is shown in *Figure 2.1*.

The surrounding land uses are as follows:

- North – Penderyn Reservoir, with farm land beyond;
- East – Manufacturing Unit, with farm land beyond;
- South – A series of small industrial units, with the A465 beyond; and
- West – Farm land.

The site is situated in the unitary authority of Rhondda Cynon Taff County Borough Council (RCTCBC), while the northern part of the site lies within the Brecon Beacons National Park.

2.2 SITE LAYOUT

2.2.1 *Site Description*

The area of the site amounts to approximately 7.96 Hectares, and the topography is generally flat, and is waterlogged towards the southern end of the site. The site lies at an elevation of approximately 195 m AOD. There are currently no buildings present on the site. The site plan is shown in *Figure* 2.2.

2.3 SITE HISTORY

Historical land use at the site has been determined by reference to old Ordnance Survey maps provided as part of the Envirocheck report. Related sheets are contained within *Annex A*. Anecdotally the site was first developed as munitions factory during World War Two.

On-Site History

- the *Envirocheck* report dated 26th October 2007 shows that no structures are present at the site until 1951[1] when a number of buildings are located at the site and are likely to been associated with the site's previous use as an

(1) ¹ Not unusual for war time installations not to shown on maps until later maps.

Ordnance factory. These buildings are shown on maps dated 1951-1953, 1964, and 1968-1969;

- a refuse tip is identified in the North-west corner of the site on a map published in 1964;

  no buildings are present at the site on a map published in 1978, and site seems vacant; and

  the map published in 1999 shows herringbone drainage has been installed at the site.

In summary the site was used from the Second World War as a Ordnance factory, as refuse tip as indicated on the 1964 plan. The factory buildings were demolished by 1978. The site has not been used since but has been prepared as a development platform.

Off-site History

Outlined below are points of interest relating to the main historical land use changes:

- the *Envirocheck* report dated 26th October 2007 suggests before the map published in 1921 that the land uses surrounding the site are exclusively farming;

  the 1921 map shows the Penderyn Reservoir, located directly to the north of the site;

- a railway line was present to the south of the site in 1883 until the map in 1978 which shows that is was replaced by the A465 trunk road;

- prior to 1978 the road was found further to the south of the railway (approximately 700m) and is shown as the A465 in 1951;

- an Engine House was identified on the 1891 map, this was approximately 850m South-East of the site. By 1900 the Engine House site was occupied by a brick works, this was disused at the date of publication;

- the map published in 1900 shows an old Ironstone quarry located approximately 1km South-West of the site; and

- the map published in 1951 shows buildings located to the South of the site. Buildings have occupied this area until the present day in the form of the Hirwaun Industrial Estate.

In summary the land uses surrounding the site are many focused towards the South with railway line, roads, and industry present there from the late 19th Century. The land use to North, West and East is mostly farm land.

2.4 *POTENTIALLY CONTAMINATIVE LAND USE*

The following land uses could be potentially contaminating:

- ordnance factory;
- refuse tip (on part of the site); and
- imported fill materials.

3 ENVIRONMENTAL SETTING

3.1 GEOLOGICAL AND HYDROLOGICAL SETTING

The information regarding the geology of the site has been obtained through site investigations undertaken at the site[1,2].

The ground at the site consists of Made Ground, Alluvium, Glacial Deposits, and Lower Coal Measures of Siltstone and Mudstone.

the investigations have shown that Made Ground was encountered to a maximum depth of 3.2 m bgl. The Made Ground consisted of *'very compact sandy clayey gravel and cobbles of sandstone with some stiff silty sandy gravely clay and is believed to be Reworked Sand and Gravels and Bouldar Clay'*. The Made Ground overlies Alluvial Deposits. These were encountered to a depth of 6.1 m bgl.

•

- glacial boulder clay was encountered in two of the Trial Pits on the southern boundary of the site. The glacial deposits consisted of *'stiff grey silty sandy clay with some gravel and cobbles of sandstone'*.

- the glacial deposits overlie Sand and Gravels, which were observed at a maximum depth of 10 m bgl. The Sand and Gravels were described as *'brown very sandy angular to sub-rounded fine to coarse gravels of mudstone and sandstone'*.

- bedrock was encountered in four boreholes at a minimum depth of 6.5 m bgl. The bedrock was described as being fine grey Sandstone and Mudstone; this is likely to be part of the Lower Coal Measures.

3.1.1 *Hydrogeology*

The Lower Coal Measures are classified as a minor aquifer. Although given the identified superficial geology the Alluvium and Glacial Till are likely to provide a degree of protection. Additionally the Sand and Gravel unit is potentially water bearing.

(2) [1] 17 Acre Site at The Hirwaun Industrial Estate September 1995 (Ref:P329.01)

(3) [2] 17 Acre Site, Hirwaun Industrial Estate. Interpretive Report on Ground investigation. July 1995 (155102)

3.1.2 *Other Geological Related Information*

According to the *Envirocheck* no radon protection measures are required in the construction of new dwellings in this area.

A study has identified two mining subsidence zones to the North of Rhingos road. These zones appear to be outside the area that would influence the site and as such the risk of subsidence resulting from underground mine workings is low. This is substantiated by a Mining Subsidence Report prepared by the Mineral Valuer (Wales) in Appendix A in report reference P329.01 by *Thomas, Morgan and & Associates.*

3.1.3 *Surface Water Resources*

The Herringbone drainage on the site drains towards to the South-Western corner of the site. The Penderyn Reservoir is the nearest off-site surface water feature and is found within 100 m of the northern boundary of the site. There are three fluvial features within 1km of the site. The Camnant that has a River Quality C status; The Sychryd that has a River Quality B status; and The Gwrangon that has a River Quality A status.

There is an unnamed stream that flows along the western boundary of the site, into which the outfall for the drainage system flows. This stream connects to the Camnant approximately 50m to the South-west of the site, the Camnant joins with the River Sychryd approximately 500m to the west of the site (NGR 292700, 206900). The Sychryd flows into the River Neath (NGR 291100, 297900) and ultimately into the Bristol Channel (NGR 272600, 193300).

According to the *Envirocheck* report there is no licensed surface water abstractions registered within a 1km radius of the site.

The site is not shown to be in an area at risk of flooding on the *Environment Agency's* Flood Risk map, though it is understood that the site is poorly drained.

3.2 *Site Environmental Sensitivity*

The variable permeability and unknown thickness of the glacial deposits of sandy clay at the may provide some protection to the minor aquifer of the Lower Coal Measures. *ERM* therefore considers groundwater vulnerability to be low.

There are no licensed abstractions within 1km of the site. *ERM* therefore considers groundwater sensitivity (the potential significance of any impact) to be low.

The herringbone surface drainage collects into a storage lagoon in the South-west corner of the site. The storage lagoon seems to have a connection to a

stream to the west of the site. *ERM* considers the surface water vulnerability to be moderate.

The *Envirocheck* report identified environmentally sensitive areas within 1km of the site. There are three Sites of Special Scientific Interest (SSSI) the Cores Bryn-Y-Gaer lies 114 m East of the site and the Woodland Park and Pontpren which lies 868 m East of the site. There are also three Special Areas of Conservation (SAC) associated with Blaen Cynon the closest of these are 114 m East of the site.

4 OUTLINE OF CONCEPTUAL SITE MODEL

4.1 REGULATORY FRAMEWORK

Within the UK, potential liabilities associated with contaminated land and the need for remediation are evaluated under a risk-based framework, which is provided for by Part IIA of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2000. Key elements of the regime are as follows:

the 'polluter should pay'. A strict hierarchy of liability is established;

the land should be 'suitable for use'. Land restoration should be to a standard suitable for its intended us;

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

a). significant harm is being caused or there is significant possibility of such harm being caused; or

b). pollution of controlled water is being or is likely to be caused.'

Every local authority is under a duty to inspect its area to identify contaminated land.

For contaminated land, risk is the product of a pollutant linkage between a source, an exposure pathway and a receptor.

Where a site is subject to redevelopment, the *Town & Country Planning Act 1990* normally requires planning permission to be granted. Contamination of land, or the possibility of it, is a material planning consideration, and a developer may need to undertake work to establish the extent and nature of contamination, and define appropriate remediation works. The planning authority should require sufficient assessment in advance of grant of planning permission to ensure that it is feasible to use the site in the manner proposed. More detailed assessment, and the remediation work itself, may be controlled through conditions attached to the permission, or by separate legal agreements.

4.2 *Potential Sources of Impact on Soil and Groundwater*

The Made Ground at the site is thought to be reworked natural material created during the construction of the Ordnance factory that was located at the site. The refuse tip identified in the 1964 map could be a possible source of contamination as the contents of this tip are unknown and no trial pits have been excavated in this vicinity. There is a possibility that local contamination could have occurred during the site's operational history from structures such as storage tanks. Any source of contamination is historic in origin and as such is unlikely to present an on going source of contamination to future developments. Details from the logs for the trial pits and boreholes show no visual evidence of contamination. Four samples were taken for chemical analysis during the investigation. Two of these samples showed levels above ICRCL guideline values for the domestic threshold. No detailed information is available for the samples.

4.3 *Potential pathways and Receptors*

If contamination of the Made Ground has historically occurred then there is a small risk of the contamination migrating into the groundwater within the alluvial deposits. The re-profiling of the site to level out the site to a flat surface may have mobilised potential contamination via groundwater and vapour pathways.

Possible receptors for the potential contamination are:

site visitors; and

- the stream that flows to the West of the site.

4.4 *Potential Source Receptor Linkages*

The potential contamination could travel to the stream to the West of the site *(identified in chapter 3.1.3)* via groundwater through the herringbone drainage system, which out falls into the stream. The system was installed at the site during the re-profiling of the site.

Site users could be exposed to the potential contamination emanating from the ground via volatilisation and if the contamination is present at the surface there would be a risk of ingestion through direct contact with the material and wind borne particles.

A Conceptual Site Model (CSM) of the site is shown in *Figure 4.4.*

Table 4.1 ***Pollutant Linkages***

tor cable to es	Pathways	Risk Issues
	Ingestion/ inhalation/ dermal contact	Site investigation required to clarify potential pollutant linkage

5 GEOTECHNICAL ASSESSMENT

The geotechnical assessment of the site has given rise to options for foundations; these would vary depending on the size, load and sensitivity to movement of the structure to be constructed. The report by *Thomas, Morgan & Associates* (155102 July 1995) set out the following options.

1. small lightly loaded structures may be constructed on shallow rafts in certain areas of the site, particularly towards the centre of the site where there appears to be less or no alluvium. This would probably not be possible to the South of the site where there is between 1.00 m and 2.00 m of alluvium below the Made Ground;

2. trench fill to the underlying sand and gravel strata may be possible in some parts of the site. Structure loadings and variability of thickness of the fill would be a significant factor for positioning of structures built on this type of foundation. Assuming the underlying sands and gravels to be medium dense then an allowable bearing capacity in the order of 300 kN/m^2 could be attained provided the excavations were kept dry. However, due to the risk of high water table it is suggested that a value of 150 kN/m^2 is employed for design purposes;

3. ground bearing floor slabs where employed would need to be designed for an allowable bearing capacity in the order of 15 kN/m^2. Any soft spots should be removed proof rolled and replaced by a suitable granular infill;

4. piles could be driven into the sand and gravel or alternately bedrock for larger structures with higher loads. There may be problems using continuous flight auger (CFA) plies due to the possibility of 'necking' in the soft zones of alluvium. The potential viability of piles should be confirmed with a specialist contractor once more information concerning the nature of the structure is known;

5. vibrocompaction of the surface layers is potentially viable, and would be particularly useful for reducing the possibility of damage to concrete floor slabs. Again details should be confirmed with specialist contractors; and

6. Vibrated Concrete Columns (VCC) may be suitable at the site and advice should be gained from specialist contractor as to their viability at this particular site.

The report stated that a clay sample collected from Made Ground in Borehole 5 indicated a coefficient of volume compressibility (m_v) of 0.03 m^2/MN, corresponding to clay of very low compressibility.

The dynamic probe holes carried out generally showed high values of penetration resistance consistent with the very compact Made Ground

encountered in the trial pits. However, DP4A and TP1 showed a soft area between 2.00 m and 3.00 m which may indicate a pocket of peat or very soft clay. It is suggested that structures are not placed at the location without use of piled foundations.

Dry density testing on the more granular Made Ground showed that at moisture contents of approximately 11% produced a dry density in the order of 2.0 Mg/m^3. At moisture content of 15% the dry density was 1.8 Mg/m^3, this shows that the material is particularly sensitive to wetting.

The report suggested there may me a requirement for an increased class of concrete due to the low pH result of 4.5 for the samples at 2.0 m in Borehole 1. The sulphate results are generally 0.02% to 0.05% except for the sample at 3.0 m in Borehole 3 where a soluble sulphate value of 1.7g/l was recorded.

6 CONCLUSIONS

The desk study has revealed that the site was formally used as an Ordnance factory during the Second World War. The factory buildings present on plans until 1971. After this time the factory was demolished and the land has been left vacant. In the mid 1990s the Welsh Development Agency (WDA) re-profiled the site in preparation of a development plateau.

The site's former use poses a small risk of contamination having occurred at the site historically. The Made Ground at the site is thought to be re-worked natural material and so does not pose a risk the environment in itself. However, there is a low risk that local contamination of the Made Ground could have occurred during the factory's history. Potential receptors for the contamination would be the stream to the West of the site, in to which the drainage system at the site outfalls, and site users to inhale or ingest the contamination via volatilisation of the contaminants or contaminants becoming air borne.

The proposed end use for the site would result in the site being mostly covered in hard standing and so removing one of the pathways for the contamination. This would still leave a pathway via the ground waters draining from the site in to the stream.

Site investigation in 1995 has confirmed the underlying geology at the site as being Made Ground overlying alluvial deposits, glacial deposits, and Lower Coal Measures, which are found at approximately 10 m bgl.

Limited chemical sampling was undertaken during the 1995 site investigation by *Thomas, Morgan & Associates*, and no detailed results are available for these samples.

The current site conditions suggest that the drainage system requires attention as the site is waterlogged at the southern end of the site.

The geotechnical assessment showed that there are foundation options available but there preferred option would depend on the final design of the development.

The National Park Boundary dissects the site and accordingly any future development will be subject, in part, to the planning requirements of the Brecon Beacons National Park Authority (BBNPA).

6.1 RECOMMENDATIONS

Although *ERM* anticipate the risk of land contamination as being low *ERM* recommends the following:

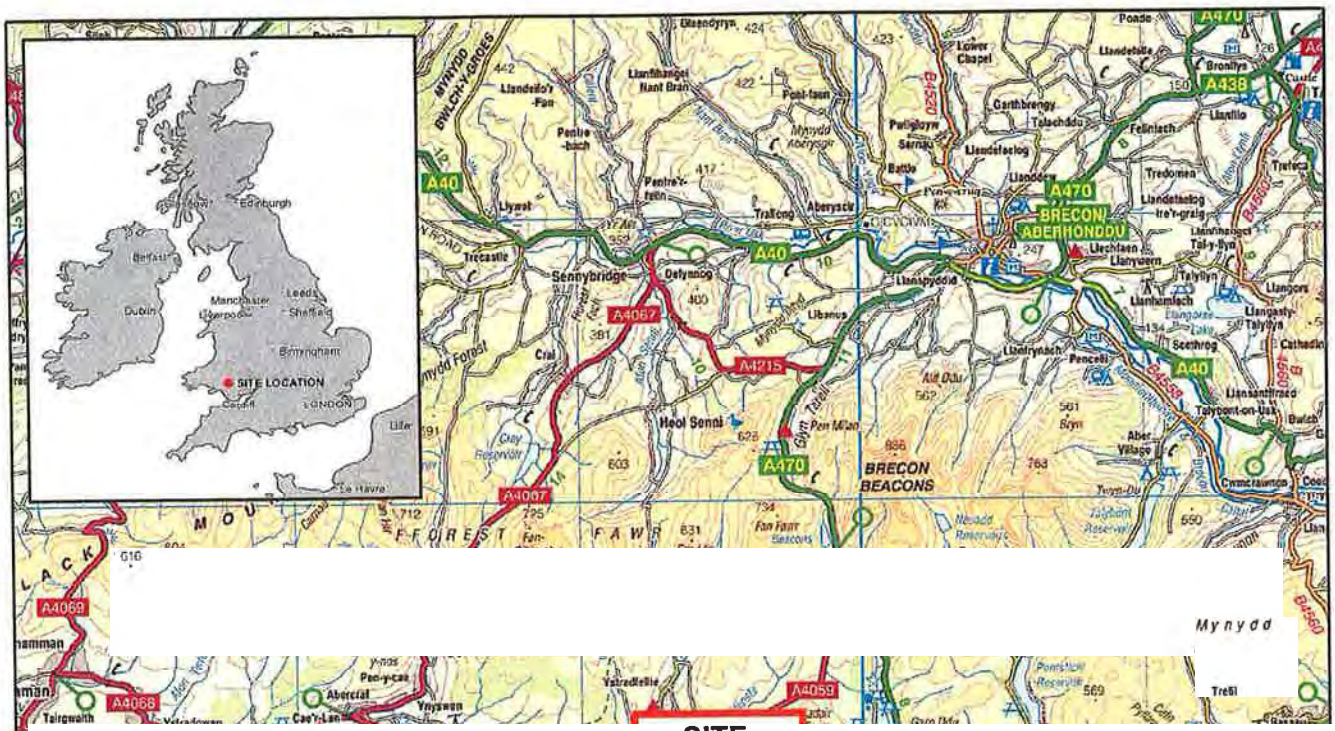
1. refinement of the outline Conceptual Site Model to obtain information to provide to Local Planning Authority (LPA) in anticipation of planning conditions relating to ground conditions. Note if appropriately scoped, site investigation data could support the Application Site Report (ASP) required for the Pollution Prevention Control (PPC) permit application; and

2. discussion to be held with LPA (Rhondda Cynon Taff County Council and Brecon Beacons National Park Authority) and Environment Agency to define site investigation.

We anticipate that the following work would be acceptable:

- excavation of twenty trial pits around site;
- installation of ground water monitoring wells at five locations;
- chemical analysis for a range of parameter consistent with former land use; and
- reporting a risk assessment in line with EA Model Procedure Document.

The cost of the undertaking of the above mentioned work would cost in the region of £15-20,000.



SITE LOCATION

CLIENT: Marlborough Developments Ltd

SIZE: A4

TITLE: Figure 2.1 Site Location Hirwaun Ecopark

ERM

DATE: 12/11/2007 CHECKED: PN PROJECT: 0067887

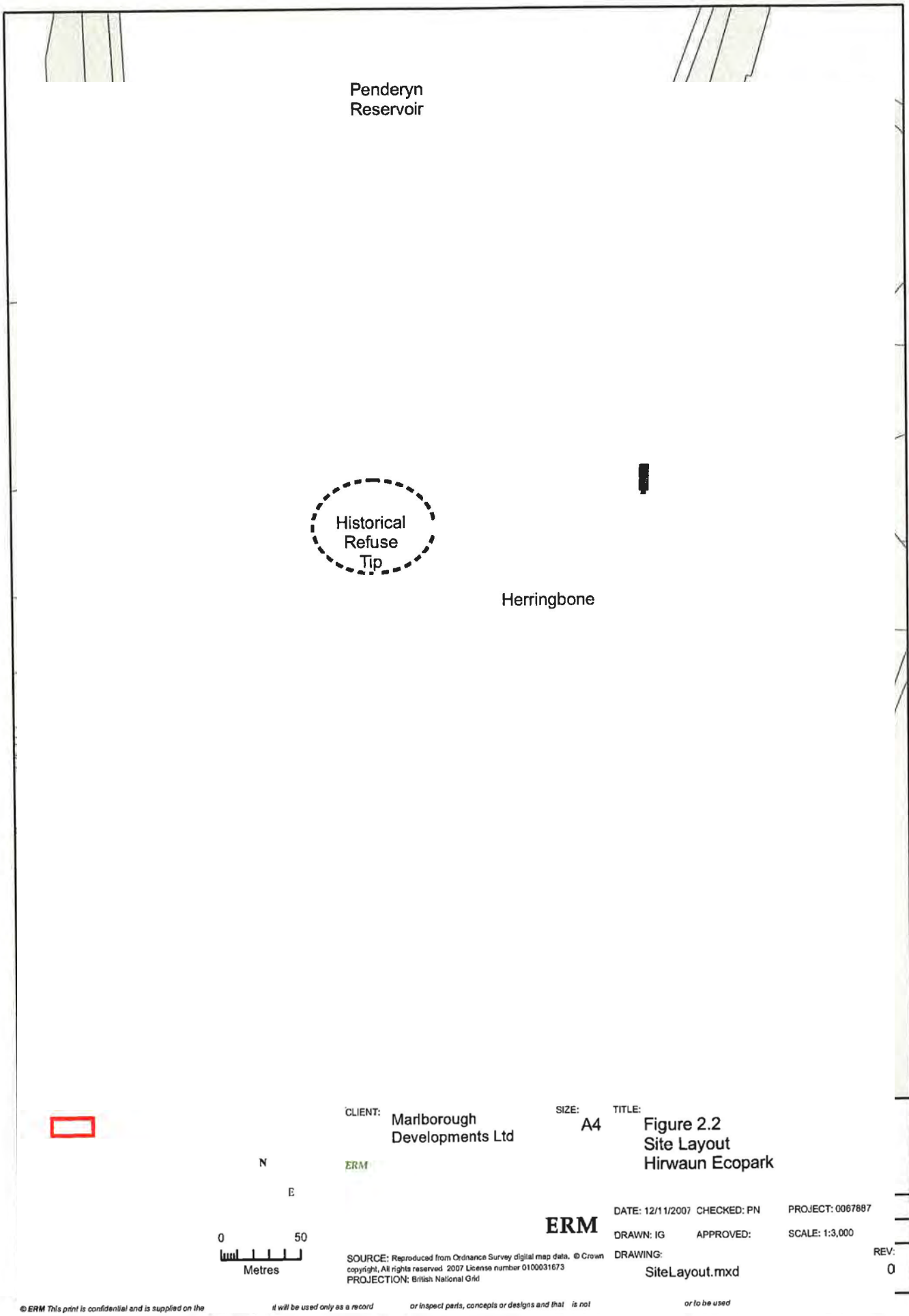
DRAWN: IG APPROVED: SCALE: 1:250,000

DRAWING: HirwaunSiteLocation.mxd REV: 0

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PROJECTION: British National Grid

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CLIENT: Marlborough Developments Ltd

SIZE: A4

TITLE: Figure 2.2
Site Layout
Hirwaun Ecopark

ERM

DATE: 12/11/2007 CHECKED: PN PROJECT: 0067887

DRAWN: IG APPROVED: SCALE: 1:3,000

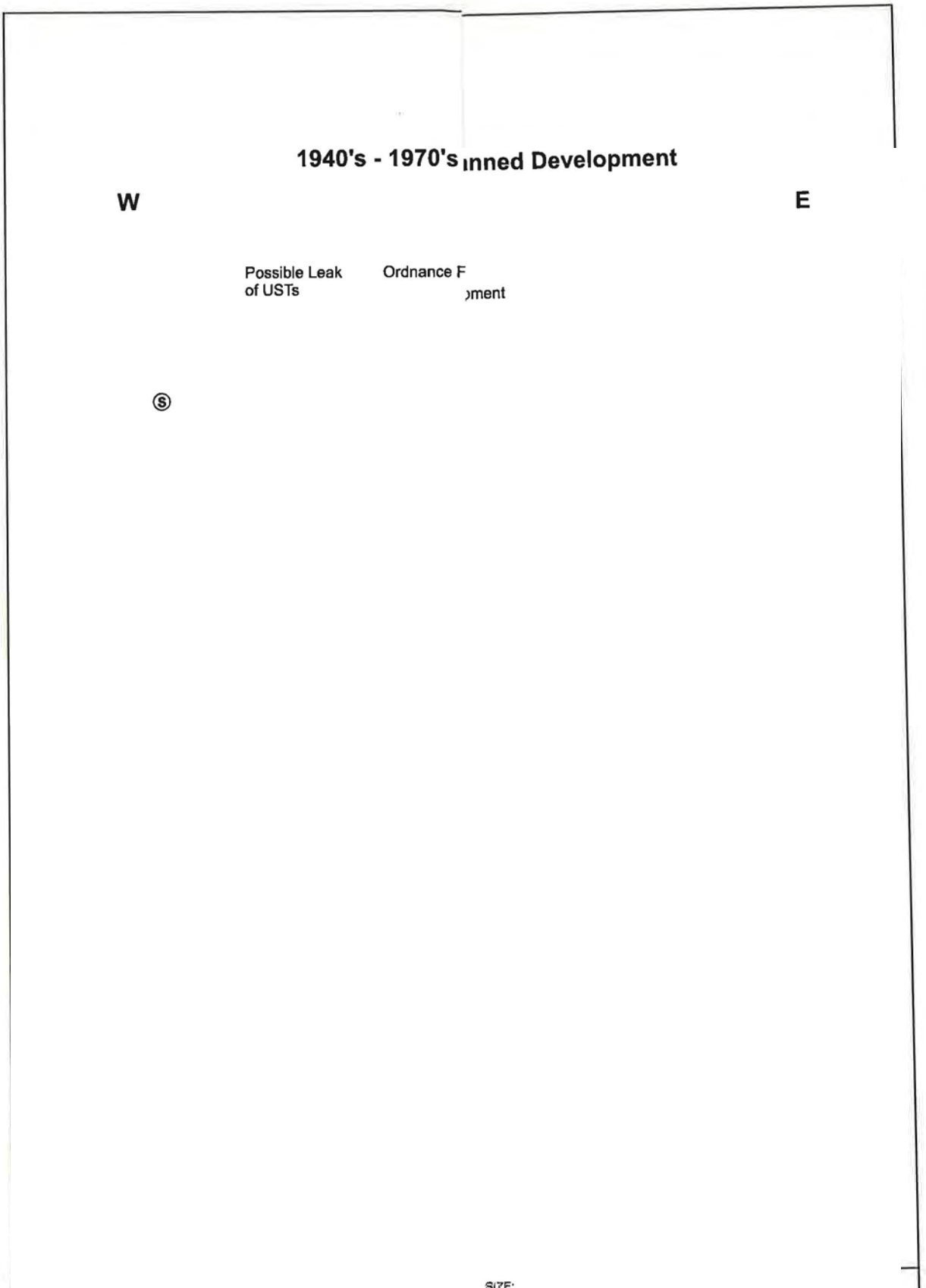
DRAWING: SiteLayout.mxd

REV: 0

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PROJECTION: British National Grid

File: 0067887 Hirwaun\05_GIS\MAPS\SiteLayout.mxd

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SIZE:
A3 Figure 3.4: Conceptual Site Model

RM DATE: 12.1107 CHECKED: PN PROJECT: 0067887
DRAWN: MTC APPROVED: SCALE: Not to Scale
REV:
0067887 1 - 12.11.07 0

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Annex A

Envirocheck Report

ERM

Envirocheck® Report: Datasheet

Order Details:

Order Number:
23315733_1_1

Customer Reference:
0067887.03.01

National Grid Reference:
293880, 206790

Slice:
A

Site Area (Ha):
7.96

Search Buffer (m):
1000

Site Details:

Site at
Hirwaun
Rhondda,Cynon,Taff

Client Details:

Ms F Coffman
ERM
Eaton House
Wallbrook Court
North Hinksley Lane
Oxford
OX2 0QS

ERM

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Industrial Land Use	17
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Data Suppliers	27
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Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scotti orporates data from Natural England (and the Scottish and Welsh equivalents) and Loca required by environmental and geotechnical consultants. It does not include any inform produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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the original DEFRA national cavity databases. PBA/DEFRA efforts are made to check that the information contained in e or error free. The information is based upon our own researches ing augmented and updated by PBA. In no event shall PBA/DEFRA ndirect or consequential loss or damage arising from the use of this data.

Report Version v28.2

Data Type	)00m)00m)
	)
	1

ERM

Summary

		On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS Recorded Mineral Sites					
BGS 1:625,000 Solid Geology	pg 15	Yes	n/a	n/a	n/a
Brine Compensation Areas			n/a	n/a	n/a
Coal Mining Affected Areas	pg 15	Yes	n/a	n/a	n/a
Mining Instability	pg 15	Yes	n/a	n/a	n/a
Natural and Mining Cavities					
Potential for Collapsible Ground Stability Hazards				n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 15	Yes	Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards		Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 15	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 15	Yes		n/a	n/a
Radon Affected Areas				n/a	n/a
Radon Protection Measures				n/a	n/a
Shallow Mining Hazards	pg 16	Yes			n/a
Industrial Land					
Contemporary Trade Directory Entries	pg 17		8	6	37
Fuel Station Entries					

Sensitive Land Use

	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
					2
[illegible]			1		2
Special Protection Areas					

	Details			Contact	
				1	293680 206740
1					293680 206740
	Property Type: Company Location: Hirwaun, Rhondda Cynon Taff, Wales	(W)			
	Authority: Environment Agency, Welsh Region Catchment Area: Not Supplied Reference: BA1002401 Permit Version: 1 Effective Date: 18th December 1963 Issued Date: 18th December 1963 Revocation Date: 28th March 2003 Discharge Type: Sewage Discharges - Final/Treated Effluent - Water Company Discharge Environment: Not Supplied Receiving Water: River Camnant **Status: New Consent, by Application (Water Resources Act 1991, Section 88)** Positional Accuracy: Located by supplier to within 100m				
	Discharge Consents				
2	Operator: Dwr Cymru Cyfyngedig Property Type: Sewage Disposal Works - Water Company Location: Hirwaun Wtw Authority: Environment Agency, Welsh Region Catchment Area: Not Supplied Reference: Af3013601 Permit Version: 1 Effective Date: 14th May 1969 Issued Date: 14th May 1969 Revocation Date: 22nd January 2001 Discharge Type: Unspecified Discharge Environment: Not Supplied Receiving Water: Cynon **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A13SW (W)	145	1	293568 206759
	Discharge Consents				
3	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Hirwaun Stw Storm Tanks Hirwaun, Storm Tanks, Hirwaun Stw, Hirwaun, Rhondda Cynon Taff Authority: Environment Agency, Welsh Region Catchment Area: Not Supplied Reference: Bp0304701 Permit Version: 1 Effective Date: 28th March 2003 Issued Date: 28th March 2003 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: The Afon Camnant **Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A12SE (W)	204	1	293507 206720

Map ID			Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Discharge Consents					
4	Operator:	British Coal Opencast	A8SW (S)	689	1	293670 205990
	Property Type:	Coal Extraction, Surface				
	Location:	Ffyndaff Site Outlet D1				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Neath				
	Reference:	Bm0001606				
	Permit Version:	2				
	Effective Date:	14th March 1994				
	Issued Date:	14th March 1994				
	Revocation Date:	7th July 1997				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Nant-Yr-Ochain				
	Status:	**Consent expired**				
	Positional Accuracy:	Located by supplier to within 100m				
	Discharge Consents					
4	Operator:	British Coal Opencast	A8SW (S)	689	1	293670 205990
	Property Type:	Coal Extraction, Surface				
	Location:	Ffyndaff Site Outlet D1				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Neath				
	Reference:	Bm0001606				
	Permit Version:	1				
	Effective Date:	26th September 1979				
	Issued Date:	26th September 1979				
	Revocation Date:	13th March 1994				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Nant-Yr-Ochain				
	Status:	**Authorisation revoked|Revoked**				
	Positional Accuracy:	Located by supplier to within 10m				
	Discharge Consents					
4	Operator:		A8SW (S)	698	1	293670 205980
	Property Type:					
	Location:					
	Authority:	Ish Region				
	Catchment Area:					
	Reference:	Bm0001603				
	Permit Version:	1				
	Effective Date:	26th September 1979				
	Issued Date:	26th September 1979				
	Revocation Date:	18th November 1992				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Nant Yr Ochain(Camnant)Trib Of				
	Status:	**Consent expired**				
	Positional Accuracy:	Located by supplier to within 10m				
	Discharge Consents					
4	Operator:		A8SW (S)	707	1	293670 205970
	Property Type:					
	Location:					
	Authority:	Ish Region				
	Catchment Area:					
	Reference:	Bm0001604				
	Permit Version:	1				
	Effective Date:	26th September 1979				
	Issued Date:	26th September 1979				
	Revocation Date:	13th March 1994				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Nant Yr Ochain				
	Status:	**Authorisation revoked|Revoked**				
	Positional Accuracy:	Located by supplier to within 10m				

			(Compass Direction)	From Site	Contact	NGR
	Discharge Consents					
5	Operator:	Dwr Cymru Cyfyngedig	A23SW (N)	841	1	293800 207800
	Property Type:	Water Supply Grid				
	Location:	Hirwaun Hirwaun Water Reservoir.				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Neath				
	Reference:	BM0041601				
	Permit Version:	1				
	Effective Date:	30th November 1984				
	Issued Date:	30th November 1984				
	Revocation Date:	Not Supplied				
	Discharge Type:	Unspecified				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Unnamed Trib Of River Camnant				
	Status:	**New Consent, by Application (Water Resources Act 1991, Section 88)**				
	Positional Accuracy:	Located by supplier to within 100m				
	Discharge Consents					
6	Operator:	Togo Organics Ltd	A3NE (S)	848	1	294100 205770
	Property Type:	Undefined Or Other				
	Location:	Hirwaun - Togo Organics				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Taff				
	Reference:	Ag0008801				
	Permit Version:	1				
	Effective Date:	15th February 1982				
	Issued Date:	15th February 1982				
	Revocation Date:	26th July 1985				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Nant Y Bwich				
	Status:	**Consent expired**				
	Positional Accuracy:	Located by supplier to within 10m				
	Discharge Consents					
7	Operator:	Eftec Ltd	A4NW (S)	935	1	294200 205700
	Property Type:	Basic Industry, Chemicals Organic				
	Location:	Rhigos Aberdare				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Taff				
	Reference:	AN0034701				
	Permit Version:	1				
	Effective Date:	20th August 1987				
	Issued Date:	20th August 1987				
	Revocation Date:	10th March 2000				
	Discharge Type:	Trade Effluent				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Cynon Tributary				
	Status:	**New Consent, by Application (Water Resources Act 1991, Section 88)**				
	Positional Accuracy:	Located by supplier to within 100m				
	Discharge Consents					
7	Operator:	Eftec Ltd	A4NW (S)	935	1	294200 205700
	Property Type:	Industrial Parks & Estates				
	Location:	Eftec Ltd Rhigos Hirwaun Aberdare, Rhigos, Hirwaun Aberdare, Cl44 9ue				
	Authority:	Environment Agency, Welsh Region				
	Catchment Area:	River Taff				
	Reference:	An0034701				
	Permit Version:	2				
	Effective Date:	11th March 2000				
	Issued Date:	20th August 1987				
	Revocation Date:	Not Supplied				
	Discharge Type:	Trade Discharges - Site Drainage				
	Discharge Environment:	Not Supplied				
	Receiving Water:	Trib Of River Cynon				
	Status:	**Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)**				
	Positional Accuracy:	Located by supplier to within 100m				

Details	Estimated Distance From Site	Contact	NGR
		2	294050 206534
		2	293823 206618
			294068 206802
		2	293669 206222
		2	293033 206581
		2	293198 206220

Dated:
Process Type: Local Authority Pollution Prevention and Control
Description: nd
Status: su tor|Surrendered
Positional Accuracy: he

				Contact	NGR
					8 9
					8 4
					0 0
					5 4
17	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity: Positional Accuracy:	Not Given Hirwaun Industrial Estate, Sewage Works Environment Agency, Welsh Region Coal Solids Not Supplied 30th November 1994 21882 Not Given Not Given Unknown Category 2 - Significant Incident Located by supplier to within 100m	(W)	1	0 206800
	Pollution Incidents to Controlled Waters				
17	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity: Positional Accuracy:	Not Given Hirwaun Sewage Treatment Works, HIRWAUN Environment Agency, Welsh Region Sewage - Septic Tank Effluent Weather 29th January 1992 2867 Not Given Not Given Runoff Category 2 - Significant Incident Located by supplier to within 100m	A13NW (W)	16	1	293700 206795
	Pollution Incidents to Controlled Waters				
18	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity: Positional Accuracy:	Not Given Surface Water To River Camnant Environment Agency, Welsh Region Miscellaneous - Fire water / Foam Accidental Spillage/Leakage 19th January 1996 27325 Not Given Not Given Runoff Category 3 - Minor Incident Located by supplier to within 100m	A13SE (S)	39	1	293900 206600

				Estimated Distance From Site	Contact	
	Pollution Incidents to Controlled Waters					
18	Property Type:	Not Given	A13SE (S)	44	1	293900 206595
	Location:	Section Of A465 Northbound, Near Hirwaun Industrial Estate				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Filter Backwash Water				
	Note:	River Neath; Spillage				
	Incident Date:	6th October 1997				
	Incident Reference:	33865				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Accidental Spillage/Leakage				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
19	Property Type:	Not Given	A13SW (W)	51	1	293660 206730
	Location:	Hirwaun Sewage Treatment Works				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Unknown				
	Note:	River Camnant				
	Incident Date:	7th April 1998				
	Incident Reference:	35371				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Unknown				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
20	Property Type:	Not Given	A13NE (E)	93	1	294100 206800
	Location:	Opposite Sewage Treatment Works				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Oils - Diesel (Including Agricultural)				
	Note:	River Camnant; Direct Introduction				
	Incident Date:	22nd January 1998				
	Incident Reference:	34693				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Neglect				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
20	Property Type:	Not Given	A13NE (E)	93	1	294100 206795
	Location:	Hirwaun Industrial Estate, North Storm/W Outfall, HIRWAUN				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Oils - Diesel (Including Agricultural)				
	Note:	River Camnant; Direct Introduction				
	Incident Date:	22nd January 1998				
	Incident Reference:	34693				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Neglect				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
21	Property Type:	Process	A13SW (W)	115	1	293600 206700
	Location:	Hirwaun Sewage Treatment Works, HIRWAUN				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Unknown				
	Note:	Not Supplied				
	Incident Date:	22nd August 1991				
	Incident Reference:	1371				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Unknown				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
21	Property Type:	Not Given	A13SW (W)	117	1	293600 206695
	Location:	Hirwaun Industrial Estate				
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Farm Effluent/Slurry				
	Note:	Weather				
	Incident Date:	21st November 1996				
	Incident Reference:	30511				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Runoff				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				

			(Compass		Contact	NGR
22					1	
				214		293500 206695
				497		
	Location:	Dinas Rock, Footbridge Up Stream Of, Sychryd	(NE)			207400
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Crude Sewage				
	Note:	Weather				
	Incident Date:	15th July 1995				
	Incident Reference:	25197				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Runoff				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
24	Property Type:	Not Given	A9NW	516	1	294300
	Location:	Hirwaun Industrial Estate, Up Stream Of Units 40 To 46, HIRWAUN	(SE)			206200
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Crude Sewage				
	Note:	Not Supplied				
	Incident Date:	1st November 1994				
	Incident Reference:	21750				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Unknown				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
25	Property Type:	Industrial Premises	A12NW	623	1	293100
	Location:	Hirwaun Industrial Estate, HIRWAUN	(W)			206900
	Authority:	Environment Agency, Welsh Region				
	Pollutant:	Farm Effluent/Slurry				
	Note:	Not Supplied				
	Incident Date:	10th April 1992				
	Incident Reference:	4293				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Unknown				
	Incident Severity:	Category 2 - Significant Incident				
	Positional Accuracy:	Located by supplier to within 100m				

26				1	
		Not Given			293805
		HIRWAUN			205995
	Authority:	Environment Agency, Welsh Region			
	Pollutant:	Mud/Clay/Soil			
		River Sychryd (Tributary Of River Neath); Run-Off			
		30th August 1997			
		33392			
		Not Given			
		Not Given			
		Weather			
		Category 3 - Minor Incident			
		Located by supplier to within 100m			
26			638		
	Note:				
	Incident Date:				
	Incident Reference:				
	Catchment Area:				
	Receiving Water:				
	Cause of Incident:				
	Incident Severity:				
	Positional Accuracy:				
			653	1	293100
					206500
28			667		
			730		
	Location:	Flyndaff Opencast Coal Site	(S)		205900
	Authority:	Environment Agency, Welsh Region			
	Pollutant:	Mud/Clay/Soil			
	Note:	Camnant-Tributary Of Sychryd; Effluent Quality			
	Incident Date:	11th November 1997			
	Incident Reference:	34086			
	Catchment Area:	Not Given			
	Receiving Water:	Not Given			
	Cause of Incident:	Inadequate Design/Capacity			
	Incident Severity:	Category 3 - Minor Incident			
	Positional Accuracy:	Located by supplier to within 100m			

		Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site		
			orm Sewer Old Mill	A7SE (SW)	753	1	293300 206100
				A8SE (S)	813	1	293900 205800
			Hirwaun waste illegally	A13SW (SW)	105	1	293790 206578
	Prosecution Act:	Epa90 S33(1)(B)					
	Hearing Date:	12th March 2007					
	Verdict:	Guilty					
	Fine:	1500					
	Costs:	0					
	Positional Accuracy:	Manually positioned within the geographical locality					
	Prosecutions Relating to Authorised Processes						
33	Location:	Unit 10 Hirwaun Industrial Estate, Merthyr Tydfil, Cf44		A8NE (S)	457	1	293944 206153
	Prosecution Text:	Storing and treating waste without a WML					
	Prosecution Act:	Epa90 S33(1)(B)					
	Hearing Date:	19th October 2005					
	Verdict:	Guilty					
	Fine:	20000					
	Costs:	2148					
	Positional Accuracy:	Manually positioned within the geographical locality					
	River Quality						
	Name:	Camnant		A18SW (N)	392	1	293841 207351
	GQA Grade:	River Quality C					
	Reach:	Conf.Gwrangon - Penderyn Res.					
	Estimated Distance (km):	1.5					
	Flow Rate:	Flow less than 0.31 cumecs					
	Flow Type:	River					
	Year:	2000					
	River Quality						
	Name:	Sychryd		A11NE (W)	990	1	292726 206832
	GQA Grade:	River Quality B					
	Reach:	Conf.Melite - Conf.Camnant/Gwrangon					
	Estimated Distance (km):	2.3					
	Flow Rate:	Flow less than 0.31 cumecs					
	Flow Type:	River					
	Year:	2000					
	River Quality						
	Name:	Gwrangon		A11NE (W)	990	1	292726 206832
	GQA Grade:	River Quality A					
	Reach:	Conf.Camnant - Conf.Canwylit					
	Estimated Distance (km):	3.6					
	Flow Rate:	Flow less than 0.31 cumecs					
	Flow Type:	River					
	Year:	2000					

	Details		Quadrant Reference	Estimated Distance		NGR
	River Quality Biology Sampling Points					
34	Name:	Camnant	A18SE (N)	443	1	293900 207400
	Reach:	Conf.R.Gwrangon - Penderyn Res.				
	Estimated Distance:	1.50				
	Positional Accuracy:	Located by supplier to within 100m				
	Year:	1990				
	GQA Grade:	Not Supplied				
	Year:	1995				
	GQA Grade:	River Quality Biology GQA Grade C - Fairly Good				
	Year:	2000				
	GQA Grade:	River Quality Biology GQA Grade C - Fairly Good				
	Year:	2002				
	GQA Grade:	River Quality Biology GQA Grade E - Poor				
	Year:	2003				
	GQA Grade:	River Quality Biology GQA Grade E - Poor				
	Year:	2004				
	GQA Grade:	River Quality Biology GQA Grade E - Poor				
	Year:	2005				
	GQA Grade:	River Quality Biology GQA Grade C - Fairly Good				
	River Quality Chemistry Sampling Points					
35	Name:	Camnant	A12NW (W)	655	1	293070 206920
	Reach:	Confluence River Gwrangon To Penderyn Reservoir				
	Estimated Distance:	1.50				
	Objective:	River Ecosystem Class 1: Very Good Quality				
	Positional Accuracy:	Located by supplier to within 10m				
	Year:	1990				
	GQA Grade:	Not Supplied				
	Compliance:	Not Supplied				
	Year:	1993				
	GQA Grade:	River Quality Chemistry GQA Grade E - Poor				
	Compliance:	Significant Failure				
	Year:	1994				
	GQA Grade:	River Quality Chemistry GQA Grade D - Fair				
	Compliance:	Significant Failure				
	Year:	1995				
	GQA Grade:	River Quality Chemistry GQA Grade B - Good				
	Compliance:	Significant Failure				
	Year:	1996				
	GQA Grade:	River Quality Chemistry GQA Grade B - Good				
	Compliance:	Marginal				
	Year:	1997				
	GQA Grade:	River Quality Chemistry GQA Grade B - Good				
	Compliance:	Significant Failure				
	Year:	1998				
	GQA Grade:	River Quality Chemistry GQA Grade C - Fairly Good				
	Compliance:	Significant Failure				
	Year:	1999				
	GQA Grade:	River Quality Chemistry GQA Grade C - Fairly Good				
	Compliance:	Significant Failure				
	Year:	2000				
	GQA Grade:	River Quality Chemistry GQA Grade C - Fairly Good				
	Compliance:	Significant Failure				
	Year:	2001				
	GQA Grade:	River Quality Chemistry GQA Grade D - Fair				
	Compliance:	Significant Failure				
	Year:	2002				
	GQA Grade:	River Quality Chemistry GQA Grade D - Fair				
	Compliance:	Significant Failure				
	Year:	2003				
	GQA Grade:	River Quality Chemistry GQA Grade D - Fair				
	Compliance:	Significant Failure				
	Year:	2004				
	GQA Grade:	River Quality Chemistry GQA Grade C - Fairly Good				
	Compliance:	Significant Failure				
	Year:	2005				
	GQA Grade:	River Quality Chemistry GQA Grade B - Good				
	Compliance:	Significant Failure				
	Substantiated Pollution Incident Register					
36	Authority:	Environment Agency - Welsh Region, South East Area	A13SE (SE)	104		294000 206507
	Incident Date:	29th November 2004				
	Incident Reference:	280145				
	Water Impact:	Category 3 - Minor Incident				
	Air Impact:	Category 2 - Significant Incident				
	Land Impact:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 10m				
	Pollutant:	Atmospheric Pollutants And Effects: Smoke				
	Pollutant:	General Biodegradable : Composted Material				
	Pollutant:	General Biodegradable Materials And Wastes: Food And Drink				
	Pollutant:	General Biodegradable : Other				
	Pollutant:	Inert : Construction / Demolition Material				

			Estimated Distance From Site	act	NGR
					295220 207750
Operator:	The Welsh Whiskey Company			1	295140
Licence Number:	21/57/23/0065	(NE)			208380
Permit Version:	1				
Location:	Borehole At The Welsh Whiskey Co. Site				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Breweries/Wine: General Use (High Loss)				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Groundwater				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	The Welsh Whiskey Co. At Gwalia				
Authorised Start:	01 January				
Authorised End:	31 December				
Permit Start Date:	20th August 2001				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 10m				
Water Abstractions					
Operator:	Tower Colliery Ltd	(S)	1844	1	294100
Licence Number:	21/57/23/0058				204770
Permit Version:	100				
Location:	Mineshaft At Tower No.3 Colliery				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Mineral Products: General Washing/Process Washing				
Abstraction Type:	Water may be abstracted from a single point				
Source:	Groundwater				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	Discharge From Tower No 3 Colliery - Hirwaun Aberdare				
Authorised Start:	01 January				
Authorised End:	31 December				
Permit Start Date:	19th November 2003				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				
Water Abstractions					
Operator:	Tower Colliery Ltd	(S)	1849	1	294100
Licence Number:	21/57/23/0058				204765
Permit Version:	Not Supplied				
Location:	Location Description Not Available				
Authority:	Environment Agency, Welsh Region				
Abstraction:	Wash Unspecified				
Abstraction Type:	Not Supplied				
Source:	Mining Operation				
Daily Rate (m3):	Not Supplied				
Yearly Rate (m3):	Not Supplied				
Details:	Water Piped From Old Workings - Hirwaun Aberdare				
Authorised Start:	Not Supplied				
Authorised End:	Not Supplied				
Permit Start Date:	Not Supplied				
Permit End Date:	Not Supplied				
Positional Accuracy:	Located by supplier to within 100m				

Map ID			Quadrant Reference (Compass Direction)	Estimated Distance From Site		
Water Abstractions						
Operator:	Dwr Cymru Cyf		(E)	1912	1	295850 207405
Licence Number:	21/57/23/0002					
Permit Version:	100					
Location:	Nant Y Bwlfa					
Authority:	Enviro					
Abstraction:	Public	- Direct				
Abstraction Type:	Water					
Source:	Surface					
Daily Rate (m3):	Not Supplied					
Yearly Rate (m3):	Not Supplied					
Details:	Bodwigiad Nr Bodwigiad Farm					
Authorised Start:	01 January					
Authorised End:	31 December					
Permit Start Date:	19th October 2006					
Permit End Date:	Not Supplied					
Positional Accuracy:	Located by supplier to within 100m					
Groundwater Vulnerability			A13NE (N)	0	1	293910 207034
Map Sheet:	Sheet 36 Mid Glamorgan					
Scale:	1:100,000					
Drift Deposits						
Drift Deposit:	Low permeability drift deposits occuring at the surface and overlying Major and Minor Aquifers are head, clay-with-flints, brickearth, peat, river terrace deposits and marine and estuarine alluvium		A13NE (NE)	0	1	293890 206808
Map Sheet:	Sheet 36 Mid Glamorgan					
Scale:	1:100,000					

Extreme Flooding from Rivers or Sea without Defences

None

Flooding from Rivers or Sea without Defences

None

Areas Benefiting from Flood Defences

None

Flood Water Storage Areas

None

Flood Defences

None

			act	NGR
				293237 206088
				293262 206367
	Name:		8	292051 208516
39				294470
	Licence Reference:	007 (SE)		205821
	Site Location:	Adj Tower Washery, Hirwaun, Aberdare, Mid Glamorgan		
	Licence Easting:	Not Supplied		
	Licence Northing:	Not Supplied		
	Operator Location:	Cartref The Bryn, Rhigos, HIRWAUN, Mid Glamorgan, CF44 9DX		
	Authority:	Environment Agency - Welsh Region, South East Area		
	Site Category:	Landfill		
	Max Input Rate:	Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)		
	Waste Source Restrictions:	No known restriction on source of waste		
	Status:	Licence lapsed/cancelled/defunct/not applicable/surrendered|Cancelled		
	Dated:	1st July 1983		
	Preceded By Licence:	Not Given		
	Superseded By Licence:	Not Given		
	Positional Accuracy:	Positioned by the supplier		
	Boundary Accuracy:	Moderate		
	Authorised Waste	Excavated Natural Materials $ Hardcore And Rubble		
	Prohibited Waste	Empty Used Containers Industrial Wastes Sludge Wastes Toxic/Poisonous Wastes		

Map ID				Estimated Distance From Site		NGR
	Registered Landfill Sites					
40	Licence Holder:	Cynon Valley B.C.	A7NW (SW)		1	292981 206159
	Licence Reference:	RES				
	Site Location:	Hughes Patches Site, Rhigos Road, Hirwaun, Aberdare, Mid Glamorgan				
	Licence Easting:	292900				
	Licence Northing:	206100				
	Operator Location:	As Site Address				
	Authority:	Environment Agency - Welsh Region, South East Area				
	Site Category:	Landfill				
	Max Input Rate:	Undefined				
	Waste Source Restrictions:	No known restriction on source of waste				
	Status:	Licence lapsed/cancelled/defunct/not applicable/surrendered|Cancelled				
	Dated:	Not Supplied				
	Preceded By Licence:	Not Given				
	Superseded By Licence:	Not Given				
	Positional Accuracy:	Manually positioned to the road within the address or location				
	Boundary Accuracy:	Not Applicable				
	Authorised Waste	Domestic Refuse				
	Registered Waste Treatment or Disposal Sites					
41	Licence Holder:	E.M.S. Togo Ltd	A8SE (S)	810	1	294000 205800
	Licence Reference:	6/93				
	Site Location:	Factory 1 Treherbert Road, Rhigos, Aberdare, Mid Glamorgan				
	Operator Location:	As Site Address				
	Authority:	Environment Agency - Welsh Region, South East Area				
	Site Category:	Recycling / Reclamation				
	Max Input Rate:	Very Small (Less than 10,000 tonnes per year)				
	Waste Source Restrictions:	No known restriction on source of waste				
	Licence Status:	Site exempt from licence|Exempt				
	Dated:	1st January 1994				
	Preceded By Licence:	Not Given				
	Superseded By Licence:	Not Given				
	Positional Accuracy:	Approximate location provided by supplier				
	Boundary Quality:	Not Supplied				
	Authorised Waste	Polyurethane & Associated Packaging Pvc & Associated Packaging				

Geological

		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
BGS 1:625,000 Solid Geology					
Description:	Lower Westphalian (mainly Productive Coal Measures)	A13NW (NW)	0	3	293585 207035
Coal Mining Affected Areas					
Description:	In an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority. Contact details are included in the Useful Contacts section of this report.	A15NW (E)	0		295000 207000
Mining Instability					
Mining Evidence:	Inconclusive Coal Mining	A23SE (N)	0		293880 208000
Source:	Ove Arup & Partners				
Boundary Quality:	As Supplied				
Potential for Collapsible Ground Stability Hazards					
No Hazard					
Potential for Compressible Ground Stability Hazards					
Hazard Potential:	No Hazard	A13NE (N)	0	3	293880 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Compressible Ground Stability Hazards					
Hazard Potential:	Moderate	A13NE (N)	0	3	293880 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Compressible Ground Stability Hazards					
Hazard Potential:	High	A13NE (NE)	98	3	294100 206925
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Compressible Ground Stability Hazards					
Hazard Potential:	High	A13SW (SW)	134	3	293775 206550
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Compressible Ground Stability Hazards					
Hazard Potential:	Moderate	A14NW (E)	243	3	294250 206900
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Ground Dissolution Stability Hazards					
No Hazard					
Potential for Landslide Ground Stability Hazards					
Hazard Potential:	Low	A13NW (W)	0	3	293725 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Landslide Ground Stability Hazards					
Hazard Potential:	Very Low	A13NW (W)	0	3	293725 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Landslide Ground Stability Hazards					
Hazard Potential:	Low	A13NW (W)	16	3	293700 206800
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Landslide Ground Stability Hazards					
Hazard Potential:	Low	A8NE (SE)	196	3	294050 206425
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Landslide Ground Stability Hazards					
Hazard Potential:	Low	A8NE (SE)	228	3	294075 206400
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Running Sand Ground Stability Hazards					
Hazard Potential:	Very Low	A13NE (N)	0	3	293880 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Running Sand Ground Stability Hazards					
Hazard Potential:	Low	A13NE (N)	0	3	293880 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Running Sand Ground Stability Hazards					
Hazard Potential:	No Hazard	A13NW (W)	21	3	293700 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Running Sand Ground Stability Hazards					
Hazard Potential:	Low	A14NW (E)	243	3	294250 206900
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Shrinking or Swelling Clay Ground Stability Hazards					
Hazard Potential:	Very Low	A13NW (W)	0	3	293700 206850
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Shrinking or Swelling Clay Ground Stability Hazards					
Hazard Potential:	No Hazard	A13NW (W)	21	3	293700 206850
Source:	British Geological Survey, National Geoscience Information Service				

Geological

Map ID		Quadrant Reference (Compass Direction)	Estimated Distance From Site		NGR
Potential for Shrinking or Swelling Clay Ground Stability Hazards					
Hazard Potential:	No Hazard	A13NE (NE)	98	3	294100 206925
Source:	British Geological Survey, National Geoscience Information Service				
Potential for Shrinking or Swelling Clay Ground Stability Hazards					
Hazard Potential:	No Hazard	A13SW (SW)	134	3	293775 206550
Source:	British Geological Survey, National Geoscience Information Service				
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	A13NE (E)	0	5	294000 206792
Source:	Health Protection Agency				
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	A13NE (E)	0	5	294000 206792
Source:	Health Protection Agency				
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	A13NE (N)	41	5	293880 207000
Source:	Health Protection				
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	A13NE (NE)	50	5	294000 207000
Source:	Health Protection Agency				
Radon Protection Measures					
Type:	No radon protective measures are necessary in the construction of new dwellings or extensions	A23SE (N)	0	3	294102 207797
Source:	British Geological Survey, National Geoscience Information Service				
Shallow Mining Hazards					
Risk:	Low-Moderate	A13NE (N)	0	3	293866 206863
Source:	British Geological Survey, National Geoscience Information Service				

			ant nce ass on)	Estimated Distance From Site	Contact	NGR
			E	34		293874 206618
			W	55		293824 206618
			IE (E)	71		294078 206833
			A13SW (S)	121		293827 206544
		9UP	A13SW (S)	121		293826 206544
		ın, CF44	A13SW (S)	123		293841 206535
	Contemporary Trade Directory Entries					
45	Name:	Sofa Link	A13SW (S)	126		293857 206525
	Location:	Unit 17, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP				
	Classification:	Road Haulage Services				
	Status:	**Inactive**				
	Positional Accuracy:	Automatically positioned to the address				
	Contemporary Trade Directory Entries					
45	Name:	W G Lane & Son	A13SW (S)	126		293856 206524
	Location:	Unit 17,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP				
	Classification:	Commercial Vehicle Breakdown & Recovery Services				
	Status:	**Active**				
	Positional Accuracy:	Manually positioned to the address or location				
	Contemporary Trade Directory Entries					
46	Name:	Cefn Strain Gauges	A8NE (S)	341		294058 206277
	Location:	Unit L, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP				
	Classification:	Tool Design, Manufacturers & Makers				
	Status:	**Active**				
	Positional Accuracy:	Automatically positioned to the address				
	Contemporary Trade Directory Entries					
46	Name:	Cabinet Makers & Designers Ltd	A8NE (S)	342		294058 206276
	Location:	Unit S Hirwaun Indust Est, Aberdare, Mid Glamorgan, CF44 9UP				
	Classification:	Cabinet Makers				
	Status:	**Inactive**				
	Positional Accuracy:	Manually positioned within the geographical locality				
	Contemporary Trade Directory Entries					
46	Name:	Rod Technical Mouldings	A8NE (S)	352		294078 206270
	Location:	L13 Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9YL				
	Classification:	Plastics - Injection Moulding				
	Status:	**Inactive**				
	Positional Accuracy:	Manually positioned within the geographical locality				

			Estimated Distance From Site	NGR
	Contemporary Trade Directory Entries			
47	Name: Centillion Enviroment & Recycling Ltd Location: Unit 49,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Recycling Centres **Status:** **Active** Positional Accuracy: Manually positioned within the geographical locality	A8NE (S)	445	294114 206184
	Contemporary Trade Directory Entries			
48	Name: Hitachi Home Electronic (Europe) Ltd Location: Unit 1-4 & 45, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UY Classification: Electrical Goods - Manufacturers & Wholesalers **Status:** **Inactive** Positional Accuracy: Automatically positioned to the address	A8NW (S)	475	293669 206227
	Contemporary Trade Directory Entries			
49	Name: Dyllas Engineering Co Ltd Location: Unit 40/41, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineering Materials **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A8NE (SE)	476	294170 206171
	Contemporary Trade Directory Entries			
50	Name: The Authentic Curry Co Location: Unit 46, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Food Products - Manufacturers **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A8SE (S)	545	294159 206093
	Contemporary Trade Directory Entries			
50	Name: J D Burford Ltd Location: Unit 2D, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Metal Spinners **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A8SE (S)	573	294158 206064
	Contemporary Trade Directory Entries			
51	Name: W T Burden Ltd Location: Unit 45, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Builders' Merchants **Status:** **Inactive** Positional Accuracy: Automatically positioned in the proximity of the address	A7NE (SW)	563	293299 206348
	Contemporary Trade Directory Entries			
51	Name: Burdens Location: Unit 45, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Builders' Merchants **Status:** **Inactive** Positional Accuracy: Automatically positioned in the proximity of the address	A7NE (SW)	563	293299 206348
	Contemporary Trade Directory Entries			
52	Name: Burdens Location: Unit 45, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Builders' Merchants **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A9SW (SE)	563	294210 206094
	Contemporary Trade Directory Entries			
53	Name: K P L Precision Tool & Die Sinking Ltd Location: Adjacent To Unit 9,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Tool Design, Manufacturers & Makers **Status:** **Active** Positional Accuracy: Manually positioned within the geographical locality	A7NE (SW)	609	293252 206330
	Contemporary Trade Directory Entries			
54	Name: Twin County Fan Co Ltd Location: Unit D, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status:** **Inactive** Positional Accuracy: Automatically positioned to the address	A7NE (SW)	627	293278 206278

NGR

54

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Contemporary Trade Directory Entries

59
Name: Dare Valley Poultry
Location: Unit 4, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP
Classification: Meat Product Manufacturers & Wholesalers
Status: **Inactive**
Positional Accuracy: Automatically positioned to the address

A7NW (SW) 703 293115 206358

Contemporary Trade Directory Entries

60
Name: Web Engineering Ltd
Location: Unit 20/21, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP
Classification: Engineers - General
Status: **Active**
Positional Accuracy: Automatically positioned to the address

A7NW (SW) 739 293134 206269

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Contemporary Trade Directory Entries				
61	Name: Dik Imports Location: Unit 23, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Trailers & Towing Equipment **Status: Active** Positional Accuracy: Manually positioned to the address or location	A7NW (SW)	744		293119 206281
	Contemporary Trade Directory Entries				
61	Name: Chiltern Services Location: Unit 26, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	770		293083 206286
	Contemporary Trade Directory Entries				
61	Name: Philtronics Ltd Location: Unit 28, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Electronic Equipment - Manufacturers & Assemblers **Status: Active** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	775		293068 206298
	Contemporary Trade Directory Entries				
62	Name: Omc Plan Stairways Location: Unit 33, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status: Active** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	792		293025 206335
	Contemporary Trade Directory Entries				
63	Name: Eftec Ltd Location: Rhigos, Aberdare, Mid Glamorgan, CF44 9UE Classification: Chemical Manufacturers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A3NE (S)	844		294004 205766
	Contemporary Trade Directory Entries				
64	Name: Pinebeam Location: Unit H,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Joinery Manufacturers **Status: Active** Positional Accuracy: Manually positioned within the geographical locality	A11SE (W)	911		292834 206484
	Contemporary Trade Directory Entries				
65	Name: Insole Technology Ltd Location: Unit 6, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Metal Finishing Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	917		292953 206214
	Contemporary Trade Directory Entries				
65	Name: Willowchem Technology Location: Unit 6-7, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Chemicals - Distributors & Wholesalers **Status: Active** Positional Accuracy: Manually positioned to the address or location	A7NW (SW)	917		292953 206214
	Contemporary Trade Directory Entries				
65	Name: Insole Technology Location: Unit 6,7,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Footwear Manufacturers & Wholesale **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A7NW (SW)	918		292952 206214
	Contemporary Trade Directory Entries				
65	Name: Welsh Trust Electronics Ltd Location: Unit 8, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9YE Classification: Electronic Equipment - Manufacturers & Assemblers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	927		292939 206217

ID	Details	(Compass Direction)	From Site	Contact	NGR
	Contemporary Trade Directory Entries				
65	Name: Metal Polishing Engineers Ltd Location: Unit 8, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9YE Classification: Metal Finishing Services **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A7NW (SW)	927		292939 206217
	Contemporary Trade Directory Entries				
66	Name: Ecr Concepts Location: Unit 28,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Cash Registers & Check-Out Equipment **Status:** **Inactive** Positional Accuracy: Manually positioned within the geographical locality	A11SE (W)	926		292826 206460
	Contemporary Trade Directory Entries				
66	Name: Bartondale Engineering Co Ltd Location: Unit N, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A6NE (W)	949		292809 206436
	Contemporary Trade Directory Entries				
66	Name: Durmech Engineering Location: Unit N, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status:** **Active** Positional Accuracy: Manually positioned to the address or location	A6NE (W)	949		292809 206436
	Contemporary Trade Directory Entries				
66	Name: Bartondale Engineering Ltd Location: Unit N, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status:** **Active** Positional Accuracy: Automatically positioned to the address	A6NE (W)	949		292809 206436
	Contemporary Trade Directory Entries				
66	Name: Durmech Engineering Location: Unit N, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Engineers - General **Status:** **Active** Positional Accuracy: Manually positioned to the address or location	A6NE (W)	949		292809 206436
	Contemporary Trade Directory Entries				
67	Name: R A P Location: Unit 43-44 Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Hose, Tubing & Fittings **Status:** **Inactive** Positional Accuracy: Manually positioned within the geographical locality	A6NE (SW)	967		292832 206329
	Contemporary Trade Directory Entries				
68	Name: N D Products Location: Unit P-t, Hirwaun Industrial Estate, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Printed Circuit Services **Status:** **Active** Positional Accuracy: Manually positioned to the address or location	A6NE (W)	988		292796 206358
	Contemporary Trade Directory Entries				
68	Name: Ris Diagnostics & Repairs Location: Unit T,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Car Engine Tuning & Diagnostic Services **Status:** **Inactive** Positional Accuracy: Manually positioned to the address or location	A6NE (W)	989		292796 206357
	Contemporary Trade Directory Entries				
68	Name: Tempakerb Ltd Location: Unit R,Hirwaun Ind Est, Hirwaun, Aberdare, Mid Glamorgan, CF44 9UP Classification: Plastic Products - Manufacturers **Status:** **Inactive** Positional Accuracy: Manually positioned within the geographical locality	A6NE (W)	995		292781 206378

ERM

Sensitive Land Use

	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site		
	National Parks					
69	Name:	Brecon Beacons	A13NE (NW)	0	6	293872 206806
	Multiple Area:	N				
	Area (m2):	1349543936				
	Source:	The National Assembly for Wales, GI Services (Department of Planning & Countryside)				
	Status:	**Fully Designated - designated as a National Park**				
	Designation Date:	31st December 1955				
	Sites of Special Scientific Interest					
70	Name:	Cors Bryn - Y - Gaer	A13SE (E)	114	7	294132 206698
	Multiple Area:	Y				
	Area (m2):	486147.93				
	Source:	Countryside Council for Wales				
	Reference:	2470|33wbn				
	Designation Details:	Biological				
	Designation Date:	13th March 2002				
	Date Type:	Notified				
	Sites of Special Scientific Interest					
71	Name:	Woodland Park And Pontpren	A19SE (E)	731	7	294699 207129
	Multiple Area:	Y				
	Area (m2):	25831.71				
	Source:	Countryside Council for Wales				
	Reference:	1645|33waa				
	Designation Details:	Biological				
	Designation Date:	27th January 2000				
	Date Type:	Notified				
	Sites of Special Scientific Interest					
72	Name:	Woodland Park And Pontpren	A19NE (NE)	868	7	294646 207514
	Multiple Area:	Y				
	Area (m2):	86344.33				
	Source:	Countryside Council for Wales				
	Reference:	1645|33waa				
	Designation Details:	Biological				
	Designation Date:	27th January 2000				
	Date Type:	Notified				
	Special Areas of Conservation					
73	Name:	Blaen Cynon	A13SE (E)	114	7	294132 206698
	Multiple Area:	Y				
	Area (m2):	486147.79				
	Source:	Countryside Council for Wales				
	Reference:	Uk0030092				
	Status:	**Designated**				
	Special Areas of Conservation					
74	Name:	Blaen Cynon	A19SE (E)	731	7	294699 207129
	Multiple Area:	Y				
	Area (m2):	25831.72				
	Source:	Countryside Council for Wales				
	Reference:	Uk0030092				
	Status:	**Designated**				
	Special Areas of Conservation					
75	Name:	Blaen Cynon	A19NE (NE)	868	7	294646 207514
	Multiple Area:	Y				
	Area (m2):	86344.3				
	Source:	Countryside Council for Wales				
	Reference:	Uk0030092				
	Status:	**Designated**				

Data Currency

	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Rhondda Cynon Taff County Borough Council - Public Health and Protection	December 2006	Annual Rolling Update
Merthyr Tydfil County Borough Council - Environmental Health Department	February 2007	Annual Rolling Update
Neath Port Talbot County Borough Council - Environmental Health Department	January 2007	Annual Rolling Update
Powys County Council - Public Protection Department	May 2007	Annual Rolling Update
Discharge Consents		
Environment Agency - Welsh Region	July 2007	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Welsh Region	October 2007	As notified
Integrated Pollution Controls		
Environment Agency - Welsh Region	January 2007	Quarterly
Integrated Pollution Prevention And Control		
Environment Agency - Welsh Region	July 2007	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Neath Port Talbot County Borough Council - Environmental Health Department	April 2007	Annual Rolling Update
Powys County Council - Public Protection Department	August 2007	Annual Rolling Update
Rhondda Cynon Taff County Borough Council - Public Health and Protection Division	May 2007	Annual Rolling Update
Merthyr Tydfil County Borough Council - Environmental Health Department	November 2006	Annual Rolling Update
Local Authority Pollution Prevention and Controls		
Neath Port Talbot County Borough Council - Environmental Health Department	April 2007	Annual Rolling Update
Powys County Council - Public Protection Department	August 2007	Annual Rolling Update
Rhondda Cynon Taff County Borough Council - Public Health and Protection Division	May 2007	Annual Rolling Update
Merthyr Tydfil County Borough Council - Environmental Health Department	November 2006	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements		
Neath Port Talbot County Borough Council - Environmental Health Department	April 2007	Annual Rolling Update
Powys County Council - Public Protection Department	August 2007	Annual Rolling Update
Rhondda Cynon Taff County Borough Council - Public Health and Protection Division	May 2007	Annual Rolling Update
Merthyr Tydfil County Borough Council - Environmental Health Department	November 2006	Annual Rolling Update
Nearest Surface Water Feature		
Ordnance Survey	July 2007	Quarterly
Pollution Incidents to Controlled Waters		
Environment Agency - Welsh Region	December 1998	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - Welsh Region	October 2007	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - Welsh Region	October 2007	As notified
Registered Radioactive Substances		
Environment Agency - Welsh Region	July 2007	Quarterly
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	October 2006	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	October 2006	Annually
Substantiated Pollution Incident Register		
Environment Agency - Welsh Region - South East Area	July 2007	Quarterly
Environment Agency - Welsh Region - South West Area	July 2007	Quarterly
Water Abstractions		
Environment Agency - Welsh Region	July 2007	Quarterly
Water Industry Act Referrals		
Environment Agency - Welsh Region	July 2007	Quarterly

Data Currency

	Version	Update Cycle
Agency & Hydrological		
Groundwater Vulnerability		
Environment Agency - Head Office	January 1999	Not Applicable
Drift Deposits		
Environment Agency - Head Office	January 1999	Not Applicable
Source Protection Zones		
Environment Agency - Head Office	April 2005	Variable
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	April 2007	Quarterly
Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	April 2007	Quarterly
Areas Benefiting from Flood Defences		
Environment Agency - Head Office	April 2007	Quarterly
Flood Water Storage Areas		
Environment Agency - Head Office	April 2007	Quarterly
Flood Defences		
Environment Agency - Head Office	April 2007	Quarterly
		Update
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Welsh Region	July 2007	Quarterly
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - Welsh Region - South East Area	August 2007	Quarterly
Environment Agency - Welsh Region - South West Area	August 2007	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - Welsh Region - South East Area	August 2007	Quarterly
Environment Agency - Welsh Region - South West Area	August 2007	Quarterly
Local Authority Landfill Coverage		
Merthyr Tydfil County Borough Council - Environmental Health Department	May 2000	Not Applicable
Neath Port Talbot County Borough Council - Environmental Health Department	May 2000	Not Applicable
Powys County Council	May 2000	Not Applicable
Rhondda Cynon Taff County Borough Council	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Merthyr Tydfil County Borough Council - Environmental Health Department	May 2000	Not Applicable
Powys County Council	May 2000	Not Applicable
Rhondda Cynon Taff County Borough Council	May 2000	Not Applicable
Neath Port Talbot County Borough Council - Environmental Health Department	September 2003	Not Applicable
Registered Landfill Sites		
Environment Agency - Welsh Region - South East Area	March 2003	Not Applicable
Environment Agency - Welsh Region - South West Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Welsh Region - South East Area	March 2003	Not Applicable
Environment Agency - Welsh Region - South West Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Welsh Region - South East Area	March 2003	Not Applicable
Environment Agency - Welsh Region - South West Area	March 2003	Not Applicable

Hazardous Substances

		Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	October 2007	Bi-Annually
Explosive Sites		
Health and Safety Executive	August 2007	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Brecon Beacons National Park	November 2006	Annual Rolling Update
Rhondda Cynon Taff County Borough Council - Planning Department	October 2006	Annual Rolling Update
Merthyr Tydfil County Borough Council - Planning Department	September 2007	Annual Rolling Update
Neath Port Talbot County Borough Council - Planning Department	September 2007	Annual Rolling Update
Powys County Council - Planning Department	September 2007	Annual Rolling Update
Planning Hazardous Substance Consents		
Brecon Beacons National Park	November 2006	Annual Rolling Update
Rhondda Cynon Taff County Borough Council - Planning Department	October 2006	Annual Rolling Update
Merthyr Tydfil County Borough Council - Planning Department	September 2007	Annual Rolling Update
Neath Port Talbot County Borough Council - Planning Department	September 2007	Annual Rolling Update
Powys County Council - Planning Department	September 2007	Annual Rolling Update

	V	Update Cycle
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	October 2007	Bi-Annually
BGS 1:625,000 Solid Geology		
British Geological Survey - National Geoscience Information Service	August 1996	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Mining Report Service	January 2006	As notified
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Natural and Mining Cavities		
Peter Brett Associates	December 2005	Variable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	November 2006	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	November 2006	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	November 2006	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	April 2007	Annually
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	November 2006	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	November 2006	Annually
Radon Affected Areas		
Health Protection Agency	January 2003	Not Applicable
Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	August 2002	Variable
Shallow Mining Hazards		
British Geological Survey - National Geoscience Information Service	August 2002	Not Applicable

Data Currency

Industrial Land Use		Update Cycle
Contemporary Trade Directory Entries		
Thomson Directories	August 2007	Quarterly
Fuel Station Entries		
Catalist Ltd - (Fuel Station Data)	October 2007	Quarterly

Sensitive Land Use	Version	Update Cycle
Areas of Outstanding Natural Beauty		
Countryside Council for Wales	August 2007	Bi-Annually
Environmentally Sensitive Areas		
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	June 2006	Annually
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Merthyr Tydfil County Borough Council	August 2007	Bi-Annually
Neath Port Talbot County Borough Council	August 2007	Bi-Annually
Powys County Council	August 2007	Bi-Annually
Rhondda Cynon Taff County Borough Council	August 2007	Bi-Annually
Marine Nature Reserves		
Countryside Council for Wales	August 2007	Bi-Annually
National Nature Reserves		
Countryside Council for Wales	August 2007	Bi-Annually
National Parks		
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	June 2006	Annually
Nitrate Sensitive Areas		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	December 2003	Not Applicable
Nitrate Vulnerable Zones		
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	October 2005	Annually
Ramsar Sites		
Countryside Council for Wales	August 2007	Bi-Annually
Sites of Special Scientific Interest		
Countryside Council for Wales	August 2007	Bi-Annually
Special Areas of Conservation		
Countryside Council for Wales	August 2007	Bi-Annually
Special Protection Areas		
Countryside Council for Wales	August 2007	Bi-Annually

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance	Licensed Partner
Environm	
Scottish E	SEPA Scottish Environment Protection Agency
The Coal A	
British Ge	
Centre for	
Countrysi	CYMRU FOR WALES
Scottish N	
Natural E	
Health Pr	
Ove Arup	ARUP
Peter Brett Associates	pba

Useful Contacts

		Contact Details
1	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
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3	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
4	**The Coal Authority - Mining Report Service** 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG	Telephone: 0845 7626848 Email: thecoalauthority@coal.gov.uk
	Health Protection Agency Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 831600 Fax: 01235 833891
6	**The National Assembly for Wales - GI Services (Department of Planning & Countryside)** Yr Hen Ysgol Gymraeg, Alexandria Road, Aberystwyth, Ceredigion, SY23 1LD	Telephone: 02920 825111 Website: www.wales.gov.uk
7	**Countryside Council for Wales** Plas Penrhose, Fford Penrhos, Bangor, Gwynedd, LL57 2LQ	Telephone: 01248 385500 Fax: 01248 355782
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	Landmark Information Group Limited The Smith Centre, Henley On Thames, Oxfordshire, RG9 6AB	Telephone: 0870 850 6670 Fax: 0870 850 6671 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / SEPA have a charging policy in place for enquiries.

APPENDIX C

SOIL MECHANICS SITE INVESTIGATION REPORT

Soil Mechanics

The UK's leading geotechnical specialists

Report No H8076

HIRWAUN INDUSTRIAL ESTATE DEVELOPMENT

INTERPRETATIVE REPORT ON SITE INVESTIGATION

Carried out for : Enviroparks Ltd

Engineer : Pell Frischmann

Date : January 2009

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HIRWAUN INDUSTRIAL ESTATE DEVELOPMENT

INTERPRETATIVE REPORT ON SITE INVESTIGATION

Report No: H8076

Date: January 2009

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1	January 2009	Report as submitted

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D GEOENVIRONMENTAL LABORATORY TEST RESULTS
E PHOTOGRAPHS
F DRAWINGS

1 INTRODUCTION

During August 2008 Soil Mechanics (SM) were commissioned by Pell Frischmann (PF), on behalf of Enviroparks Ltd (EL), to carry out a site investigation at Hirwaun Industrial Estate Development, Hirwaun. The investigation was required to obtain geotechnical and geoenvironmental information for a proposed Enviroparks waste recycling plant including anaerobic digestion and plasma conversion systems.

The scope of the investigation, which was specified by PF, comprised cable percussion and rotary drilled boreholes, trial pits, in situ testing and laboratory testing. The investigation was carried out in accordance with the contract specification and relevant standards (see References). The fieldwork was carried out between 14th August and 23rd September 2008.

This report presents the factual records of the fieldwork and laboratory testing together with an interpretation of the findings with respect to the proposed development. The data is also presented separately in digital format following AGS (2005).

A previous desk study report had been carried out by EL (dated November 2007). A copy of their report was made available to SM by PF at the outset of the current investigation. Previous investigations had been carried out by Wallace Evans, 1972 and Exploration Associates, 1995.

2 THE SITE AND GEOLOGY

2.1 The Site

Hirwaun Industrial Estate Development is situated approximately 1.5km northwest of Hirwaun Town Centre, see Site Location Plan in Enclosure F. The site is at National Grid reference SN 938 068.

The site comprised an area of approximately level ground that has been prepared as a development platform by regrading the site some 10 years ago. The site is approximately rectangular in shape and covers an area of approximately 8 Hectares and is approximately 250m to 300m at its widest. The site was locally flooded across the southern section of the site. No buildings were present on the site.

Evidence of existing drainage was visible with both herring bone type drainage and open ditches observed across the site.

The site boundary is defined by; a track at the lower edge of the Penderyn Reservoir embankment in the north, Ninth Avenue in the east, Fifth Avenue in the south and an unnamed stream in the west. The entrance to the site was established from the south boundary from Fifth Avenue.

The area surrounding the site is used for the Penderyn Reservoir and farm fields to the north, farm fields and woodland to the west and by industrial units in the south and east.

2.2 EL Desk Study

The desk study carried out by EL revealed that the site was formally used as an Ordnance factory during the Second World War although all buildings associated with the plant were demolished in the late 1960s early 1970s. The site remained vacant until the late 1990s when the Welsh Development Agency (WDA) re-profiled the site creating the plateau noted in the previous section.

The site was not thought to be particularly contaminated from the previous use as it is believed that natural materials were used to level the site.

2.3 Published Geology

The published geological map covering the site, GS Sheet 231 (1979) drift shows the surface of the site to be covered by alluvium over the south and glacial till to the north. The glacial till probably underlies the alluvium. Bedrock at the site comprises the Lower Coal Measures, a sequence of mainly mudstones and sandstones with rare coal seams. An unnamed coal seam is shown to outcrop with an east to west strike through the centre of the site. It is not part of the scope of this report to comment on any possible mining beneath the site.

The 1995 desk study includes a 1993 mining report which states that it is extremely unlikely that mining has been undertaken under the site in the past, or will be in the future. However, within this mining report it states that it is valid for a period of 12 months only, and therefore should be updated.

Two north south trending faults are located to the east and west of the site with downthrows to the west. The general dip of strata is to the south.

From the desk study previous investigations revealed alluvial deposits overlying glacial deposits with Lower Coal Measures bedrock found at approximately 10 m below ground level. The Alluvium was believed to have a layer of peat within it.

3 FIELDWORK

3.1 General

The fieldwork was carried out in general accordance with BS EN 1997-2 (2007) and its related standards together with the relevant section of BS 5930 (1999).

The exploratory hole locations were selected by PF. The locations were set out from local features. The co-ordinates and reduced levels were surveyed by Pelorus who surveyed final position to National Grid and Ordnance Datum. The exploratory hole locations are shown on the Site Plan in Enclosure F.

3.2 Exploratory Holes

The exploratory holes are listed in the following table.

SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Cable Percussion Boring	9	10.90	Designated as BH101 to BH109
Rotary Core Drilling/Open Hole Drilling	5	18.00	Designated as BH101R, 103R, 105R, 107R and 108R
Trial Pits	19	3.80	Machine dug, designated as TP1, TP1A, TP2 to TP11, TP11A, TP12, TP12A, TP14 to TP17

The exploratory hole records are presented in Enclosure A and should be read in conjunction with the Key included therein. The records provide descriptions of the materials encountered, in accordance with the standards referenced on the Key, details of the samples taken, together with observations made during boring, drilling and pitting. Photographs of the trial pits and recovered cores are presented in Enclosure E.

On completion of the fieldwork all geotechnical samples were transported to the laboratory of Soil Mechanics for temporary retention and testing. Geoenvironmental samples were transported from site directly to the laboratory of TES Bretby for testing.

Plots of SPT 'N' value against depth and reduced level are presented in Enclosure F.

3.3 Instrumentation and Monitoring

The instruments installed in the exploratory holes are shown on the logs and detailed in Enclosure B. Records of groundwater and gas monitoring carried out by SM who monitored the installations after the fieldwork period are presented in Enclosure B.

4 LABORATORY TESTING

4.1 Geotechnical Testing

The testing was scheduled by SM and was carried out in accordance with BS 1377 (1990). The testing is summarised below and the results are presented in Enclosure D.

SUMMARY OF GEOTECHNICAL LABORATORY TESTING

TYPE	REMARKS
Moisture Content Determination	16 no
Atterberg Limit Determination	11 no
Particle Size Distribution Analysis	14 no tests
pH and Water Soluble Sulphate Content of Soils	Testing appropriate for use with BRE Special Digest 1 (2005). 21 no tests
Unconsolidated Undrained Triaxial Compression Testing	1 no test
One Dimensional Oedometer Consolidation Testing	2 no tests
Compaction tests	2 no tests 2.5kg method and 2 no tests 4.5kg method

A plot of index properties against depth and a plasticity chart are presented in Enclosure F.

4.2 Geoenvironmental Testing

The testing was scheduled by SM and was carried out by TES Bretby at their Burton on Trent laboratory. The results are presented in Enclosure D.

Testing as required under the Landfill (England and Wales) Regulations 2002 (as amended) and current regulatory guidance (EA 2005) has not been instructed.

5 GROUND CONDITIONS AND GROUNDWATER

5.1 Strata Encountered

Descriptions of the strata encountered are given on the exploratory hole records. The downward succession encountered is broadly uniform across the site and is summarised below. Depths and reduced levels of the base of the Made Ground and depths and reduced levels of rockhead are presented on plans in Enclosure F.

TABLE : SUMMARY OF STRATA - ALL EXPLORATORY HOLES

Code	STRATA	Minimum thickness (m)	Maximum thickness (m)	Minimum level top of strata (m OD)	Maximum level top of strata (m OD)	Remarks
A	**MADE GROUND**	0.10	3.60	198.88	203.44	Base of layer 0.10 to 3.60 (m)
A1	MADE GROUND: Very dense brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone with low cobble content. Cobbles are angular to subangular of sandstone, locally of brick, concrete, fused slag, builder's waste etc. Locally a sand	0.10	3.50			Not BH 108 & 108A or TP12, 12A & 14
A2	MADE GROUND: Soft to stiff grey and black slightly sandy slightly gravelly silty CLAY or SILT with low to medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite locally of brick, concrete, builders waste etc	0.10	3.20			TP01A, 2 to 6, 8, 9, 11, 12A 14 and 15 only.
B	**ALLUVIUM (Old Topsoil Layer ?)**					
B1	Soft to firm brown and black clayey SILT with rare small pockets of back woody peat and many roots/rootlets	0.50	0.50			Trial Pit 6 only
C	**GLACIAL DEPOSITS**	3.52	8.50	195.67	200.68	Base of layer 0.50 to 11.70 (m)
C1	Dense to very dense locally medium dense brown and grey brown clayey silty subrounded to angular fine to coarse GRAVEL of sandstone with low to high cobble content. Locally gravelly COBBLES	8.50	0.20			All holes that proved the base of the Made Ground
C2	Firm to stiff grey slightly sandy slightly sandy silty CLAY with medium cobble content. Gravel is subrounded to subangular fine to coarse of sandstone and quartzite. Locally organic ? and soft and a silt.	0.30	3.40			BHs 102, 103 & 104 and TP01, 6, 7, 12A, 14, 15 & 16 only.
D	**WEATHERED BEDROCK**	0.10	3.60	187.54	194.07	Rockhead 8.50 to 12.00 (m)
D1	Fractured broken SANDSTONE with brown sandy silt (Driller's description)	0.20	5.40			BHs 101R, 103R, 105R, 107R and 108R only
E	**LOWER COAL MEASURES**	0.10	3.60	186.88	191.42	Rockhead 8.50 to 12.00 (m)

TABLE : SUMMARY OF STRATA - ALL EXPLORATORY HOLES

E1	Moderately strong to very strong grey stained brown SANDSTONE/SILTSTONE rare mudstone bands	0.60	6.30			BHs 101R, 103R, 105R, 107R and 108R only

The strata profile encountered across the site was relatively consistent with a layer of Made Ground typically up to 3.5 m thick overlying cohesive and/but predominantly granular glacial deposits. It is possible that adjacent to the southern border by the stream alluvium may be encountered although there was little evidence of this from the exploratory holes. Bedrock was encountered at a depth of between 8.5 to 12.0 m (186.9 to 191.4 mAOD).

5.2 Made Ground

Made Ground, 0.1 to 3.6 m thick but typically over 2.0 m thick, was encountered across the whole site. The material was proved down to a reduced level of 195.7m OD. A plan showing the thicknesses of the Made Ground and also the basal levels of the material are shown on a plan in Enclosure G.

The Made Ground was predominately granular but cohesive layers or pockets up to 3.2 m thick were found but typically less than 1.0 m thick.

The cohesive layers were predominantly of a soft to firm consistency. These soils should therefore be regarded as being of relatively low strength and possibly relatively compressible.

For the granular soils SPT N Values ranged from 14 to over 50 suggesting a medium dense to very dense relative density. It is possible however that the higher values are as a consequence of encountering coarse granular particles and therefore for design purposes the strata should be regarded as having a medium dense relative density. An internal angle of friction of approximately 32 to 34 degrees (Peck & Thornburn (1975)) would therefore be assessed. A bulk density for this stratum would be about 1.9 Mg/m^3.

5.3 Alluvium

Alluvium comprising soft to firm clayey silt with rare small pockets of back woody peat and many roots/rootlets was proved in Trial Pit 6 only. From previous investigations the extent of the alluvium (peat) would be greater than would be expected from this investigation. It is possible

however that the material was removed during the regrading exercise. The supposed extent of the alluvium (peat) is shown on the Exploratory Hole Location Plan in Enclosure F.

5.4 Glacial Deposits

5.4.1 General

Underlying the Made Ground both cohesive but predominantly granular glacial deposits were encountered and proved to a depth of 8.50 to 12.00 m (186.9 to 191.4 mAOD) where bedrock was encountered.

In assessing parameters in glacial deposits it is usual to use SPT ‘N’ values, assuming it has not been possible to recover undisturbed samples of sufficient quality for laboratory testing. However such soils often contain coarse granular materials where high SPT 'N' values are often recorded which are not necessarily representative of the true strength or in situ relative density of the soil. This is usually as a consequence of trying to drive a cobble or boulder in the ground requiring very high blow counts, to achieve any sort of penetration. It has been found therefore that when determining parameters from 'N' values for design purposes the lower bound or even the lowest values obtained are more representative of the true relative density than the mean values and on this basis suggested design lines are presented on the SPT 'N' value with depth/reduced level plots in Enclosure F. In this context the 'N' values assessed for design purposes would be about 5 at say 2 m at the top of the strata increasing incrementally to over 40 blows or locally greater at say 10 m depth.

5.4.2 Cohesive Glacial Deposits

Cohesive glacial deposits (Glacial Till) were found across the site in about half the exploratory holes with thicknesses ranging from 1.3 to 3.5 m but with typical thicknesses of 1.6 m.

The soils were essentially clays of low plasticity. Given the SPT N-values assessed for design purposes (see Section 5.4.1) then the clay bands had a consistency of soft to firm becoming stiff then very stiff with increasing depths. Based on published correlations (Stroud & Butler (1975)), the N-values suggest an undrained shear strength (c_u) of clay layers at depths of 2.0 m of approximately 30 kPa increasing incrementally to over 150 to 200 kPa at about 10 m and deeper.

Given the low plasticity of the soils, then a coefficient of volume compressibility (m_v) of approximately 0.4 m^2/MN (Stroud & Butler (1975)) at 2.0 m decreasing incrementally to about 0.05 m^2/MN at 10.00 m would be estimated. A bulk density for this stratum would be about 2.1 Mg/m^3.

5.4.3 Granular Glacial Deposits

The glacial granular deposits represent the predominant glacial deposit and was found across the site in the majority of the exploratory holes that proved the base of the Made Ground. In general an initial layer of this granular deposit was encountered above the cohesive glacial deposit (Glacial Till), which in turn overlay another thicker deposit of granular glacial material. SPT N-values for design purposes within this strata would be typically 5 at 2.0 m rising incrementally to 40 at 10.0 m suggesting a loose becoming medium dense then dense relative density. An internal angle of friction of approximately 28 to 30 degrees (Peck & Thornburn (1975)) at 2.0 m increasing incrementally to about 38 to 40 degrees at 10.0 m and deeper would therefore be assessed.

A bulk density for this stratum would be about 2.0 Mg/m^3.

5.5 Lower Coal Measures

Predominantly sandstone bedrock was encountered at a depth of between 8.5 to 12.0 m (186.9 to 191.4 mAOD) where proved by rotary coring. It is possible locally on the site rockhead may be found both deeper and shallower than those depths. A plot of depths to bedrock and reduced levels of rockhead are presented on a plan in Enclosure F.

The rock comprised a moderately strong to very strong sandstone/siltstone with rare mudstone bands but upper layers, up to 5.2 m thick, were recorded which were either highly weathered or fractured as no or little core could be recovered.

5.6 Groundwater

A summary of groundwater strikes encountered during boring, drilling and pitting are presented below and also a table of water levels recorded in the boreholes at the start of the shift.

TABLE : SUMMARY OF GROUNDWATER STRIKES

Hole	Depth of Water Strike (m)	Water depth after 20 mins (m)	Remarks/Observations
BH101R	6.00	5.90	slow
BH101R	10.00	7.30	fast
BH103	8.40	1.50	
BH103R	1.50	1.20	Medium
BH104	9.10		
BH105R	3.00	2.70	Medium
BH105R	8.10	0.80	Fast
BH107R	0.90	0.80	Fast
BH108R	0.90	0.80	Fast
TP2	2.40	2.40	Seepage
TP3	0.00	NA	Seepage from surface
TP5	0.00	NA	Seepage from surface
TP7	0.00	NA	Seepage from surface
TP8	0.00	NA	Strong inflow from surface
TP11	1.40	NA	Seepage
TP11A	1.40	NA	Strong inflow
TP12	1.70	NA	Seepage
TP12A	1.80	NA	Seepage
TP14	1.80	NA	Strong inflow
TP15	1.80	NA	Seepage
TP16	0.30	NA	Strong inflow
TP17	1.30	NA	Strong inflow

TABLE: START OF SHIFT WATER LEVELS

Hole	Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
BH101	4.50	3.50	1.60	Start of shift
BH101R	16.50	12.00	0.95	Start of shift
BH102	4.50	4.50	3.40	Start of shift
BH107R	11.00	8.50	0.80	Start of shift
BH108R	6.00	6.00	0.80	Start of shift

These observations however do not necessarily indicate the position of the water table as equilibrium conditions were not determined. It is possible therefore that a higher water table than suggested by the boreholes may be found during construction.

Groundwater depths recorded in standpipes after completion of fieldwork ranged from 0.10 m (Borehole 109) to 2.04 to 2.31 m (Boreholes 101 to 103 & 105) that is with water-table reduced levels varying from 196.8 to 199.8 mAOD. A plan showing the levels and depths to the groundwater is presented in Enclosure F. From this plan it appears the hydraulic gradient falls to the south.

It should be appreciated that part of the site was flooded suggesting, given the predominantly granular strata, a water table close to ground level at least locally. It will be appreciated that seasonal fluctuations in groundwater level will occur with the highest levels likely to be recorded towards the end of the winter and following extended periods of heavy rain. Other effects such as investigation and constructional excavation may also change groundwater levels.

6 PROPOSED WORKS

It is proposed to construct a waste recycling plant including anaerobic digestion and plasma conversion systems, a power station office block/visitors centre and other structures. Details of the plant were provide as a series of drawings referenced M53274, dated August 2008. The proposed loadings are presented below:

TABLE: PROPOSED STRUCTURAL LOADINGS

Fuel Preparation Area		Anaerobic Digestion Area		Plasma Gasification Process Area		Pryolsis Process Area		Biomax Process Area		Power House		Water Treatment Area		Visitor's centre
Structure	*Load*	*Structure*	*Load*	*Structure*	*Load*	*Structure*	*Load*	*Structure*	*Load*	*Structure*	*Load*	*Structure*	*Load*	
Dano drums	100 tonne rotating load	Inoculation Chamber	65 kN/m^2	Floor	65 kN/m^2	Floor	65 kN/m^2	Centrifuge	65 kN/m^2	Engines	6x60 tonne piles	Reactor	75kN/m^2	Two storey building with strip footings
Piles under dano drums	4 piles at 60tonnes each at each end	Day tanks	65 kN/m^2	Portal Frame	30 tonnes per column	Portal Frame	30 tonnes per column	Macerators	65 kN/m^2	Turbines	6x60 tonne piles			
Waste storage area	50 kN/m^2	Anaerobic Digesters	165 kN/m^2					Separators	65 kN/m^2	Portal frame	50 tonnes per column			
Macerators	50 kN/m^2	Driers	65 kN/m^2					Portal frame	30 tonnes per column					
Skip	50 kN/m^2	Ammonia Scrubber	65 kN/m^2											
Portal frame	60 tonnes per column	LPG	65 kN/m^2											

It is understood that many of the structures will be founded below or partly below ground level with founding levels down to 195.5 mAOD. These structures will therefore have full or partial basements.

7 GEOTECHNICAL ENGINEERING ASSESSMENT

7.1 Foundations

7.1.1 Introduction

The strata profile encountered across the site was relatively consistent with a layer of Made Ground typically 2.0 m thick (but locally up to 3.5 m thick) overlying cohesive and/but predominantly granular glacial deposits. There is evidence from previous investigations at the site (undertaken in 1995) to suggest that adjacent to the southern border by the stream alluvium may be encountered, however there was little conclusive evidence of this from the recently drilled exploratory holes. Bedrock was encountered at a depth of between 8.5 to 12.0 m (186.9 to 191.4 mAOD). Groundwater was found at virtually ground level to about 2.27 m (196.8 to 199.8 mAOD).

While the strata overall in terms of layer thicknesses is relatively consistent within each layer there is significant variation of the material. In this context bands of clay of apparently variable thickness are present in both the Made Ground and underlying Glacial Deposits although the soils overall are predominantly granular. Consequently it is very difficult to give definitive guidelines for foundations for a structure as a particular footing could be on a part of the site where clay predominates while its neighbouring footing is on predominantly granular soils. In this case the conditions exist for differential movement as each stratum has differing settlement/stiffness properties. It may be therefore advisable to consider piling all structures that are sensitive to ground movements. Such structures could include portal frame column bases, machinery foundations etc.

For light to moderate loads where some settlement may be acceptable shallow strip or pad foundation could be feasible but such decisions can only be made at the design stage when more details of the structures are available.

The following therefore presents options for the various foundation types with sufficient information to enable foundations to be designed. Given the complexity of the development and of the ground conditions it is likely that it will be necessary to do a foundation assessment on a structure by structure basis when full details are available.

7.1.2 Shallow foundations

It is anticipated that only a few of the structures would be founded on shallow foundations close to ground level. This would notably be the office/visitors centre in the south east corner of the site. However almost all such foundations would mean founding within the Made Ground. Consequently only the lightest structures should have such foundations. It is however possible that at the basement level shallow foundations could be used for the more lightly loaded structures where the foundations would be most likely on the glacial deposits.

The Made Ground based on the testing carried out has reasonable properties being predominantly granular. It is possible therefore that this material was laid in a controlled manner following an earthworks type specification. There is always however a risk be it slight in founding in such soils. Consequently strip footing should be suitably reinforced so they can span any weak ground or alternatively utilise a piled foundation.

For strip foundations to carry wall loads then foundations should be taken below any unsuitable materials to a minimum depth of say 0.75 m (assuming granular strata) where Made Ground (close to ground level) or natural glacial soils (at basement level) will be found. The natural glacial soils, immediately below the Made Ground based on SPTs have generally poorer properties than the Made Ground. In this context the Made Ground would be medium dense while the natural soils would only be loose (see plots of SPT 'N' value against depth).

Below are presented tables which give safe bearing pressures to enable sizing of pad foundations and/or strip footing widths to be derived once loads are known for both the Made Ground and the Glacial Deposits. These values have been derived assuming total settlement for a particular footing does not exceed 25 mm, which is the conventional maximum limiting criteria, for assessing allowable bearing pressures, for most structures.

SAFE BEARING PRESSURES TO LIMIT SETTLEMENT TO 25mm FOR SPREAD OR STRIP FOUNDATIONS FOUNDED WITHIN THE MADE GROUND

Minimum Founding depth (m) below existing ground level.	**Relative density**	**Safe bearing capacity (kPa) for foundations not exceeding the following widths**		
		Foundation width 1.00m	**Foundation width 2.00m**	**Foundation width 4.00m**
0.75 m	Medium Dense	150	100	Not anticipated

SAFE BEARING PRESSURES TO LIMIT SETTLEMENT TO 25mm FOR SPREAD OR STRIP FOUNDATIONS FOUNDED WITHIN THE GLACIAL DEPOSITS

Minimum Founding depth (m) below existing ground level.	Relative density	Safe bearing capacity (kPa) for foundations not exceeding the following widths		
		Foundation width 1.00m	Foundation width 2.00m	Foundation width 4.00m
Below the Made Ground and 0.75m into the material	loose	100 or 50 if close to the water table	75 or 40 if close to the water table	75 or 40 if close to the water table

Notes: Bearing pressures would have to be halved as indicated if at or close to the water table which is what would be expected.

Prior to construction of such foundations, the formation zone should be inspected by a suitably experienced person to confirm the founding conditions. It should be appreciated that soils can be variable and locally softened, and therefore the minimum relative density given above are for guidance to enable an inspector to satisfy himself that at the founding level the strata is suitable.

All soft or loose soils encountered at the formation level should be removed and replaced with compacted engineering fill or lean mix concrete. Upon excavation and following inspection, the formation zone should be immediately concreted or protected by a layer of blinding to prevent softening, especially in the presence of groundwater, of the exposed soils. In this context the soils being sandy are particularly prone to these effects. Comments regarding the groundwater are presented in Section 5.6.

7.1.3 Piles

It is anticipated that the majority of the structures will be piled.

It should be appreciated that the load bearing characteristics of piles are very dependent on the type of pile, method of installation and construction, and workmanship and as such it is recommended that detailed discussions be held with suitably experienced piling contractors prior to finalising design. In any event positive assurances should be sought from the piling contractor in respect of performance of their proprietary system.

For the design of piles, both a driven or bored concrete cast in situ pile could be considered. From the boreholes pile lengths of say 10 to 15 m would be anticipated with piles founded in bedrock. A driven pile may not be acceptable given the environmental hazards (noise and vibration) that results from such methods. In addition such piles may prove difficult to pile to depth due to the coarse nature of the ground.

It is assumed that piles will terminate within bedrock. In this case the maximum working load would be defined by the working compressive strength of the concrete (normally taken as 25%) used to form the pile shaft and for a 450 mm diameter bored pile would equate to a vertical working load of about 1000 to 1200 kN. It is probably advisable however to use lower pile loads for preliminary design purposes (say 50 to 75% of maximum) until the values can be verified by pile testing.

Given the thickness of Made Ground it may be necessary to consider incorporating in the design of the piles some small allowance for negative skin friction if it is perceived that the material is likely to settle.

For pile groups then the above pile load would need to be reduced to keep settlement within tolerable bounds. Final pile design should be confirmed with pile load tests carried out on working piles taken to 1.5 times its design working load or preferably on piles specifically put down for pile testing where higher loads can be applied. Pile integrity tests should also be carried out on a selection of the piles.

7.1.4 Basements/Ground Floor Slabs

For small presumably lightly loaded structures such as the visitors centre then given the thickness of the Made Ground then a suspended floor slab would be recommended although it may be possible to excavate and re-compact the upper layers of the Made Ground and use a ground bearing slab suitably reinforced.

Many of the ground floor slabs will be below ground level, and therefore, will effectively be basements. Whether these can be designed as ground bearing or have to be piled, will depend on the net loadings. If the loadings are similar to the effective overburden pressure removed, then ground bearing slabs may be feasible. If loads are particularly high then a piled slab may be advisable. This however can only be assessed on a structure by structure basis.

It should be noted that many of the bases will be below the water table and consequently the ground may become disturbed during construction. This disturbance would need to be taken into account when designing foundations. It may also be necessary to consider buoyancy effects given the high water table for certain structures.

It will be necessary to remove all unsuitable materials from beneath the proposed slab location and replace with suitable imported granular fill. Prior to placing the fill the formation should be proof

rolled and inspected such that any soft spots that develop can be removed and replaced with compacted suitable granular infill. It should be appreciated that the likely formation soil here are sandy and will soften rapidly especially where water is present. In this context it would be recommended that the formation is protected as soon as is feasible following excavation.

7.3 Excavations and Groundwater

Any excavations required within the strata observed should be easily accomplished using conventional back-acting hydraulic plant. However excavations may require support even at shallow depths. Any excavation requiring man entry should be fully supported or cut back to a safe slope in accordance with normal safe site practice.

Localised seepages into open trenches at/or above founding depths should be anticipated but should be capable of being controlled through pumping from internal sumps at shallow depths. At depths probably as shallow as 2.5 m (possibly shallower where the site is flooded) the inflows into any excavation may be more significant and consequently additional pumping and or other dewatering may be required. In this context permeabilities based on an assessment of the particle size distribution curves could be as high as 5×10^{-3} m/sec. It should be noted that with layered soils, as is the case here with water bearing granular layers sandwiched between cohesive layers, that there is the possibility for local blowing of excavations to occur.

7.4 Infrastructure

For preliminary design of roads and hard-standings a CBR of 2% can be used for a preliminary assessment but such values should be confirmed during construction by in situ CBR testing. It may be possible to use higher values where the soils are granular. The precautions to be taken with regard to the formation should be as discussed under Section 7.1.4 for the floor slabs.

7.5 Chemical Considerations for Buried Concrete

The results of twenty one tests for sulphate concentration and pH levels on selected soil samples measured sulphate concentrations of 0.01 to 0.26 grams per litre (as SO_4) and pH levels of 4.9 and 8.9. From these results characteristic values of 0.12 grams per litre for sulphate and pH level of 5.2 would be assessed.

These test results indicate a Design Sulphate Class 1 (DS-1) and Aggressive Chemical Environment for Concrete Class 3z (AC-3z) (BRE Special Digest 1 (2005)) assuming a brownfield site and a mobile groundwater regime.

8 GEOENVIRONMENTAL ASSESSMENT

8.1 Basis of Assessment

In line with existing legislation and the current regime for contaminated land, the site has been assessed using a risk based approach. To undertake this assessment it is necessary to define a conceptual model for the site which identifies the potential sources of contamination, the receptors and the pathways that can connect them. In order for there to be a risk from contamination, there must first be a source, a receptor (an entity which might be affected by the contamination) and a pathway (or mechanism) by which the receptor can be exposed to the contaminant.

Potential sources of contamination are usually associated with current and historical industrial activities, where the processing, storage, use, transportation and disposal of raw materials, products and wastes often leads to the contamination of underlying ground and groundwater. In addition, natural processes can also give rise to contamination such as hazardous gases.

Potential pathways can include dermal contact with or ingestion / inhalation of contaminated soil, permeable ground conditions, underground voids, services, groundwater flow and abstraction and surface water (flow and abstraction).

Potential receptors can include humans, environmental receptors (watercourses, groundwater and protected sites) and buildings or structures.

8.2 Potential Site Sources of Contamination, Pathways and Receptors

As discussed in Section 6, it is proposed to use the site for a new commercial development. Therefore there is the potential for receptors to be affected by any soil contamination via pathways created during and after the development.

Potential receptors relevant for the site are:

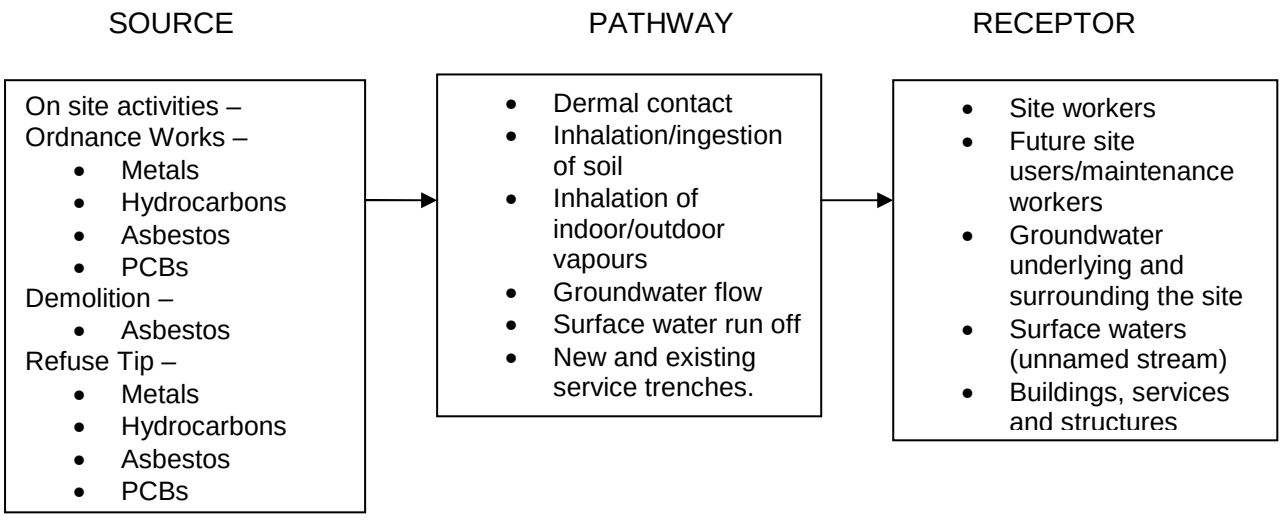
- Site workers during future development

- Future site users and maintenance workers
- Groundwater underlying the site
- A surface watercourse (unnamed stream) along the west boundary of the site.

Potential pathways by which the identified human receptors could be exposed to soil contamination include dermal contact and inhalation and ingestion of soil particles. In the case of the groundwater receptor, a potential pathway exists whereby rainfall could leach out soil contaminants into the groundwater. Contaminants could migrate via groundwater flow to the adjacent watercourse.

The desk study information presented in the report prepared by EL (dated November 2007) on past uses of the site indicates the north east section of the site had been developed previously into an ordnance works and, associated with these works, an area designated as a refuse tip. No details of the contents of the tip are available. The works were demolished in 1978 and no further buildings or works have been constructed on the site. The site was regraded and drainage placed across the site in 1999. The site is currently unoccupied. Potential contaminants could include metals, hydrocarbons, asbestos and polychlorinated biphenyls (PCB) in the area of the former ordnance works and the refuse tip.

The conceptual model is summarised below:



8.3 Soil Contaminants

In order to assess whether there is a source of soil contamination, 53 samples were analysed for pH, metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), sulphate, sulphur, sulphide, total moisture, phenols, cyanide (total and free) chloride and fraction of organic carbon (FOC). Selected samples were also analysed for PCB and screened for asbestos. The chemical analysis results are summarised in the table below.

SUMMARY OF CHEMICAL ANALYSIS RESULTS FOR SOILS FROM GL TO 1.0 m

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL GUIDELINE VALUE (SGV) *	NUMBER EXCEEDING SGV
		MIN.	MAX.		
Arsenic	30	4.9	13.9	500	0
Cadmium	30	<0.1	2.01	1400	0
Chromium (total)	30	7.7	44.3	5000	0
Chromium (hexavalent)	30	<0.1	<0.1	5000	0
Lead	30	8.2	187.2	750	0
Mercury	30	<0.1	0.22	480	0
Nickel	30	<0.5	28.2	5000	0
Selenium	30	<0.5	370.6	8000	0
Phenol	30	<0.5	<0.6	21900	0
Toluene	30	<0.011	<0.032	150	0
Ethylbenzene	30	<0.011	<0.032	48000	0

Notes : *based on end use of commercial/industrial
Units in mg/kg

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL SCREENING LEVEL (SSL) *	NUMBER EXCEEDING SSL
		MIN.	MAX.		
Copper	30	8.2	187.2	45700	0
Zinc	30	<1	212.4	188000	0
Boron (water soluble)	30	<0.5	420	314000	0
PAH (total)	30	<10	123	N/A	N/R
TPH	30	<11.0	1000	N/A	N/R
TPH (>C8 – C10)	30	<2	<3	N/A	N/R
TPH (>C10 – C12)	30	<2	<3	N/A	N/R
TPH (>C12 – C16)	30	<2	17.6	N/A	N/R
TPH (>C16 – C21)	30	<2	148	N/A	N/R
TPH (>C16 – C21)	30	<4.84	727	N/A	N/R
Cyanide (free)	30	<0.5	<0.6	11800	0
Cyanide (total)	30	<0.5	<0.6	11800	0
Sulphur	30	<19	306	N/C	N/R
Sulphate (acid soluble)	30	<19	1740	N/C	N/R
pH (unitless)	30	7.3	10.1	N/R	N/R
Thiocyanate	30	<2.2	<2.5	N/A	N/R

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL SCREENING LEVEL (SSL) *	NUMBER EXCEEDING SSL
		MIN.	MAX.		
Sulphide	30	<0.6	<0.6	N/C	N/R
PCB	4	<5.0	<5.2	14.7	0
FOC	30	0.25	3.16	N/C	N/R
Chloride	30	7.2	102	N/C	N/R
Barium	30	<0.1	420	31000	0
Boron	30	<0.5	3.4	314000	0
Antimony	30	<0.5	1.4	N/A	N/R
Molybdenum	30	<0.5	4.2	N/A	N/R
Xylenes	30	<0.023	<0.063	324	0
Benzene	30	<0.011	<0.032	1.65	0
Total Moisture	30	7.3%	21.5%	N/C	N/R

Notes : *based on end use of commercial/industrial
Units : mg/kg unless stated otherwise
N/A = Not available N/R = Not relevant N/C = Not considered hazardous to human health

SUMMARY OF CHEMICAL ANALYSIS RESULTS FOR SOILS FROM BELOW 1.0 m

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL GUIDELINE VALUE (SGV) *	NUMBER EXCEEDING SGV
		MIN.	MAX.		
Arsenic	23	2.3	27.8	500	0
Cadmium	23	<0.1	0.77	1400	0
Chromium (total)	23	7.9	19.6	5000	0
Chromium (hexavalent)	23	<0.1	<0.1	5000	0
Lead	23	9	39.2	750	0
Mercury	23	<0.1	0.94	480	0
Nickel	23	5.1	25.4	5000	0
Selenium	23	<0.5	1.1	8000	0
Phenol	23	<0.6	<0.9	21900	0
Toluene	23	<0.011	<0.290	150	0
Ethylbenzene	23	<0.011	<0.290	48000	0

Notes : *based on end use of commercial/industrial
Units in mg/kg

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL SCREENING LEVEL (SSL) *	NUMBER EXCEEDING SSL
		MIN.	MAX.		
Copper	23	4.2	27	45700	0
Zinc	23	18.7	203.1	188000	0
Boron (water soluble)	23	<0.5	4.1	314000	0
PAH (total)	23	<10	227	N/A	N/R
TPH	23	<11	611	N/A	N/R
TPH (>C8 – C10)	23	<2	4.73	N/A	N/R
TPH (>C10 – C12)	23	<2	29.9	N/A	N/R
TPH (>C12 – C16)	23	<2	198	N/A	N/R
TPH (>C16 – C21)	23	<2	223	N/A	N/R
TPH (>C16 – C21)	23	<4.85	226	N/A	N/R

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		SOIL SCREENING LEVEL (SSL) *	NUMBER EXCEEDING SSL
		MIN.	MAX.		
Cyanide (free)	23	<0.5	<0.9	11800	0
Cyanide (total)	23	<0.5	<0.9	11800	0
Sulphur	23	<19	968	N/C	N/R
Sulphate (acid soluble)	23	<21	2310	N/C	N/R
pH (unitless)	23	5.8	11.5	N/R	N/R
Thiocyanate	23	<2.2	<3.7	N/A	N/R
Sulphide	23	<0.5	15.6	N/C	N/R
PCB	1	<4.9	<4.9	14.7	0
FOC	23	0.16	5.08	N/C	N/R
Chloride	23	9.2	101	N/C	N/R
Barium	23	3	611	31000	0
Boron	23	<0.5	4.1	314000	0
Antimony	23	<0.5	1.7	N/A	N/R
Molybdenum	23	<0.5	5.3	N/A	N/R
Xylenes	23	<0.022	<0.581	324	0
Benzene	23	<0.011	<0.290	1.65	0
Total Moisture	23	8.9%	45.5%	N/C	N/R

Notes : *based on end use of commercial/industrial
Units : mg/kg unless stated otherwise
N/A = Not available N/R = Not relevant N/C = Not considered hazardous to human health

Within the United Kingdom the risks posed to human health by soil contaminants are assessed using a number of methodologies. One of these methods is the Contaminated Land Exposure Assessment (CLEA) model. Several versions of the model have been published (DEFRA and EA, 2002a, 2002b and 2002c and EA, 2005b). The 2002 version of model was used by the Environment Agency (EA) to derive Soil Guideline Values (SGVs) for a number of contaminants (DEFRA and EA, 2002d, 2004a, 2004b and 2005). The 2005 version of the model (beta version software) was used by Land Quality Management (LQM, 2007) and by SM to derive Soil Screening Levels (SSLs) for some additional contaminants. The derived SGVs/SSLs are for various site uses.

- Residential with gardens in which plants are grown for human consumption
- Residential with gardens but without plant uptake
- Allotments
- Commercial/industrial use where there are open areas which are not hard surfaced.

Following publication of a new version of the CLEA model in August 2008 (EA, 2008a, 2008b and 2008c), the SGVs derived by the EA and the 2005 version of the model used to derive SSLs have been withdrawn. However, no practical guidance has been provided by the EA as to how to

assess soil contamination in the absence of guideline values/screening levels. Therefore, for the purposes of the current report the previous SGVs and SSLs have been used pending new values being published by the EA or derived from the new software. However, it should be noted that if the new values are higher or lower than the existing values, re-assessment of the contamination may be required.

The SGVs/SSLs represent intervention values which act as indicators to an assessor that soil concentrations above this level might present an unacceptable risk to the health of site users and that further investigation and/or remediation is required. Given the proposed use of the site discussed in Section 8.2, the results in the above tables have been compared with a site use of commercial/industrial.

Where a CLEA SGV is not available for a particular contaminant, a Soil Screening Level (SSL) for commercial/industrial site use derived using the CLEA UK (beta version) software by Land Quality Management (LQM, 2007) or by Soil Mechanics has been utilised.

The chemical analysis results detailed in the above table show that the concentrations of the contaminants which have SGVs or SSLs did not exceed their respective guideline values. Therefore, these contaminants are not considered to pose a risk to site users.

No SGV or SSL is currently available for total PAH or TPH concentrations. However, SSLs have been derived for individual PAH. The most harmful PAH is considered to be benzo(a)pyrene and the SSL for commercial use is 29.7 mg/kg. Benzo(a)pyrene typically comprises 1% of the total (ERL, 1988). As the maximum PAH concentration in soil samples was 227 mg/kg, it is unlikely there will be a risk from benzo(a)pyrene or other PAH contamination to site users.

A range of TPH concentrations (maximum 1000 mg/kg) were encountered in soil samples across the site. Soil samples from trial pit TP2 had TPH concentrations in excess of the limit value for mineral oil (500 mg/kg) in the Landfill Waste Acceptance Criteria (DEFRA, 2004) below which waste including waste soil is considered to be inert. TPH concentrations are therefore considered to pose a potential risk to site users in the vicinity of TP2. However, carbon banding indicates that none of the SSLs for the aromatic and aliphatic fractions of the carbon bands were exceeded. Therefore, no actual risk is considered to be present.

The concentrations of copper, nickel and zinc encountered in soil samples are not considered to be high enough to inhibit plant growth (DE, 1989) in any landscaped areas.

The levels of phenol indicate that there would be no adverse effect on buried plastics (ERL, 1988 and WRAS, 2002) across the site. Hydrocarbon (PAH, TPH) concentrations indicate there would be no adverse impact on plastic water pipes (WRAS, 2002) across the majority of the site. A potential risk is present in the vicinity of TP2, TP10, TP11, TP12A, TP14, TP15, TP16, BH101, BH105 and BH109 where the guidance value of 50 mg/kg is exceeded.

No bulk asbestos fibres were observed in any of the samples screened for asbestos.

8.5 Groundwater Contaminants

A total of 5 groundwater samples were collected from boreholes standpipes during the investigation and analysed for metals, phenol, cyanide (free and total), sulphide, total sulphate, thiocyanate, pH, TPH, speciated PAH, chloride, fluoride, molybdenum, antimony, ammoniacal nitrogen, chemical oxygen demand (COD), biological oxygen demand (BOD), total organic carbon (TOC) and BETX (benzene, toluene, ethylbenzene and xylenes). The analysis results are summarised in the table below. The groundwater contamination has been assessed by reference to Environmental Quality Standards (EQS) and Environmental Assessment Levels (EAL) for inland waters published by the various Environment Agencies (EA, 2003a) and the Maximum Admissible Concentrations (MAC) presented in the Water Supply (Water Quality) Regulations (DETR 2000).

SUMMARY OF CHEMICAL ANALYSIS RESULTS FOR GROUNDWATER

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		EQS	EAL	MAC
		MIN.	MAX.			
Arsenic	5	<1	14	50		10
Cadmium	5	<0.1	0.3	5		5
Chromium	5	2	5		5-50*	50
Lead	5	<1	3		4-20*	25
Mercury	5	<0.1	0.1	1		1
Nickel	5	2	15		50-200*	20
Selenium	5	<1	4		N/L	10
Copper	5	<1	6		1-28*	2000
Zinc	5	19	95		8-125*	5000
Boron	5	30	80		2000	1000
Phenol	5	<50	<50		30	0.5
Cyanide (free)	5	<20	<20		1	50
Cyanide (total)	5	<20	<20		N/L	N/L
Sulphide	5	<200	1500		0.25**	
Total sulphate as SO4	5	11mg/l	32mg/l		N/L	250mg/l
Thiocyanate	5	<200	<200		N/L	N/L
pH (unitless)	5	6.6	7.5		6-9	6.5-10

DETERMINAND	NUMBER OF ANALYSES	MEASURED CONCENTRATIONS		EQS	EAL	MAC
		MIN.	MAX.			
TPH	5	<10	140			10
Naphthalene	5	0.010	1.219	10		
Acenaphthylene	5	<0.010	0.021	N/L	N/L	N/L
Acenaphthene	5	<0.010	0.755	N/L	N/L	N/L
Fluorene	5	<0.010	0.478	N/L	N/L	N/L
Phenanthrene	5	<0.010	0.104	N/L	N/L	N/L
Anthracene	5	<0.010	0.365	N/L	N/L	N/L
Fluoranthene	5	<0.010	0.327	N/L	N/L	N/L
Pyrene	5	<0.010	0.204	N/L	N/L	N/L
Benzo(a)anthracene	5	<0.010	0.032	N/L	N/L	N/L
Chrysene	5	<0.010	0.032	N/L	N/L	N/L
Benzo(b)fluoranthene	5	<0.010	0.020			0.025***
Benzo(k)fluoranthene	5	<0.010	0.024			0.025***
Benzo(a)pyrene	5	<0.010	0.021			0.01
Indeno(123-cd)pyrene	5	<0.010	0.010			0.025***
Dibenzo(ah)anthracene	5	<0.010	<0.010	N/L	N/L	N/L
Benzo(ghi)perylene	5	<0.010	<0.010			0.025***
Chloride	5	7mg/l	27mg/l	N/L	N/L	200mg/l
Fluoride	5	0.2mg/l	4.2mg/l	N/L	N/L	1.5mg/l
Molybdenum	5	<1	4	N/L	N/L	N/L
Antimony	5	<1	<1	N/L	N/L	5
Ammoniacal Nitrogen	5	190	11500	N/L	31	500
Chromium (hexavalent)	5	<10	<10	N/L	5-50*	50
COD	5	10000	80000	N/L	N/L	N/L
Total Organic Carbon	5	4000	24000	N/L	N/L	N/L
Barium	5	180	300	N/L	N/L	N/L
BOD	5	<2000	13000	N/L	N/L	N/L
Benzene	5	<5	9	30		
Xylene	5	<10	<10	30		
Toluene	5	<5	<5	50		
Ethylbenzene	5	<5	<5		20	

Notes :
Units : ug/l unless stated otherwise
* The EAL varies with water hardness (mg/l CaCO3)
** As hydrogen sulphide
*** 25% of sum of concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(123-cd) and benzo(ghi)perylene
N/L = not listed

Comparison of the analysis results with the guideline values indicates the groundwater underlying the site is relatively uncontaminated. Many of the analysis results are below the level of detection. It is considered that the majority of the contaminant concentrations in the groundwater do not pose a risk to human health, to groundwater outside the site or to controlled surface waters.

However, there is a risk from benzo(a)pyrene contamination in the vicinity of BH101 and TPH contamination in the vicinity of BH101, BH103, BH105 and BH109.

There is a potential risk posed by elevated levels of copper and zinc. However, the actual risk will be dependant on the water hardness. There is also a potential risk from phenol and cyanide contamination. It should be noted that the guidance values for these contaminants are only exceeded as the limit of detection of the analytical method exceeds the guidance value.

8.6 Site Conceptual Model

In Section 8.2 potential sources of contamination, pathways and receptors were identified for the site based on the available information. These potential pollutant linkages constituted the preliminary conceptual model for the site.

The results of the site investigation have been used to refine the conceptual model and to define the specific source-pathway-receptor pollutant linkages for the site based on the proposed development.

The chemical analysis results in Section 8.3 indicate that there are limited sources of soil contamination at the site and therefore limited source-pathway-receptor pollutant linkages. These relate to risks to groundwater from metallic and hydrocarbon contamination and risks to pipes from hydrocarbon contamination.

8.7 Remediation/Recommendations

The levels of contamination in the analysed soil and groundwater samples are low for the analysed contaminants. Based on the available evidence, the site may be developed without the need for remediation to remove the risks to human health.

It is understood that the majority of the site will be covered by hardstanding on completion of the development. However, there will be landscaping in some areas of the site and a series of ponds in the southern section of the site. Therefore some remediation will be required to remove risks to controlled waters from hydrocarbon contamination. It is recommended that the ground in the vicinity of TP2 is excavated and removed to a suitably licensed disposal facility. A considerable depth of excavation (up to 3.50m below ground level) will be required to remove the risk to

controlled waters and it is recommended that the Environment Agency is consulted about the extent of the remediation.

Further site investigation and chemical analysis is recommended to delineate the TPH contamination in the vicinity of TP2 in order to reduce disposal costs.

Elevated levels of TPH and PAH in some areas of the site have the potential to affect plastic pipes. Where these are being proposed, it is recommended that the ground excavated for the service trenches is disposed of at a suitable licensed landfill facility. Following excavation samples should be taken for chemical analysis in order to confirm the in-situ ground is free from contamination. Should hydrocarbon contamination still be present, the trenches should be lined with an impermeable membrane. The trenches should be backfilled with uncontaminated materials.

Due to the limited nature of all site investigations, there always remains the possibility that pockets of previously undiscovered contamination may be encountered during redevelopment. If any unusual or fibrous materials or signs of contamination spillages are found during the works the area should be fenced off and advice sought on the nature of the possible contamination.

8.8 Construction Health and Safety

Based on the chemical analysis results, the levels of the majority of contaminants in the soil at the site are such that they do not pose a particular hazard to ground workers. However, it is considered that TPH contamination could pose a risk to ground workers in the area of TP2.

Contact with soil should be avoided and standard site hygiene procedures should be implemented, such as wearing gloves and overalls and providing adequate washing facilities. Eating, drinking and smoking should be banned in the working areas to prevent inadvertent ingestion of the soil.

8.9 Disposal of Excavated Materials

The chemical analysis results in Section 8.3 indicate that the majority of excavated materials may be disposed of as non-hazardous waste (EA, 2004 and 2006). It may be possible to dispose of excavated materials characterised as non-hazardous waste with TPH concentrations less than 500mg/kg as inert waste. However, this will require WAC (Waste Acceptance Criteria) testing of the waste to prove it conforms to the definition of inert waste as set out in the Landfill Regulations (DEFRA, 2002, 2004 and 2005).

Soils with concentrations of TPH equal to or greater than 1000 mg/kg but less than 10000 mg/kg are potentially hazardous waste. The current classification system (EA, 2007) is based on the total concentration of eight known carcinogenic PAH in the same sample. If the total exceeds 1% of the TPH concentration then the material is hazardous waste.

A sample for TP2 had a TPH concentration of 1000 mg/kg and a total PAH concentration of <10 mg/kg. Although the total concentration of the 8 PAH has not been determined, clearly the threshold (10 mg/kg) can not be exceeded. Therefore, hazardous waste disposal will not be required for excavated materials in the vicinity of TP2.

9 GAS

Ground gas is largely generated by the decomposition of organic matter, both in natural soils such as peat, and man made deposits such as landfill or other fill materials. The gases that are normally associated with these materials, and which can pose a risk to health, include methane (which is toxic and also potentially explosive), and carbon dioxide (which is toxic). Oxygen depletion is also a consequence of the generation of these other gases.

For the assessment of sites, in terms of the potential for ground gas to present a hazard, the risk-based methodology detailed in CIRIA Report C659 (2007) is used. The above is primarily based on the main method of characterising a site as proposed by Wilson and Card (1999). This method can be used for all types of development except conventional low-rise housing and therefore is appropriate for the proposed industrial development. The method is predominantly centred on a conceptual model which relates possible sources of gas to likely receptors via potential pathways.

The potential risk associated with gases being generated in the ground (whether from natural or man made sources) depends on the concentrations of gas and its rate of flow to the surface. These factors are assessed by monitoring of the gas installations in the boreholes. The variable nature of gas generation, and the effect of barometric pressure on gas flow, means that the volume of gas potentially reaching the ground surface is normally inconsistent over time. It is therefore necessary to undertake a number of monitoring visits over as long a period as is practical (and preferably with varying atmospheric pressure conditions), to establish the full range of gas conditions at the site.

Gas monitoring to date has recorded levels of methane up to 1.2% by volume in air while levels of carbon dioxide levels were up to 4.3 % by volume in air. No hydrogen sulphide was encountered. Oxygen levels ranged from 15.4 to 20.8%. The maximum flow rate recorded was 0.4 litre per hour. The readings were taken with atmospheric pressures ranging from 978 to 1013 mb.

The gas screening value is defined as a product of the gas concentration and gas flow, the worst case scenario being established from the highest of each. The highest measured borehole flow rate was 0.4 l/hr and the highest concentration of methane or carbon dioxide was 4.3%. The gas screening value would therefore be 0.02 l/hr, which is within the range for Characteristic Situation 1 (CIRIA R149 (2007)). This is regarded as 'Very Low Risk', and is normally associated with natural organic soils and 'typical made ground'. For the Characteristic Situation 1 no special precautions would normally need to be adopted but as methane levels are over 1 % it may be advisable to carry out a assessment of those parts of the development that may be at risk (eg small enclosed spaces in contact with the ground) of gas accumulation and adopt Characteristic Situation 2 requirements (CIRIA R149 (2007)) where appropriate.

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ENCLOSURE A
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
Borehole Logs	BH101 to 109R
Trial Pit Logs	TP1 to 17

Key to Exploratory Hole Records

Soil Mechanics

SAMPLES

Undisturbed

U	Driven tube sample
TW	Pushed thin wall tube sample } nominally 100 mm diameter and full recovery unless otherwise stated
P	Pushed piston sample
L	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
CS	Core sample (from rotary core) taken for laboratory testing
AMAL	Amalgamated sample

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C — Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* Vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value
	Test results provided in Field Records column

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930 (1999)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER

▼	Groundwater strike
▽	Groundwater level after standing period

Key to Exploratory Hole Records

Soil Mechanics

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:



SP Standpipe
SPIE Standpipe piezometer
PPIE Pneumatic piezometer
EPIE Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:



ICE Biaxial inclinometer
ICM Inclinometer tubing for use with probe
SLIP Slip indicator

Settlement Points or Pressure Cells

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

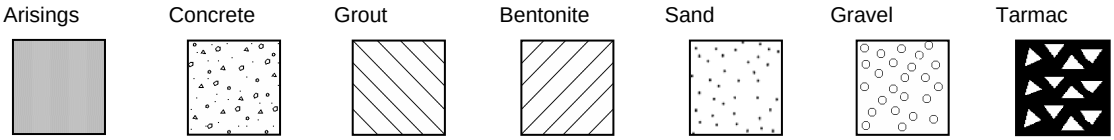
The type of instrument installed is indicated by a code in the Legend column:



ESET Electronic settlement cell/gauge
ETM Magnetic extensometer settlement point
EPCE Electronic embedment pressure cell
PPCE Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.



NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1 (2002), 14688-2 (2004), 14689-1 (2003) and BS 5930 (1999) as clarified by Baldwin et al (2007).

2 Strata legends are in accordance with BS 5930 (1999).

3 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930 : 1999, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

4 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

5 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

6 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

7 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

Key to Exploratory Hole Records

Soil Mechanics

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Updated July 2007

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 27/08/2008 **End** 28/08/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods 1.20 - 5.60m.	**Depth from** 0.00m	**to** 5.60m	**Diameter** 200mm	**Casing Depth** 5.60m	**Ground Level** +199.24 mOD **Coordinates** E 293941.51 **National Grid** N 206685.12 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			27/08/2008	0800 dry
0.30	ES 1			
0.70	ES 2			
1.20-1.47	SPT C	50 (4,10/10,40 for 40mm)	1.20	dry
1.20-1.65	B 3			
1.50	ES 4			
2.00-2.45	SPT C	N=36 (10,6/9,9,9,9)	2.00	1.50
2.00	B 5			
2.50	ES 6			
3.00-3.45	SPT C	N=25 (10,11/10,4,6,5)	3.00	1.60
3.00-3.45	B 7			
			27/08/2008	1700
			3.50	1.60
3.50	ES 8			
4.00-4.45	SPT C	N=30 (6,6/10,7,6,7)	4.00	1.60
4.00-4.45	B 9			
4.50	ES 10			
			28/08/2008	0800
			3.50	1.60
5.00-5.45	SPT C	N=25 (4,5/5,6,7,7)	5.00	1.60
5.00	B 11			
			28/08/2008	1700
5.50-5.81	SPT C	50 (10,10/12,20,18 for 10mm)	5.50	1.60
5.60-5.91	SPT C	30 (25,20/20,10, for 10mm)	5.60	1.60

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Very dense brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone with low cobble content. Cobbles are angular to subangular of sandstone.	(1.50)		
MADE GROUND: Dense and medium dense grey and black slightly silty sandy angular to subangular fine to coarse GRAVEL of sandstone, concrete and brick with low cobble content. Cobbles are angular to subangular of sandstone, concrete and brick. Rare strands of steel wire (10mm).	1.50 *+197.74* (2.00)		
Dense becoming very dense brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, siltstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	3.50 *+195.74* (2.10)		
5.00-5.45 m Medium dense			
EXPLORATORY HOLE ENDS AT 5.60 m	5.60 *+193.64*		

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.50	60 mins	Chisel
1.50 -2.00	90 mins	Chisel
2.00 -3.00	180 mins	Chisel
5.00 -5.50	90 mins	Chisel
5.50 -5.60	60 mins	Chisel

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

Scale 1:50

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Project Hirwaun Industrial Estate
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Borehole

BH101

Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 17/09/2008 **End** 18/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 12.00m. Rotary cored 6.00 - 7.50 and 12.00 - 18.00m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 12.00m / 142mm / 12.00m 12.00m / 18.00m / 106mm	**Ground Level** +199.24 mOD **Coordinates** E 293941.51 **National Grid** N 206685.12 **Chainage**		

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
		*	17/09/2008	0800 dry
6.00-7.50	0 NR 0 NR 0 NR			
7.50-7.60		SPT C (50 for 100mm)	7.50	
9.00-9.45		SPT C N=50 (9,10/14,15,15,6)	9.00	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Made ground sandstone gravel and silty clay and bricks and concrete rubble. (Driller's description)	(3.40)		
Small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)	3.40 *+195.84*		
6.00-7.50 m No recovery.			
7.50 m Very dense.	(8.30)		SP
Stratum continues to 11.70 m			

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	6.00	Rose to 5.90 m after 20 minutes. slow	-
2	10.00	Rose to 7.30 m after 20 minutes. fast	-

Depth Related Remarks *

From	to (m)	
0.00	18.00	Air/mist flush 100% return.

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole

BH101R

Sheet 1 of 2

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 17/09/2008 **End** 18/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 12.00m. Rotary cored 6.00 - 7.50 and 12.00 - 18.00m.	**Depth from** / **to** 0.00m / 12.00m 12.00m / 18.00m	**Diameter** 142mm 106mm	**Casing Depth** 12.00m	**Ground Level** +199.24 mOD **Coordinates** E 293941.51 **National Grid** N 206685.12 **Chainage**	

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
10.50-10.95			SPT C N=53 (10,12/12,11,15,15)	10.50	
12.00-12.15			SPT C (50,25)	12.00	
12.00-13.50			C 1		
			If NI/10/20		
12.00-13.50	93 52 29				
13.50-15.00			C 2		
13.50-15.00	81 60 41				
15.00-16.50		NI 150 300	C 3		
15.00-16.50	95 71 49				
				17/09/2008 12.00	1700
				18/09/2008 12.00	0800 0.95
16.71			C 4		
16.50-18.00	97 67 55				
				18/09/2008 12.00	1200

Strata

Description (Continued from Sheet 1)

Small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)

Depth, *Level* (Thickness): 11.70 *+187.54* (0.30)

Grey siltstone with strong sandstone bands. (Driller's description) (LOWER COAL MEASURES)

Depth, *Level* (Thickness): 12.00 *+187.24* (0.30)

Strong locally very strong grey MUDSTONE.
Weathering: Dark grey staining on discontinuity surfaces.
Discontinuities: Subhorizontal and subvertical extremely closely spaced rough undulating with <1mm silt infill.
(LOWER COAL MEASURES)

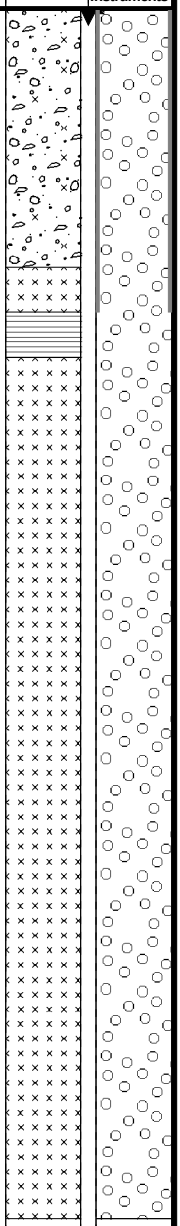
Depth, *Level* (Thickness): 12.30 *+186.94* (5.70)

Very strong grey SILTSTONE.
Weathering: Dark grey staining on discontinuity surfaces, local weakening penetrating <20mm.
Discontinuities: Subhorizontal and 45 degree closely and medium spaced rough and smooth stepped with <1mm silt infill (locally NI). (LOWER COAL MEASURES)

Depth, *Level* (Thickness): 18.00 *+181.24*

EXPLORATORY HOLE ENDS AT 18.00 m

Legend / **Backfill/ Instruments**



Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
2	10.00	Rose to 7.30 m after 20 minutes. fast	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole
BH101R
Sheet 2 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 29/08/2008 **End** 01/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods 1.20 - 7.50m.	**Depth from** 0.00m	**to** 7.50m	**Diameter** 200mm	**Casing Depth** 7.50m	**Ground Level** +199.16 mOD **Coordinates** E 293857.10 **National Grid** N 206723.94 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			29/08/2008	0800 dry
0.30	ES 1			
0.30	W 2			
0.70	ES 3			
1.20-1.32	SPT C	(25,50 for 40mm)	1.20	1.00
1.20	B 4			
1.50	ES 5			
2.00-2.45	SPT C	N=23 (7,7/7,7,4,5)	2.00	1.00
2.00	B 6			
2.50	ES 7			
3.00-3.45	SPT C	N=2 (2,1/0,1,0,1)	3.00	1.50
3.00-3.45	B 8			
3.45-3.90	SPT C	N=4 (1,1/1,1,1,1)	3.00	1.50
3.50	ES 9			
4.00-4.50	U 10	27 mm rec		
			29/08/2008	1700
			4.50	2.00
4.50-4.70	D 11			
			01/09/2008	0800
			4.50	3.40
5.00-5.45	SPT C	N=20 (1,2/4,5,5,6)	5.00	3.40
5.00	B 12			
6.00-6.45	SPT C	N=30 (4,7/5,5,8,12)	6.00	3.40
6.00	B 13			
6.50-6.88	SPT C	50 (12,13/18,17,15,- for 5mm)	6.50	3.40
7.00	B 14			
7.20	B 15			
			01/09/2008	1700
			7.50	3.40
~~7.50-7.95~~	~~SPT C~~	~~N=42 (4,6/10,10,12,10)~~	~~7.50~~	~~3.40~~

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Brown slightly clayey sandy angular to subangular fine to coarse GRAVEL of sandstone with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(1.70)		
Dense brown and grey clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of sandstone with high cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	1.70 *+197.46* (2.20)		
Firm to stiff grey slightly sandy slightly gravelly organic silty CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. (GLACIAL TILL)	3.90 *+195.26* (1.70)		
Medium dense brown and pink slightly silty sandy subangular to subrounded fine to coarse GRAVEL of sandstone, siltstone and quartzite with low cobble content. Cobbles are subrounded of pink sandstone. (Red sandstone boulder - Driller's description.) (FLUVIAL GLACIAL DEPOSITS)	5.60 *+193.56* (1.60)		
Very dense dark grey subangular fine to coarse GRAVEL of siltstone (Possible bedrock).	7.20 *+191.96* (0.30)		
EXPLORATORY HOLE ENDS AT 7.50 m	7.50 *+191.66*		SP

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.70	150 mins	Chisel
1.70 -1.70	30 mins	Chisel
5.60 -5.60	60 mins	Chisel
6.00 -6.00	90 mins	Chisel
6.50 -7.20	90 mins	Chisel

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

Scale 1:50

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Project Hirwaun Industrial Estate

Project No. H8076

Carried out for Enviroparks Ltd

Borehole

BH102

Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 02/09/2008 **End** 03/09/2008	**Equipment, Methods and Remarks** DANDO 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion metods 1.20m to 8.60m.	**Depth from** 0.00m	**to** 8.70m	**Diameter** 200mm	**Casing Depth** 8.70m	**Ground Level** +198.88 mOD **Coordinates** E 293740.83 **National Grid** N 206755.00 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.30	ES 1			
0.60	B 2			
0.70	ES 3			
1.20-1.65	SPT C	N=39 (4,10/10,10,9,10)	1.20	damp
1.20	B 4			
1.50	ES 5			
2.00-2.45	SPT C	N=26 (4,4/6,7,7,6)	2.00	1.50
2.00	B 6			
2.50	ES 7			
2.60	B 8			
3.00-3.50	U 9	27 blows		
3.50	D 10			
3.50	ES 11			
4.00-4.45	SPT S	N=16 (3,4/4,4,4,4)	4.00	2.00
4.00	B 12			
4.50	ES 13			
5.00-5.45	SPT S	N=7 (2,2/2,1,2,2)	5.00	2.60
5.00	B 14			
			02/09/2008 5.70	2.60
6.00-6.45	SPT C	N=8 (2,2/2,2,2,2)	6.00	2.50
6.00	B 15			
6.50	ES 16			
7.00-7.45	SPT C	N=25 (4,6/6,6,7,6)	7.00	2.50
7.00	B 17			
7.50	ES 18			
8.00-8.45	SPT C	N=24 (10,9/8,8,4,4)		
8.00	B 19			
			03/09/2008 8.70	1.50
~~8.70-8.89~~	~~SPT C~~	~~50 (25, for 0mm/ 25,25 for 35mm)~~	~~8.70~~	~~1.50~~
8.70	B 20			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND Dense brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are angular to subangular of sandstone and quartzite.	(2.00)		
Medium dense brown and grey slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are angular to subangular of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	2.00 *+196.88* (0.60) 2.60 *+196.28*		
Soft to firm brown and grey slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. (GLACIAL TILL)	(3.40)		
5.00-6.00 m Grey.			
Loose becoming medium dense grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	6.00 *+192.88* (1.50)		
Medium dense grey and brown slightly clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, quartzite and mudstone with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	7.50 *+191.38* (0.50) 8.00 *+190.88* (0.60)		
Medium dense brown and grey subrounded COBBLES of sandstone and quartzite with a little clay, sand and gravel. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	8.60 *+190.28* 8.70 *+190.18*		
Moderately strong to strong grey stained brown SANDSTONE recovered as angular			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	8.40	Rose to 1.50 m after 20 minutes.	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.60	60 mins	Chisel
7.80 -7.80	45 mins	Chisel
8.40 -8.40	45 mins	Chisel
8.60 -8.70	60 mins	Chisel

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

Scale 1:50

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Project Hirwaun Industrial Estate

Project No. H8076

Carried out for Enviroparks Ltd

Borehole

BH103

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 02/09/2008 **End** 03/09/2008	**Equipment, Methods and Remarks** DANDO 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion metods 1.20m to 8.60m.	**Depth from** 0.00m	**to** 8.70m	**Diameter** 200mm	**Casing Depth** 8.70m	**Ground Level** +198.88 mOD **Coordinates** E 293740.83 **National Grid** N 206755.00 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
Depth	**Type & No**	**Records**	**Date Casing**	**Time Water**

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
cobbles of sandstone.			
EXPLORATORY HOLE ENDS AT 8.70 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Project No. H8076

Carried out for Enviroparks Ltd

Borehole

BH103

Borehole Log

Soil Mechanics

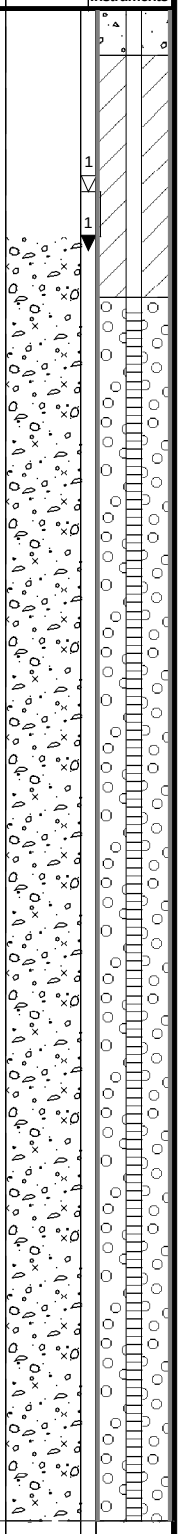
Drilled KO **Logged** RF **Checked** HW	**Start** 23/09/2008 **End** 23/09/2008	**Equipment, Methods and Remarks** Hands England 36 Rotary open hole GL - 10.00m. Rotary cored 10.00 - 15.50m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 10.00m / 142mm / 10.00m 10.00m / 15.50m / 106mm			**Ground Level** +198.88 mOD **Coordinates** E 293740.83 **National Grid** N 206755.00 **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			23/09/2008	0800
		Flush: 0.00-15.50 air/mist, 100 %		

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Made ground brown clay and sandy gravel reworked. (Driller's description)	(1.50)		
Small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)	1.50 *+197.38* (8.50)		



Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	1.50	Rose to 1.20 m after 20 minutes. Medium	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Project Hirwaun Industrial Estate

Project No. H8076

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Borehole

BH103R

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 23/09/2008 **End** 23/09/2008	**Equipment, Methods and Remarks** Hands England 36 Rotary open hole GL - 10.00m. Rotary cored 10.00 - 15.50m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 10.00m / 142mm / 10.00m 10.00m / 15.50m / 106mm	**Ground Level** +198.88 mOD **Coordinates** E 293740.83 **National Grid** N 206755.00 **Chainage**		

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
10.00-10.04	SPT C		(50 for 40mm)		
10.00-11.00	0 0 0	NR NR NR	SPT C (50 for 50mm)		
11.00-11.05					
11.00-12.00	0 0 0				
12.00-12.01			SPT C (50 for 10mm)		
12.00-13.00	98 95 85	100 150 580	C 1		
12.00-13.00					
13.00-14.00	90 64 64		C 2		
13.00-14.00					
14.00-15.50	65 62 62	350 500 730	C 3		
14.00-15.50					
		NR NR NR		23/09/2008 10.00	1800 2.10

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Badly broken sandstone with large joints filled with brown sandy silt. (Driller's description) (LOWER COAL MEASURES)	10.00 *+188.88* (2.00)		SP
Very strong grey fine grained SANDSTONE. Weathering: Orange brown staining on discontinuity surfaces. Discontinuities: Subhorizontal above 13.00m closely spaced below 13.00m medium spaced rough planar. (LOWER COAL MEASURES) 13.50-13.70 m Discontinuity 45 degrees rough planar with orange brown staining on surface. 13.70-15.00 m Discontinuities widely spaced.	12.00 *+186.88* (3.00)		
AZCL. Solid sandstone grey fine grained. (Driller's description)	15.00 *+183.88* (0.50)		
EXPLORATORY HOLE ENDS AT 15.50 m	15.50 *+183.38*		

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole
BH103R
Sheet 2 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 04/09/2008 **End** 08/09/2008	**Equipment, Methods and Remarks** DANDO 2000 Hand dug inspection pit GL - 1.20m. L ight cable percussion methods1.20 - 10.90m.	**Depth from** 0.00m **to** 10.90m **Diameter** 200mm **Casing Depth** 10.90m	**Ground Level** +199.27 mOD **Coordinates** E 293794.50 **National Grid** N 206810.29 **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.30	ES 1			
0.70	ES 2			
1.20-1.65	SPT C	N=27 (4,4/4,6,10,7)	1.20	dry
1.20-1.65	B 3			
1.50	ES 4			
2.00-2.45	SPT C	N=48 (10,10/10,12,12,14)	2.00	1.50
2.00-2.45	B 5			
2.50	ES 6			
2.60	B 7			
3.00-3.50	U 8	27 blows	3.00	2.00
3.50	ES 9			
4.00-4.45	SPT C	N=8 (2,2/2,2,2,2)	4.00	1.60
4.00-4.45	B 10			
4.50	ES 11			
5.00-5.45	SPT C	N=18 (10,10/6,4,4,4)	5.00	2.00
5.00-5.45	B 12			
5.50	ES 13			
			04/09/2008 5.90	2.00
6.00-6.50	U 14	29 blows		
6.50	ES 15			
7.00-7.45	SPT C	N=36 (6,6/8,8,10,10)	7.00	2.60
7.00-7.45	B 16			
8.00-8.45	SPT C	N=50 (6,10/12,12,14,12)	8.00	2.60
8.00-8.45	B 17			
9.00-9.45	SPT C	N=47 (6,8/10,12,12,13)	9.00	2.60
9.00-9.45	B 18			

Strata

Description	Depth, *Level* (Thickness)
MADE GROUND Medium dense to dense brown very clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(2.60)
Soft grey brown and orange slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. (GLACIAL TILL)	2.60 *+196.67* (1.40)
Soft CLAY with large gravel boulders. (Driller's description)	4.00 *+195.27* (0.40)
Medium dense soft grey brown and orange slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. (GLACIAL TILL)	4.40 *+194.87* (2.60)
6.50-7.00 m Dense	
Brown and grey slightly clayey slightly sandy slightly gravelly subangular to subrounded COBBLES of sandstone and quartzite. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	7.00 *+192.27* (3.90)
Stratum continues to 10.90 m	

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	9.10	-	1.50

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.80	60 mins	Chisel

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

Scale 1:50

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Borehole
BH104
Sheet 1 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 04/09/2008 **End** 08/09/2008	**Equipment, Methods and Remarks** DANDO 2000 Hand dug inspection pit GL - 1.20m. L ight cable percussion methods1.20 - 10.90m.	**Depth from** 0.00m	**to** 10.90m	**Diameter** 200mm	**Casing Depth** 10.90m	**Ground Level** +199.27 mOD **Coordinates** E 293794.50 **National Grid** N 206810.29 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.00-10.45 10.00-10.45	SPT C B 19	N=53 (10,10/12,14,17,10)	10.00	1.50
			08/09/2008	
~~10.90-11.01~~ 10.90	~~SPT C~~ B 20	~~50 (25 for 70mm/50 for 40mm)~~	10.90 ~~10.90~~	1.90 ~~1.90~~

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Brown and grey slightly clayey slightly sandy slightly gravelly subangular to subrounded COBBLES of sandstone and quartzite. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	10.90 *+188.37*		
EXPLORATORY HOLE ENDS AT 10.90 m			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
10.50 -10.90	60 mins	Chisel

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

Scale 1:50

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Borehole
BH104
Sheet 2 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 15/09/2008 **End** 15/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods1.20 - 6.00m.	**Depth from** 0.00m	**to** 6.00m	**Diameter** 200mm	**Casing Depth** 6.00m	**Ground Level** +199.53 mOD **Coordinates** E 293875.60 **National Grid** N 206822.06 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			15/09/2008	0800 dry
0.30	ES 1			
0.70	ES 2			
1.20-1.65	SPT C	N=18 (4,3/4,6,4,4)	1.20	dry
1.20-1.65	B 3			
1.50	ES 4			
2.00-2.45	SPT C	N=11 (2,2/2,3,3,3)	2.00	dry
2.00-2.45	B 5			
2.50	ES 6			
3.00-3.45	SPT C	N=23 (4,8/8,5,5,5)	3.00	dry
3.00-3.45	B 7			
3.50	ES 8			
4.00-4.45	SPT C	N=38 (4,4/8,6,12,12)	4.00	dry
4.00-4.45	B 9			
4.50	ES 10			
5.00-5.45	SPT C	N=29 (12,4/5,8,8,8)	5.00	3.10
5.00	B 11			
			15/09/2008	1800
			6.00	3.10
6.00-6.21	SPT C	50 (14,11 for 45mm/ 31,19 for 15mm)	6.00	3.10
6.00	B 12			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Medium dense brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite (Re-worked natural).	(2.00)		
Medium dense becoming dense dark grey mottled brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	2.00 *+197.53* (2.20)		
Dense becoming very dense grey and brown slightly clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with high cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	4.20 *+195.33* (1.80)		
EXPLORATORY HOLE ENDS AT 6.00 m	6.00 *+193.53*		

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
5.00 -5.20	30 mins	Chisel
5.60 -6.00	60 mins	Chisel

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

Scale 1:50

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Borehole
BH105
Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 22/09/2008 **End** 22/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 9.00m. Rotary cored 9.00 - 14.50m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 9.00m / 142mm / 9.00m 9.00m / 14.50m / 106mm	**Ground Level** +199.50 mOD **Coordinates** E 293875.60 **National Grid** N 206822.06 **Chainage**		

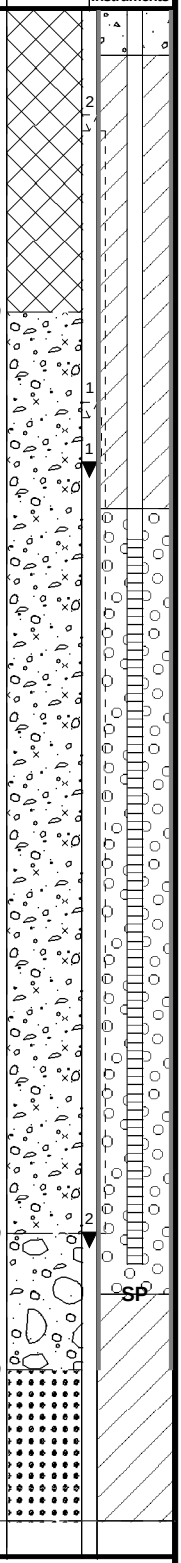
Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			22/09/2008	0800
		Flush: 0.00-14.50 air/mist, 100 %		
8.00-8.06	SPT C	(50 for 60mm)		
9.00-10.00	0 NR 0 NR 0 NR			

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Strata

Description	Depth, *Level* (Thickness)
Made ground brown clay and sandy gravel reworked. (Driller's description)	(2.00)
Small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)	2.00 *+197.50* (6.10)
Very dense large sandstone boulders with medium sandy gravel, possible top of bedrock. (Driller's description) (FLUVIAL GLACIAL DEPOSITS / WEATHERED BEDROCK)	8.10 *+191.40* (0.90)
Badly broken sandstone with large joints filled with brown sandy silt. (Driller's description) (LOWER COAL MEASURES)	9.00 *+190.50* (1.00)



Depth	Legend	Backfill/ Instruments

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	3.00	Rose to 2.70 m after 20 minutes. Medium	5.00
2	8.10	Rose to 0.80 m after 20 minutes. Fast	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole

BH105R

Sheet 1 of 2

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 22/09/2008 **End** 22/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 9.00m. Rotary cored 9.00 - 14.50m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 9.00m / 142mm / 9.00m 9.00m / 14.50m / 106mm	**Ground Level** +199.50 mOD **Coordinates** E 293875.60 **National Grid** N 206822.06 **Chainage**			

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
10.00-10.01			SPT C (50 for 10mm)		
10.00-11.50			C 1		
	95				
10.00-11.50	83				
	75				
11.50-13.00			C 2		
	95	50			
11.50-13.00	67	200			
	59	420			
13.00-14.50			C 3		
13.00			CS 4		
	97				
13.00-14.50	67				
	63				
				22/09/2008 9.00	1800

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Very strong grey fine grained SANDSTONE. Weathering: Rare orange brown staining on discontinuity surfaces. Discontinuities: Subhorizontal and 45 degree medium spaced (locally closely) rough planar and rough stepped, locally with <1mm clay infill. (LOWER COAL MEASURES)	10.00 *+189.50*		
	(4.50)		
14.10-14.20 m NI recovered as angular coarse gravel of sandstone.	14.50 *+185.00*		
EXPLORATORY HOLE ENDS AT 14.50 m			

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole

BH105R

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 09/09/2008 **End** 09/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods 1.20 - 3.40m.	**Depth from** 0.00m	**to** 3.40m	**Diameter** 200mm	**Casing Depth** 3.40m	**Ground Level** +199.80 mOD **Coordinates** E 293799.73 **National Grid** N 206899.27 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			09/09/2008	0800 dry
0.30	ES 1			
0.70	ES 2			
1.20-1.65	SPT C	N=14 (3,3/4,4,2,4)	1.20	dry
1.20	B 4			
1.50	ES 5			
2.00-2.45	SPT C	N=13 (3,2/3,3,4,3)	2.00	1.60
2.00	B 6			
2.50	ES 7			
3.00-3.43	SPT C	N=46 (16,9 for 55mm/14,14,9,9)	3.00	2.00
3.00	B 8			
			10/09/2008	1200
			3.40	2.00
~~3.40-3.57~~	~~SPT C~~	~~20 (25,30/20 for 20mm)~~	~~3.40~~	~~2.00~~

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, quartzite and brick with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(2.00)		
Medium dense becoming dense brown grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobbble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	2.00 *+197.80* (1.20)		
Very dense brown and grey slightly clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with high cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	3.20 *+196.60* 3.40 *+196.40*		
EXPLORATORY HOLE ENDS AT 3.40 m			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
3.00 -3.40	105 mins	Chisel

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

Scale 1:50

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Project No. H8076
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Borehole
BH106
Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 11/09/2008 **End** 12/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable precussion methods 1.20 - 4.20m.	**Depth from** 0.00m	**to** 4.20m	**Diameter** 200mm	**Casing Depth** 4.20m	**Ground Level** +199.95 mOD **Coordinates** E 293981.43 **National Grid** N 206822.81 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			11/09/2008	0800 dry
0.30	ES 1			
0.70	ES 2			
1.20-1.65	SPT C	N=20 (4,2/4,6,6,4)	1.20	dry
1.20-1.45	B 3			
			11/09/2008	1700
			1.80	dry
2.00-2.45	SPT C	N=27 (3,3/4,5,9,9)	2.00	1.80
2.00-2.45	B 4			
2.50	ES 5			
3.00-3.45	SPT C	N=37 (4,5/8,9,10,10)	3.00	2.40
3.00-3.45	B 6			
3.50	ES 7			
4.00-4.09	SPT C	(75 for 90mm)	4.00	3.00
4.00-4.09	B 8		12/09/2008	1700
4.20-4.26	SPT C	(75 for 55mm)	4.00	3.00

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Medium dense brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite (Re-worked natural).	(1.80)		
	1.80 *+198.15*		
Medium dense becoming dense brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	(2.00)		
	3.80 *+196.15*		
Moderately strong grey stained brown SANDSTONE recovered as: angular fine to coarse gravel of sandstone.	(0.40)		
	4.20 *+195.75*		
EXPLORATORY HOLE ENDS AT 4.20 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.80	90 mins	Chisel
3.80 -4.00	60 mins	Chisel
4.00 -4.20	60 mins	Chisel

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

Scale 1:50

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Project No. H8076

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Borehole

BH107

Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 18/09/2008 **End** 19/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inpsection pit GL - 1.20m. Rotary open holed 1.20 - 8.50m. Rotary cored 8.50 - 13.50m.	**Depth from** / **to** 0.00m / 8.50m 8.50m / 13.50m	**Diameter** 142mm 106mm	**Casing Depth** 8.50m	**Ground Level** +199.92 mOD **Coordinates** E 293970.55 **National Grid** N 206841.49 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			18/09/2008	0800
4.50-4.95	SPT C	N=48 (9,10/11,13,12,12)		
6.00-6.45	SPT C	N=43 (9,10/10,10,11,12)		
		Flush: 0.00-13.50 air/mist, 100 %		
7.50-7.95	SPT C	N=41 (10,10/9,10,11,11)		
8.50-8.51 8.50-10.00	SPT C 1	(50 for 10mm)		
8.50-10.00	63 5 0	NI NI 80		

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Made ground sandstone gravel and silty clay and bricks and concrete rubble. (Driller's description)	(1.70)		
Dense small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)	1.70 *+198.22*		
	(6.60)		
Badly broken sandstone with large joints filled with brown sandy silt. (Driller's description)	8.30 *+191.62* 8.50 *+191.42*		
Medium strong locally strong grey fine grained SANDSTONE. Largely NI recovered as medium to coarse angular gravel. Weathering: Orange brown discolouration on discontinuity surfaces. Discontinuities: Intact core very closely to closely spaced subhorizontal	(2.50)		
Stratum continues to 11.00 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	0.90	Rose to 0.80 m after 20 minutes. Fast	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole
BH107R
Sheet 1 of 2

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 18/09/2008 **End** 19/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inpsection pit GL - 1.20m. Rotary open holed 1.20 - 8.50m. Rotary cored 8.50 - 13.50m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 8.50m / 142mm / 8.50m 8.50m / 13.50m / 106mm	**Ground Level** +199.92 mOD **Coordinates** E 293970.55 **National Grid** N 206841.49 **Chainage**			

Samples and Tests

Strata

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
10.00-11.00			C 2			and subvertical smooth stepped, with <2mm sandy silt infill. (LOWER COAL MEASURES)			
10.00-11.00	98 6 0			18/09/2008 8.50	1800				
11.00-12.00			C 3	19/09/2008 8.50	0800 0.80	No recovery. Badly broken sandstone with large joints filled with brown sandy silt. (Driller's description) (LOWER COAL MEASURES)	11.00 *+188.92* (1.00)		
11.00-12.00	0 0 0	NR NR NR							
12.00-12.04			SPT C (50 for 40mm)				12.00 *+187.92*		
12.00-13.50			C 4			Very strong grey fine grained SANDSTONE. Weathering: Orange brown staining on discontinuity surfaces. Discontinuities: Subhorizontal and subvertical very closely to closely spaced rough planar and smooth stepped. (LOWER COAL MEASURES)	(1.50)		
12.00-13.50	67 29 13	NI 30 100							
				19/09/2008 8.50	1300				
13.50-13.53			SPT C (80 for 30mm)			EXPLORATORY HOLE ENDS AT 13.50 m	13.50 *+186.42*		

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole

BH107R

Sheet 2 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 10/09/2008 **End** 10/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods 1.20 - 1.80m.	**Depth from** 0.00m	**to** 1.80m	**Diameter** 200mm	**Casing Depth** 1.80m	**Ground Level** +199.87 mOD **Coordinates** E 293862.79 **National Grid** N 206911.57 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.30	ES 1			
0.70	ES 2			
1.20-1.43	SPT C	50 (10,12/50)	1.20	dry
1.20	B 3			
1.50	ES 4			
~~1.80-2.02~~	~~SPT C~~	~~50 (25,25/50 for 70mm)~~	~~1.80~~	~~1.00~~
1.80	D 5		10/09/2008	0800
			1.80	dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Very dense brown clayey slightly gravelly subangular fine to coarse GRAVEL of sandstone and quartzite with high cobble content. Cobbles are subangular of sandstone and quartzite. (FLUVIAL GLACIAL DEPOSITS)	(1.80)		
EXPLORATORY HOLE ENDS AT 1.80 m	1.80 *+198.07*		

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.80	90 mins	Chisel

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

Scale 1:50

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Borehole
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Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 18/09/2008 **End** 22/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 6.00m. Rotary cored 6.00 - 12.00m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 6.00m / 142mm / 6.00m 6.00m / 12.00m / 106mm	**Ground Level** +199.87 mOD **Coordinates** E 293862.79 **National Grid** N 206911.57 **Chainage**			

Samples and Tests

Depth	Type & No	TCR SCR RQD	If	Records	Date Casing	Time Water
3.00-3.45	SPT C			N=39 (5,7/10,9,9,11)		
4.50-4.95	SPT C			N=41 (8,9/9,10,9,13)		
6.00-6.06	SPT C			(50 for 60mm)	18/09/2008 6.00	1800
6.00-7.00	0 0 0				22/09/2008 6.00	0800 0.80
7.00-7.02				SPT C (50 for 20mm)		
7.00-8.00	0 0 0					
8.00-8.01			NR NR NR	SPT C (50 for 10mm)		
8.00-9.00	0 0 0					
9.00-9.06				SPT C (50 for 55mm)		
9.00-10.00	0 0 0					

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Dense small to medium sandy gravel with bands of silty brown clay and large cobbles and sandstone boulders. (Driller's description) (FLUVIAL GLACIAL DEPOSITS)	(4.60)		
Dense large sandstone boulders with medium sandy gravel possible top of bedrock. (Driller's description)	4.60 *+195.27* (1.20)		
No recovery. Badly broken sandstone with large joints filled with brown sandy silt. (Driller's description) (LOWER COAL MEASURES)	5.80 *+194.07* (4.20)		

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	0.90	Rose to 0.80 m after 20 minutes. Fast	-

Depth Related Remarks *

From / to (m)

Chiselling

Depths (m) / Time / Tools used

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

Scale 1:50

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Borehole

BH108R

Sheet 1 of 2

Borehole Log

Soil Mechanics

Drilled KO **Logged** RF **Checked** HW	**Start** 18/09/2008 **End** 22/09/2008	**Equipment, Methods and Remarks** Hands England 36 Hand dug inspection pit GL - 1.20m. Rotary open holed 1.20 - 6.00m. Rotary cored 6.00 - 12.00m.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 6.00m / 142mm / 6.00m 6.00m / 12.00m / 106mm	**Ground Level** +199.87 mOD **Coordinates** E 293862.79 **National Grid** N 206911.57 **Chainage**			

Samples and Tests

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water
10.00-10.02			SPT C (50 for 15mm)		
10.00-11.00			C 1		
	67				
10.00-11.00	10				
	10	NI			
		30			
		100			
11.00			SPT C (50 for 0mm)		
11.00-12.00			C 2		
11.34			CS 3		
	85				
11.00-12.00	55				
	55	250			
		250			
		350		22/09/2008 6.00	1800
12.00-12.02			SPT C (50 for 20mm)		

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Very strong grey fine grained SANDSTONE. Weathering: Orange brown and dark grey staining on discontinuity surfaces. Discontinuities: Subhorizontal and subvertical very closely and closely spaced rough planar, with upto 40mm sandy silt infill. (some core loss). (LOWER COAL MEASURES)	10.00 *+189.87* (1.40)		
Very strong grey fine grained SANDSTONE. Weathering: Slight brown staining on discontinuity surfaces. Discontinuities: Subhorizontal medium spaced rough planar. (LOWER COAL MEASURES)	11.40 *+188.47* (0.60)		
EXPLORATORY HOLE ENDS AT 12.00 m	12.00 *+187.87*		

Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

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

Scale 1:50

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Borehole
BH108R
Sheet 2 of 2

Borehole Log

Soil Mechanics

Drilled MY **Logged** PL **Checked** HW	**Start** 10/09/2008 **End** 11/09/2008	**Equipment, Methods and Remarks** Dando 2000 Hand dug inspection pit GL - 1.20m. Light cable percussion methods 1.20 - 3.00m.	**Depth from** 0.00m	**to** 3.00m	**Diameter** 200mm	**Casing Depth** 3.00m	**Ground Level** +199.96 mOD **Coordinates** E 293933.25 **National Grid** N 206877.21 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
			10/09/2008	0800 dry
0.30	ES 1			
0.70	ES 2			
1.20-1.29	SPT C	(75 for 90mm)	1.20	0.30
1.20-1.29	B 3			
1.50	ES 4			
2.00-2.45	SPT C	N=31 (10,10/8,7,8,8)	2.00	1.50
2.00-2.45	B 5			
2.50	ES 6			
2.80	B 7		11/09/2008	1700
			3.00	0.30
~~3.00-3.06~~	~~SPT C~~	~~(75 for 60mm)~~	~~3.00~~	~~0.30~~

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
MADE GROUND: Grey brown and red slightly silty slightly sandy angular to subangular fine to coarse GRAVEL of sandstone, brick, concrete and quartzite with medium cobble content. Cobbles are angular to subangular of sandstone, concrete and brick.	(2.80)		
Moderately strong grey stained brown SANDSTONE recovered as: angular fine to coarse gravel of sandstone (Possible weathered bedrock).	2.80 *+197.16* 3.00 *+196.96*		SP
EXPLORATORY HOLE ENDS AT 3.00 m			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
1.20 -1.50	60 mins	Chisel
1.80 -2.00	30 mins	Chisel
2.30 -2.50	30 mins	Chisel
2.50 -2.80	90 mins	Chisel
2.80 -3.00	90 mins	Chisel

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

Scale 1:50

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Borehole

BH109

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 22/08/2008 **End** 22/08/2008	**Equipment, Methods and Remarks** CAT 428C Machine excavated trial pit GL - 0.50m. Pit moved 5.00m NW.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A D B C 305 (Deg)	**Ground Level** +199.65 mOD **Coordinates** E 293921.63 **National Grid** N 206645.27 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		* 0800 22/08/2008 dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite.	(0.50)		
EXPLORATORY HOLE ENDS AT 0.50 m	0.50 *+199.15*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)	
0.00	0.50	Pit terminated at 0.50m due to discovery of blue water pipe marker tape.

Stability Stable

Shoring None

Weather Raining

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

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Project Hirwaun Industrial Estate

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Trial Pit

TP1

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 22/08/2008 **End** 22/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL- 3.80m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 305 (Deg)	**Ground Level** +199.51 mOD **Coordinates** E 293916.98 **National Grid** N 206649.83 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		1000
0.30	ES 1	
0.30	D 6	
0.50	B 11	
0.70	ES 2	
0.70	D 7	
1.50	B 12	
1.50	ES 3	
1.50	D 8	
2.50	B 13	
2.50	ES 4	
2.50	D 9	
3.50	D 10	
3.50	B 14	
3.50	ES 5	
		22/08/2008 dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite.	0.10 *+199.41*		
2 MADE GROUND: Dark brown very clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. 3 boulders of 650 x 650m.	(0.80)		
3 MADE GROUND: Soft to firm black grey and brown sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone, quartzite and brick.	0.90 *+198.61*		
	(1.20)		
4 Soft to firm brown mottled orange and grey slightly sandy slightly gravelly silty CLAY with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible reworked natural material. (GLACIAL TILL)	2.10 *+197.41*		
	(1.70)		
EXPLORATORY HOLE ENDS AT 3.80 m	3.80 *+195.71*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Scale 1:25

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Project No. H8076

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Trial Pit

TP1A

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 22/08/2008 **End** 22/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D → 205 (Deg)	**Ground Level** +199.44 mOD **Coordinates** E 293949.01 **National Grid** N 206705.96 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		1200
0.30	ES 1	
0.30	D 7	
0.50	B 13	
0.70	ES 2	
0.70	D 8	
1.30	ES 3	
1.30	D 9	
1.50	B 14	
1.70	D 10	
1.70	ES 4	
2.50	B 15	
2.70	D 11	
2.70	ES 5	
3.30	D 12	
3.30	ES 6	22/08/2008 1400
3.50	B 16	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Dark brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite.	0.10 *+199.34*		
2 MADE GROUND: Brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(1.30)		
3 MADE GROUND: Dark grey silty sandy subangular to subrounded fine to coarse GRAVEL of sandstone, quartzite and brick with medium cobble content. Cobbles are subangular to subrounded of sandstone, quartzite and brick. Rare fragments of glass, metal and wall ties. Small pockets of clay. 1 boulder of quartzite (750 x 700mm).	1.40 *+198.04* (0.60)		
4 MADE GROUND: Soft to firm black , brown and grey slightly sandy slightly gravelly clayey SILT with much decomposed plant material. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite with rare whole bricks. 2.70-2.80 m Strong hydrocarbon smell	2.00 *+197.44* (1.50)		
EXPLORATORY HOLE ENDS AT 3.50 m	3.50 *+195.94*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	2.40	Remained at 2.40 m after 20 minutes. Seepage

Depth Related Remarks *
From to (m)

Stability Stable
Shoring None
Weather Raining

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

Scale 1:25

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Trial Pit
TP2
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 21/08/2008 **End** 21/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 2.30m. Trench was opened to 6.00m for observation of wall.	**Dimensions and Orientation** Width 0.60 m Length 6.00 m A / D / B / C 160 (Deg)	**Ground Level** +199.66 mOD **Coordinates** E 293960.06 **National Grid** N 206769.19 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.20	ES 1	
0.20	D 5	
0.20	B 9	
0.50	B 10	
0.50	ES 2	
0.50	D 6	
1.20	B 11	
1.20	ES 3	
1.20	D 7	
1.90	B 12	
1.90	ES 4	
1.90	D 8	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.	(0.30)		
	0.30 *+199.36*		
2 MADE GROUND: Orange brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Rare steel bar 15mm x 15mm.			
Double brick cavity wall at 2.20m depth running at 220 degrees. Bricks are orange red and cement bonded.	(2.00)		
2.20 m Brick wall			
EXPLORATORY HOLE ENDS AT 2.30 m	2.30 *+197.36*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	0.00	Seepage from surface

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Project Hirwaun Industrial Estate

Project No. H8076

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Trial Pit

TP3

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 22/08/2008 **End** 22/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 230 (Deg)	**Ground Level** +199.29 mOD **Coordinates** E 293876.50 **National Grid** N 206719.70 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 11	
0.30	D 6	
0.70	ES 2	
0.70	D 7	
1.30	B 12	
1.40	ES 3	
1.40	D 8	
2.30	B 13	
2.40	ES 4	
2.40	D 9	
3.30	B 14	
3.40	D 10	
3.40	ES 5	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown very clayey sandy subangular to subrounded fine to coarsre GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.40)		
2 MADE GROUND: Brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, quartzite and brick with low cobble content. Cobbles are subangular to subrounded of sandstone, quartzite and brick.	0.40 *+198.89* (2.20)		
3 MADE GROUND: Soft to firm grey and black slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. 3 boulders of quartzite 700mm x 700mm. Rare small pockets of black silty sand 100mm x 100mm. Possible re-worked natural material.	2.60 *+196.69* (0.90)		
EXPLORATORY HOLE ENDS AT 3.50 m	3.50 *+195.79*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Project No. H8076

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Trial Pit

TP4

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 22/08/2008 **End** 22/08/2008	**Equipment, Methods and Remarks** cat428c Machine excavated trial pit GL - 3.60m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A / D / B / C → 220 (Deg)	**Ground Level** +199.27 mOD **Coordinates** E 293841.16 **National Grid** N 206752.36 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 11	
0.30	D 6	
0.60	B 12	
0.60	ES 2	
0.60	D 7	
1.20	B 13	
1.20	ES 3	
1.20	D 8	
2.00	ES 4	
2.00	D 9	
2.20	B 14	
3.00	D 10	
3.00	ES 5	
3.20	B 15	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Dark brown clayey subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.40)		
	0.40 *+198.87*		
2 MADE GROUND: Orange brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.30)		
	0.70 *+198.57*		
3 MADE GROUND: Grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Rare gravel sized lumps of green glassy fused slag.	(0.80)		
	1.50 *+197.77*		
4 MADE GROUND: Grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(1.10)		
	2.60 *+196.67*		
5 MADE GROUND: Soft to firm grey brown and black slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone, brick and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Rare fragments of cardboard and steel wire. 3.00 m 2 boulders of quartzite 700mm x 700mm	(1.00)		
	3.60 *+195.67*		
EXPLORATORY HOLE ENDS AT 3.60 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	0.00	Seepage from surface

Depth Related Remarks *
From to (m)

Stability Stable
Shoring None
Weather Raining

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

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Trial Pit
TP5
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 20/08/2008 **End** 20/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A / D / B / C → 212 (Deg)	**Ground Level** +199.05 mOD **Coordinates** E 293790.98 **National Grid** N 206748.53 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 13	
0.30	D 7	
0.70	ES 2	
0.70	D 8	
0.90	B 14	
0.90	ES 3	
0.90	D 9	
1.60	D 10	
1.60	B 15	
1.60	ES 4	
2.60	D 11	
2.60	B 16	
2.60	ES 5	
3.50	D 12	
3.50	B 17	
3.50	ES 6	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.	0.10 *+198.95*		
2 MADE GROUND: Brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.50)		
3 MADE GROUND: Orange brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked natural material.	0.60 *+198.45* (1.40)		
4 MADE GROUND: Grey mottled black clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked natural material.	2.00 *+197.05* (1.00)		
5 Soft to firm grey brown and black clayey SILT with rare small pockets of black woody peat and many roots and rootlets. (ALLUVIUM)	3.00 *+196.05* (0.50)		
EXPLORATORY HOLE ENDS AT 3.50 m	3.50 *+195.55*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Collapsing below 2.00m.

Shoring None

Weather Raining

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

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Trial Pit

TP6

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 21/08/2008 **End** 21/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.80m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 140 (Deg)	**Ground Level** +199.20 mOD **Coordinates** E 293755.36 **National Grid** N 206802.22 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 13	
0.30	D 7	
0.70	B 14	
0.70	ES 2	
0.70	D 8	
1.20	B 15	
1.20	ES 3	
1.20	D 9	
2.20	D 10	
2.20	B 16	
2.20	ES 4	
3.20	D 11	
3.20	B 17	
3.20	ES 5	
3.70	D 12	
3.70	B 18	
3.70	ES 6	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Brown clayey sandy angular to subangular fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are angular to subangular of sandstone and quartzite.	(0.40)		
2 MADE GROUND: Grey and dark grey very clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and quartzite with low cobble content. Cobbles are angular to subangular of sandstone and quartzite.	0.40 *+198.80* (0.55)		
3 Brown orange and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (FLUVIAL GLACIAL DEPOSITS)	0.95 *+198.25* (0.75)		
4 Grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (FLUVIAL GLACIAL DEPOSITS)	1.70 *+197.50* (1.80)		
5 Soft to firm grey mottled brown and orange slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. (GLACIAL TILL)	3.50 *+195.70* (0.30)		
EXPLORATORY HOLE ENDS AT 3.80 m	3.80 *+195.40*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	0.00	Seepage from surface

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Project No. H8076

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Trial Pit

TP7

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Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 21/08/2008 **End** 21/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 2.30m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 200 (Deg)	**Ground Level** +199.43 mOD **Coordinates** E 293863.26 **National Grid** N 206795.70 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 11	
0.30	D 6	
0.60	ES 2	
0.60	D 7	
0.80	B 12	
0.80	ES 3	
0.80	D 8	
1.50	B 13	
1.50	ES 4	
1.50	D 9	
2.10	D 10	
2.10	B 14	
2.10	ES 5	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.	0.10 *+199.33*		
2 MADE GROUND: Grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.60)		
3 Orange brown very clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. Unable to progress below 2.30m. (POSSIBLE FLUVIAL GLACIAL DEPOSITS)	0.70 *+198.73*		
	(1.60)		
EXPLORATORY HOLE ENDS AT 2.30 m	2.30 *+197.13*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	0.00	Strong inflow from surface

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Project Hirwaun Industrial Estate

Project No. H8076

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Trial Pit

TP8

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 21/08/2008 **End** 21/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 178 (Deg)	**Ground Level** +199.93 mOD **Coordinates** E 293971.87 **National Grid** N 206818.72 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.20	ES 1	
0.20	B 11	
0.20	D 6	
0.70	B 12	
0.70	ES 2	
0.70	D 7	
1.40	B 13	
1.40	ES 3	
1.40	D 8	
2.40	B 14	
2.40	ES 4	
2.40	D 9	
3.40	D 10	
3.40	B 15	
3.40	ES 5	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.30) 0.30 *+199.63*		
2 MADE GROUND: Grey and brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, brick and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(1.00) 1.30 *+198.63*		
3 MADE GROUND: Grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, brick and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone, brick and quartzite.	(1.60) 2.90 *+197.03*		
4 Soft grey slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. (GLACIAL TILL)	(0.60) 3.50 *+196.43*		
EXPLORATORY HOLE ENDS AT 3.50 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Project Hirwaun Industrial Estate

Project No. H8076

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Trial Pit

TP9

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged	PL	Start	20/08/2008	Equipment, Methods and Remarks	Dimensions and Orientation	Ground Level	+199.54 mOD
Checked	HW	End	20/08/2008	CAT428C Machine excavated trial pit GL - 3.10m.	Width 0.60 m Length 5.00 m A / D / B / C → 130 (Deg)	Coordinates National Grid Chainage	E 293832.84 N 206821.27

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	D 5	
0.30	B 9	
0.70	B 10	
0.70	ES 2	
0.70	D 6	
1.70	B 11	
1.70	ES 3	
1.70	D 7	
2.70	B 12	
2.70	ES 4	
2.70	D 8	
		*

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite.	(0.70)		
2 MADE GROUND: Grey and dark grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, brick and quartzite with rare whole bricks. Rare fragments of steel wire, clay pipe and glass. Pit was terminated at 3.10m due to a black cast iron pipe of approximately 9 inches diameter running the length of the pit.	0.70 *+198.84* (2.40)		
EXPLORATORY HOLE ENDS AT 3.10 m	3.10 *+196.44*		

Depth	Type & No.	Records Date

Groundwater Entries

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

Depth Related Remarks *

From (m)	to (m)	
3.10		Cast iron pipe

Stability Stable

Shoring None

Weather Raining

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

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Trial Pit

TP10

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 20/08/2008 **End** 20/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D → 238 (Deg)	**Ground Level** +199.98 mOD **Coordinates** E 293809.63 **National Grid** N 206940.04 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 10	
0.30	D 6	
0.60	ES 2	
1.20	B 11	
1.30	ES 3	
1.30	D 7	
2.20	B 12	
2.30	ES 4	
2.30	D 8	
3.20	B 13	
3.30	ES 5	
3.30	D 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft dark brown sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone, brick and quartzite. Cobbles are subangular to subrounded of sandstone, brick and quartzite. Rare whole bricks.	(0.40)		
	0.40 *+199.58*		
2 MADE GROUND: Black silty fine SAND.	(0.30)		
	0.70 *+199.28*		
3 MADE GROUND: Soft grey brown and blue slightly organic silty CLAY.	(0.70)		
	1.40 *+198.58*		1
4 MADE GROUND:Stiff brown orange and grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Rare fragments of glass, asbestos cement and metal.	(2.10)		
	3.50 *+196.48*		
EXPLORATORY HOLE ENDS AT 3.50 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.40	Seepage

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather Raining

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

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Trial Pit

TP11

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 20/08/2008 **End** 20/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 1.80m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 225 (Deg)	**Ground Level** +199.83 mOD **Coordinates** E 293845.19 **National Grid** N 206914.26 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.10	ES 1	
0.10	D 4	
0.10	B 8	
0.30	D 5	
0.30	B 7	
0.50	ES 2	
1.30	ES 3	
1.30	D 6	
1.30	B 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite.	0.10 *+199.73*		
2 Orange brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (POSSIBLE FLUVIAL GLACIAL DEPOSITS)	(1.60)		1
3 Grey angular COBBLES AND BOULDERS of sandstone and quartzite. Possible weathered bedrock.	1.70 *+198.13*		
EXPLORATORY HOLE ENDS AT 1.80 m	1.80 *+198.03*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.40	Strong inflow

Depth Related Remarks *
From to (m)

Stability Collapsing below 1.50m.
Shoring None
Weather Raining

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

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Trial Pit
TP11A
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 18/08/2008 **End** 18/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 1.75m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 265 (Deg)	**Ground Level** +199.90 mOD **Coordinates** E 293875.53 **National Grid** N 206902.89 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	D 4	
0.30	B 7	
0.70	ES 2	
0.70	D 5	
0.70	B 8	
1.30	ES 3	
1.30	D 6	
1.30	B 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 Brown slightly clayey sandy angular fine to coarse GRAVEL of sandstone and quartzite with high cobble content. Cobbles are angular of sandstone and quartzite. Possible weathered bedrock.	(1.75)		
EXPLORATORY HOLE ENDS AT 1.75 m	1.75 *+198.15*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.70	Seepage

Depth Related Remarks *
From to (m)

Stability Stable

Shoring None

Weather Heavy rain

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

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Trial Pit
TP12
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 20/08/2008 **End** 20/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 1.80m. Pit was 1.40m from north boudary fence.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 105 (Deg)	**Ground Level** +200.56 mOD **Coordinates** E 293874.48 **National Grid** N 206934.10 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.20	ES 1	
0.20	D 4	
0.20	B 7	
0.60	ES 2	
0.60	D 5	
0.60	B 8	
1.50	ES 3	
1.50	D 6	
1.50	B 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft dark brown sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone, brick and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.30) 0.30 *+200.26*		
2 Stiff orange brown and grey slightly sandy slightly gravelly silty CLAY with high cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Unable to progress beyond 1.80m.	(1.50)		
1.70 m Possible weathered bedrock at base of trial pit.			
EXPLORATORY HOLE ENDS AT 1.80 m	1.80 *+198.76*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.80	Seepage

Depth Related Remarks *
From to (m)

Stability Stable
Shoring None
Weather Raining

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

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Scale 1:25

Project Hirwaun Industrial Estate
Project No. H8076
Carried out for Enviroparks Ltd

Trial Pit
TP12A
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 19/08/2008 **End** 19/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 2.30m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 310 (Deg)	**Ground Level** +200.39 mOD **Coordinates** E 293900.08 **National Grid** N 206910.71 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	D 5	
0.30	B 9	
0.70	B 10	
0.70	ES 2	
0.70	D 6	
1.30	B 11	
1.30	ES 3	
1.30	D 7	
2.30	B 12	
2.30	ES 4	
2.30	D 8	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft black sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone, brick and quartzite. Cobbles are subangular to subrounded of sandstone, brick and quartzite.	(0.35)		
2 Stiff orange brown and grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Possible weathered bedrock. (GLACIAL TILL)	0.35 *+200.04* (1.95)		
2.00 m Possible weathered bedrock at base of trial pit.			
EXPLORATORY HOLE ENDS AT 2.30 m	2.30 *+198.09*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.80	Strong inflow

Depth Related Remarks *
From to (m)

Stability Stable
Shoring None
Weather Raining

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

Scale 1:25

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Project Hirwaun Industrial Estate
Project No. H8076
Carried out for Enviroparks Ltd

Trial Pit
TP14
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 18/08/2008 **End** 18/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 2.80m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A B C D 270 (Deg)	**Ground Level** +201.10 mOD **Coordinates** E 293926.53 **National Grid** N 206915.37 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	D 5	
0.30	B 9	
0.70	B 10	
0.70	ES 2	
0.70	D 6	
1.30	B 11	
1.30	ES 3	
1.30	D 7	
2.30	B 12	
2.30	ES 4	
2.30	D 8	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Soft brown sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite Cobbles are subangular to subrounded of sandstone and quartzite	(0.30) 0.30 *+200.80*		
2 MADE GROUND: Black and grey silty sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and mudstone with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.50) 0.80 *+200.30*		
3 Firm to stiff brown orange and grey slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (GLACIAL TILL)	(0.60) 1.40 *+199.70*		
4 Brown silty very sandy angular to subangular fine to coarse GRAVEL of sandstone and quartzite with low cobble content. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (FLUVIAL GLACIAL DEPOSITS)	(1.40)		
EXPLORATORY HOLE ENDS AT 2.80 m	2.80 *+198.30*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.80	Seepage

Depth Related Remarks *

From to (m)

Stability Collapsing below 1.40m.

Shoring None

Weather Raining

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

Scale 1:25

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Project Hirwaun Industrial Estate

Project No. H8076

Carried out for Enviroparks Ltd

Trial Pit

TP15

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 19/08/2008 **End** 19/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.20m.	**Dimensions and Orientation** Width 0.60 m Length 2.50 m A / D / B / C → 292 (Deg)	**Ground Level** +201.48 mOD **Coordinates** E 293960.69 **National Grid** N 206892.10 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	D 4	
0.30	B 7	
1.00	ES 2	
1.00	D 5	
1.00	B 8	
2.30	ES 3	
2.30	D 6	
2.30	B 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone, brick and quartzite with high cobble content. Cobbles are subangular to subrounded of sandstone, brick and quartzite.	(0.40)		1
	0.40 *+201.08*		
2 MADE GROUND: Dark grey and green fused slag recovered as angular fine to coarse gravel.	0.50 *+200.98*		
3 MADE GROUND: Brown and grey clayey sandy subangular to subrounded fine to coarse GRAVEL of sandstone and quartzite with medium cobble content. Cobbles are subangular to subrounded of sandstone and quartzite.	(0.30)		
	0.80 *+200.68*		
4 Stiff brown orange and grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. Possible re-worked material. (GLACIAL TILL)	(2.40)		
EXPLORATORY HOLE ENDS AT 3.20 m	3.20 *+198.28*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	0.30	Strong inflow

Depth Related Remarks *
From to (m)

Stability Collapsing below 2.00m.
Shoring None
Weather Raining

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

Scale 1:25

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Project Hirwaun Industrial Estate
Project No. H8076
Carried out for Enviroparks Ltd

Trial Pit
TP16
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged PL **Checked** HW	**Start** 19/08/2008 **End** 19/08/2008	**Equipment, Methods and Remarks** CAT428C Machine excavated trial pit GL - 3.50m.	**Dimensions and Orientation** Width 0.80 m Length 7.00 m A B C D 100 (Deg)	**Ground Level** +203.44 mOD **Coordinates** E 293965.94 **National Grid** N 206926.16 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		0800
0.30	ES 1	
0.30	B 13	
0.30	D 7	
0.70	B 14	
0.70	ES 2	
0.70	D 8	
1.20	B 15	
1.20	ES 3	
1.20	D 9	
1.50	D 10	
1.50	B 16	
1.50	ES 4	
2.50	D 11	
2.50	B 17	
2.50	ES 5	
3.50	D 12	
3.50	B 18	
3.50	ES 6	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
1 MADE GROUND: Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of sandstone, brick and quartzite. Cobbles are subangular to subrounded of sandstone, brick and quartzite.	(0.90)		
2 MADE GROUND: Firm to stiff orange grey and brown slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite. Cobbles are subangular to subrounded of sandstone and quartzite. 3 boulders of quartzite 400mm x 400mm. 1.35m: Black cast iron pipe approximately 15 inch diameter with a small steel pipe directly below it. An electric cable alongside with a small plastic water pipe alongside the cable. All are at 48 degrees. Black cast iron pipe was encased in grey black silty clay.	0.90 *+202.54* (2.60)		1
EXPLORATORY HOLE ENDS AT 3.50 m	3.50 *+199.94*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.30	Strong inflow

Depth Related Remarks *
From to (m)

Stability Collapsing below 2.00m
Shoring None
Weather Raining

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

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Scale 1:25

Project Hirwaun Industrial Estate
Project No. H8076
Carried out for Enviroparks Ltd

Trial Pit
TP17
Sheet 1 of 1

ENCLOSURE B
INSTRUMENTATION AND MONITORING

Installation Details	B1
Groundwater Monitoring	B2
Gas Monitoring	B3-B6

Groundwater Installation Details

Hole No	Instrument ID	Installation Type	Date of Installation	Reference depth (mBGL)	Piezometer Diameter (mm)	Top of response zone (mBGL)	Base of response zone (mBGL)	Tubing Completion Details	Headworks	Remarks
BH101R		SP	18 Sep 2008	0.00	50	1.00	7.00	Open	Lockable top cover	
BH102	1	SP	1 Sep 2008	0.00	50	1.00	7.50	Gas tap	Lockable top cover	
BH103R		SP	23 Sep 2008	0.00	50	2.00	11.50	open	lockable top cover	
BH105R		SP	22 Sep 2008	0.00	50	3.50	8.30	open	lockable top cover	
BH109		SP	11 Sep 2008	0.00	50	1.50	3.00	Gas tap	Lockable top cover	

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Electronic Piezometer Prepared: 12/11/2008 11:22

AGS

Project Hirwaun Industrial Estate

Project No. H8076

Carried out for Enviroparks Ltd

Table

B1

Borehole	BH101	BH102	BH103	BH104	BH105	BH106	BH107	BH108	BH109
Date Installed									
Depth to Base (m)	5.26	6.91	12.47		8.27				2.58
Ground Level (m A.O.D)									
Date	Depth to Water from GL (m)								
06-Oct-08	2.42	2.24	2.10		2.04				0.14
09-Oct-08	2.31		2.13		2.06				0.10
17-Oct-08	2.39	2.21	2.12		2.05				0.12
31-Oct-08	2.27	2.25	2.10		2.04				0.16

Remarks:

Groundwater Monitoring	**Project:** **Hirwain Industrial Estate**	**Contract** **H8076**
Soil Mechanics	**Client:**	**Figure No** **B2**

Date :	09/10/2008	Meteorological and Site Conditions	
Operator:	JL	State of ground	Damp
		Wind	Light
		Wind Direction	West
		Cloud Cover	20%
		Precipitation	None
		Barometric Pressure (mb)	1013
		Temperature(deg.C)	12

Equipment Used:	Multi Gas Meter, Gas Flow Meter

Borehole	Instrument Depth (m)	O_2 (%v/v)	CH_4 (%v/v)	CO_2 (%v/v)	H2S (ppm)	Flow rate (Ltr/hr)	PID (PPM)	Water Level (m)
BH101	5.26	19.70	-	1.2	0.0	0.1	0.0	2.31
BH102	6.91	17.60	-	1.3	0.0	0.2	0.0	
BH103	12.47	18.20	-	1.2	0.0	0.4	0.0	2.13
BH105	8.27	20.10	-	0.2	0.0	0.0	0.0	2.06
BH109	2.58	21.00	-	0.1	0.0	0.1	0.0	0.10

Remarks: CH4 and LEL have been voided due to false readings

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Gas Monitoring / Groundwater	Project: Hirwaun Inustrial Estate	Contract: H8076
Soil Mechanics	Client: Pell Frischmann	Figure: B3

Date :	31/10/2008
Operator:	JL

Meteorological and Site Conditions

State of ground	Wet
Wind	Light
Wind Direction	Northerly
Cloud Cover	Clear
Precipitation	None
Barometric Pressure (mb)	988
Temperature(deg.C)	7.5

Equipment Used: Multi Gas Meter, Gas Flow Meter

Borehole	Instrument Depth (m)	O_2 (%v/v)	CH_4 (%v/v)	CO_2 (%v/v)	H2S (ppm)	Flow rate (Ltr/hr)	PID (PPM)	Water Level (m)
BH101	5.26	19.10	-	1.3	-	0.3	0.0	2.27
BH102	6.91	15.40	-	1.2	-	0.1	0.0	2.25
BH103	12.47	17.00	-	1.4	-	0.2	0.0	2.10
BH105	8.27	20.80	-	0.0	-	0.1	0.0	2.04
BH109	2.58	20.70	-	0.1	-	0.1	0.0	0.16

Remarks:

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Gas Monitoring / Groundwater	**Project:** Hirwaun Industrial Estate	**Contract:** H8076
Soil Mechanics	**Client:** Pell Frischmann	**Figure:** B4

Date :	07/11/2008	Meteorological and Site Conditions	
Operator:	JL	State of ground	Light Rain
		Wind	strong
		Wind Direction	westerly
		Cloud Cover	30%
		Precipitation	slight
		Barometric Pressure (mb)	1011
		Temperature(deg.C)	6.0

Equipment Used:	Multi Gas Meter, Gas Flow Meter

Borehole	Instrument Depth (m)	O_2 (%v/v)	CH_4 (%v/v)	CO_2 (%v/v)	H2S (ppm)	Flow rate (Ltr/hr)	PID (PPM)	Water Level (m)
BH101	5.26	20.10	0.5	0.0	0.0	0.1	0.0	2.30
BH102	6.91	17.40	0.8	0.6	0.0	0.2	0.0	2.28
BH103	12.47	17.20	1.2	0.9	0.0	0.3	0.0	2.09
BH105	8.27	20.40	0.7	0.2	0.0	0.1	0.0	2.09
BH109	2.58	20.40	0.1	0.1	0.0	0.1	0.0	0.09

Remarks:

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Gas Monitoring / Groundwater	Project: Hirwaun Industrial Estate	Contract: H8076
Soil Mechanics	Client: Pell Frischmann	Figure: B5

Date :	11/11/2008	Meteorological and Site Conditions	
Operator:	CP	State of ground	Saturated
		Wind	Strong Gusts
		Wind Direction	West
		Cloud Cover	90%
		Precipitation	None
		Barometric Pressure (mb)	978
		Temperature(deg.C)	8
Equipment Used:		Multi Gas Meter, Gas Flow Meter	

Borehole	Instrument Depth (m)	O_2 (%v/v)	CH_4 (%v/v)	CO_2 (%v/v)	H2S (ppm)	Flow rate (Ltr/hr)	PID (PPM)	Water Level (m)
BH101	5.26	19.20	0.3	4.3	0.0	0.1	0.0	2.31
BH102	6.91	19.70	0.3	0.4	0.0	0.1	0.0	2.31
BH103	12.47	19.10	0.1	0.2	0.0	0.1	0.0	2.21
BH105	8.27	19.80	0.3	0.3	0.0	0.1	0.0	2.11
BH109	2.58	19.70	0.1	0.1	0.0	0.1	0.0	0.04

Remarks:

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrument adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Gas Monitoring / Groundwater	**Project:**	**Hirwaun Industrial Estate**	**Contract: H8076**
Soil Mechanics	**Client:**	**Pell Frischmann**	**Figure: B6**

ENCLOSURE C

GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX 1
Particle Size Distribution Analyses	PSD 1 to 14
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM 1
Uniaxial Compressive Strength of Rock – Summary of Results	RUCS 1
One Dimensional Consolidation Test	OED 1 to 2
Chemical Tests – Summary of Results	CHEM 1
Compaction tests 2.5 kg method	COMPL 1 to 2
Compaction tests 4.5 kg method	COMPH 1 to 2

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
H8076	Hirwaun Industrial Estate

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m³	p_d Mg/m³	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m³	Remarks
BH101	9	4.00	4.45	B	Brown grey clayey sandy fine to coarse subrounded GRAVEL with high cobble			7.2						
BH102	11	4.50	4.70	D	Grey brown slightly sandy CLAY			21	100	34 a	19	15		
BH103	12	4.00		B	Brown grey slightly sandy slightly gravelly CLAY			38	92 s	50 a	23	27		
BH104	8	3.00	3.50	U	Brown sandy CLAY	1.79	1.44	24						
BH104	12	5.00	5.45	B	Brown grey slightly gravelly CLAY			19	79 s	26 a	16	10		
BH105	7	3.00	3.45	B	Brown grey slightly gravelly slightly sandy slightly organic SILT with low cobble content			20						
BH109	3	1.20	1.29	B	Brown grey slightly clayey very sandy fine to coarse subangular GRAVEL with low cobble			12						
TP11	10	0.30		B	Grey brown slightly sandy slightly gravelly CLAY			29	72 s	41 a	23	18		
TP11	12	2.20		B	Orange brown grey slightly gravelly sandy CLAY			24	92 s	36 a	18	18		
TP12A	5	0.60		D	Brown grey slightly sandy gravelly CLAY			21	63 s	43 a	22	21		
TP14	10	0.70		B	Brown slightly sandy slightly gravelly CLAY			18	75 s	38 a	18	20		
TP15	11	1.30		B	Brown slightly sandy slightly gravelly CLAY			18	85 s	28 a	17	11		
TP1A	9	2.50		D	Brown grey slightly sandy slightly gravelly CLAY			19	82 s	31 a	18	13		
TP5	13	1.20		B	Grey brown very silty very sandy GRAVEL with low cobble content			8.1						
TP7	18	3.70		B	Brown grey slightly sandy slightly gravelly CLAY			16	98 s	28 a	15	13		
TP9	15	3.40		B	Brown grey slightly sandy gravelly CLAY			8.1	68 s	27 a	17	10		

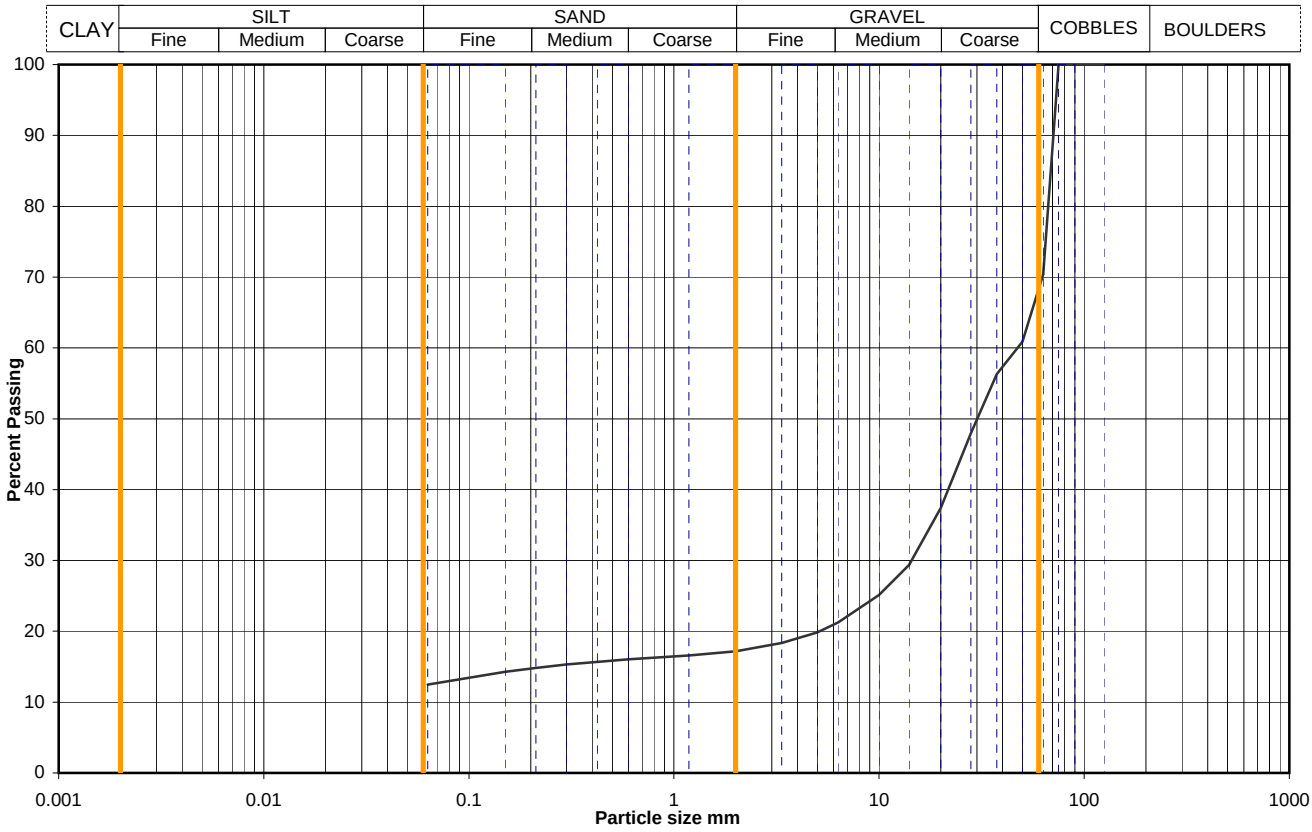
General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

p	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	p_s	particle density
p_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH101		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	4.00		
			Samp No	9	Type	B
			ID	ESGH807620080902000000246		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	70		
50	61		
37.5	56		
28	48		
20	37		
14	29		
10	25		
6.3	21		
5.0	20		
3.35	18		
2.00	17		
1.18	17		
0.600	16		
0.425	16		
0.300	15	Dry mass of sample, kg	
0.212	15		
0.150	14	4.3	
0.063	12		

Soil description	Brown grey clayey sandy fine to coarse subrounded GRAVEL with high cobble content		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	32	0
	Gravel	51	75
	Sand	5	7
	Silt	silt+clay =	
	Clay	12	18

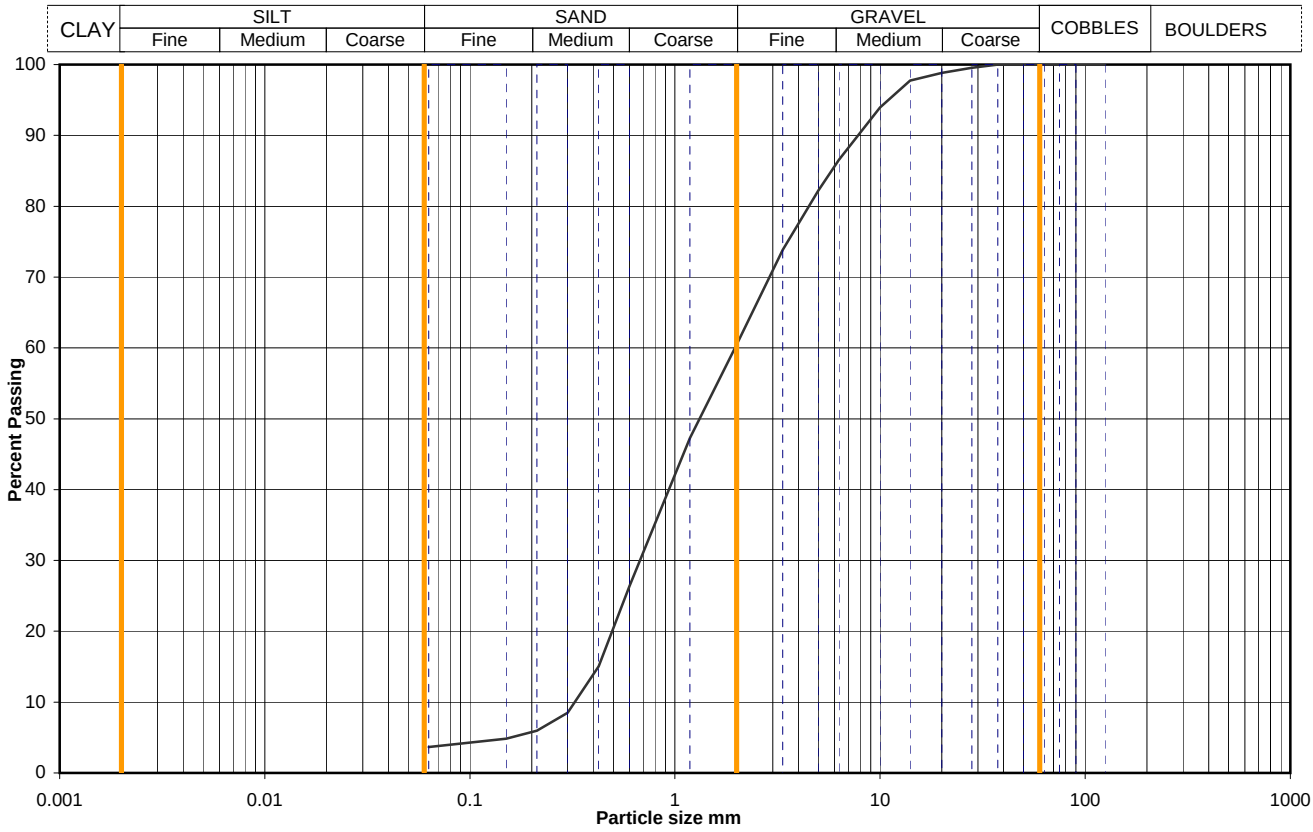
Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2.9 Rev 78 Jan 08	Soil Mechanics	UKAS TESTING 4089	Printed:27/10/2008 14:29	**Figure** **PSD 1**

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH102		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	6.00		
			Samp No	13	Type	B
			ID	ESGH807620080916000000263		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	94		
6.3	87		
5.0	82		
3.35	74		
2.00	60		
1.18	47		
0.600	26		
0.425	15		
0.300	8	Dry mass of sample, kg	
0.212	6		
0.150	5	11.1	
0.063	4		

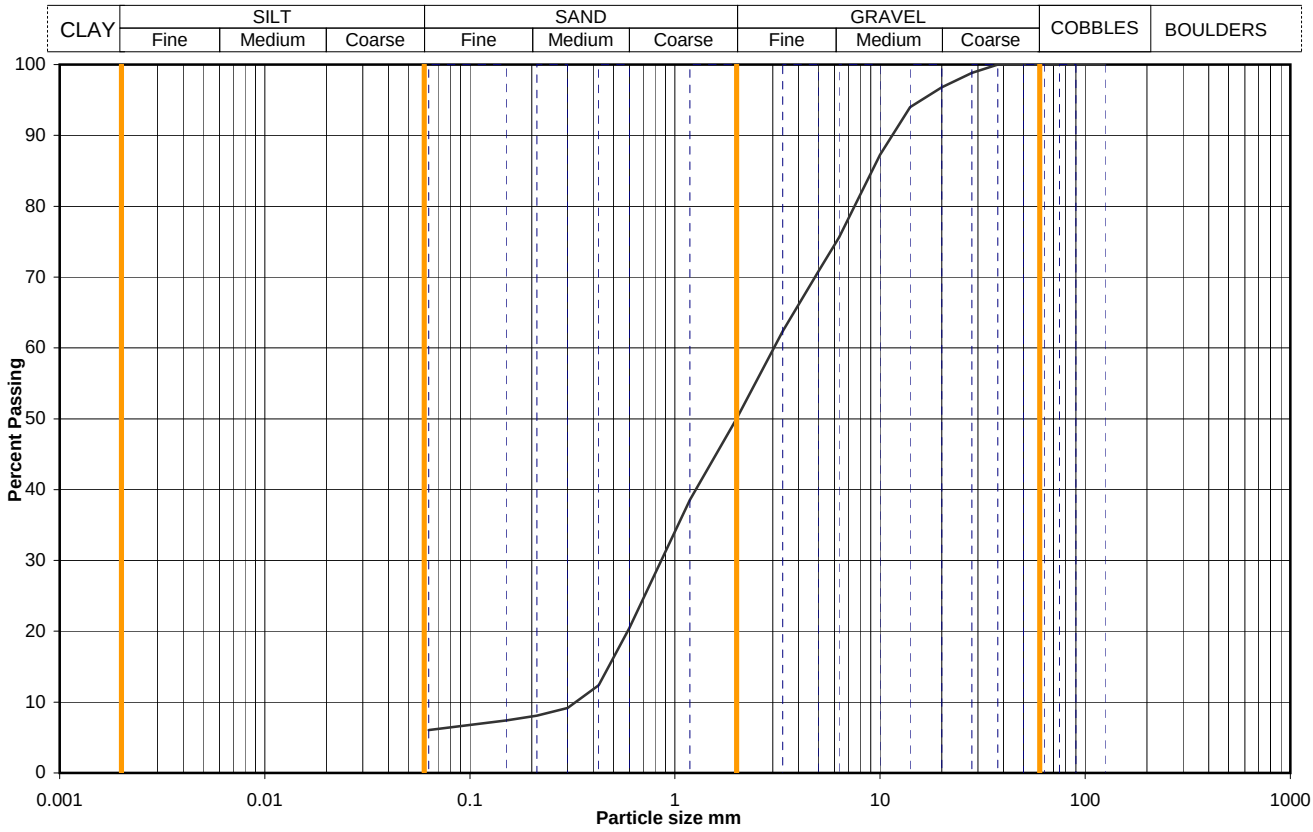
Soil description	Brown grey slightly clayey gravelly SAND		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	40	40
	Sand	57	57
	Silt	silt+clay =	
	Clay	3	3

Uniformity Coefficient	D_{60} / D_{10}	6

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH103		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	7.00		
			Samp No	17	Type	B
			ID	ESGH807620080916000000282		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	99		
20	97		
14	94		
10	87		
6.3	76		
5.0	71		
3.35	62		
2.00	50		
1.18	39		
0.600	20		
0.425	12		
0.300	9	Dry mass of sample, kg	
0.212	8		
0.150	7	8.0	
0.063	6		

Soil description	Brown grey clayey SAND and GRAVEL		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	50	50
	Sand	44	44
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	6	6

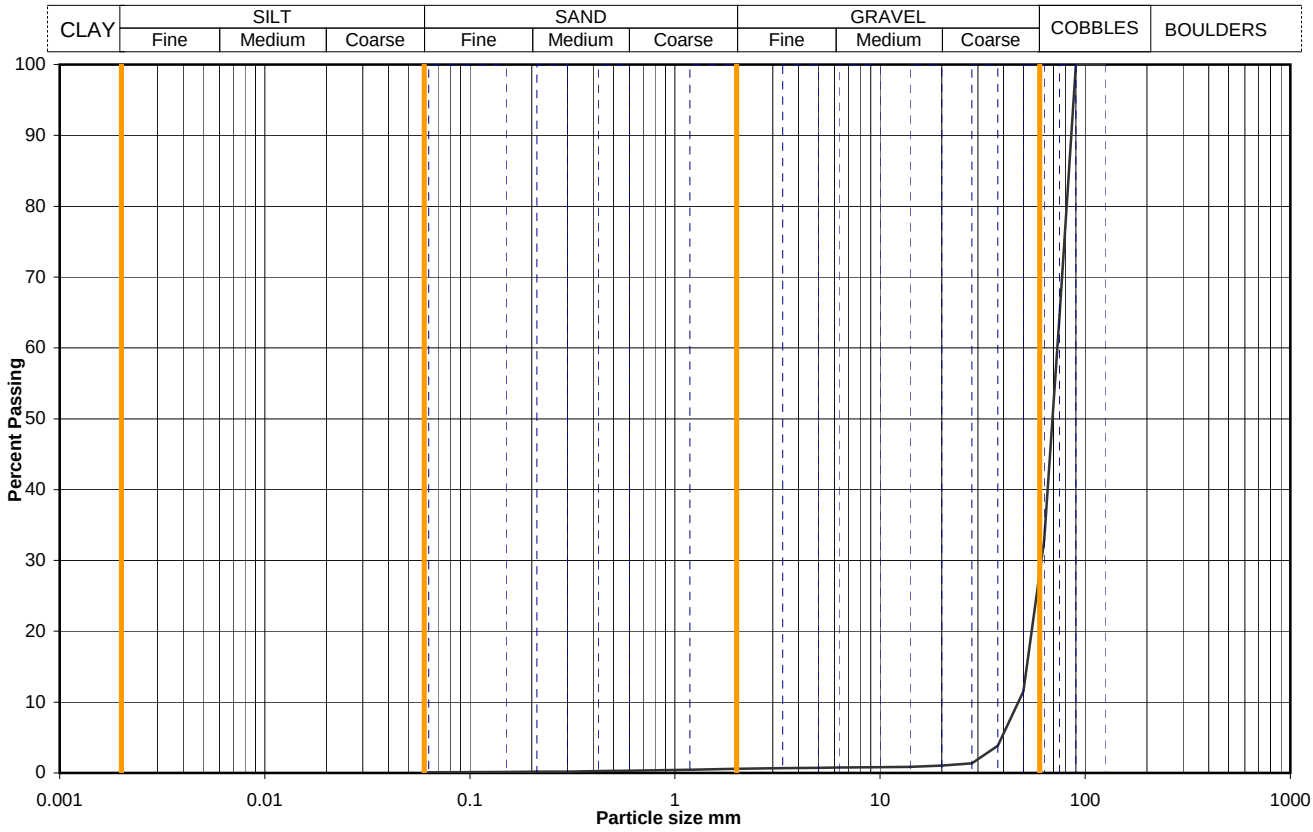
Uniformity Coefficient	D_{60} / D_{10}	9

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2.9 Rev 78 Jan 08	Soil Mechanics	UKAS TESTING 4089	Printed:27/10/2008 14:29	**Figure** **PSD 3**

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH104		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	8.00		
			Samp No	17	Type	B
			ID	ESGH807620080916000000302		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	65		
63	33		
50	12		
37.5	4		
28	1		
20	1		
14	1		
10	1		
6.3	1		
5.0	1		
3.35	1		
2.00	1		
1.18	0		
0.600	0		
0.425	0		
0.300	0	Dry mass of sample, kg	
0.212	0		
0.150	0	8.5	
0.063	0		

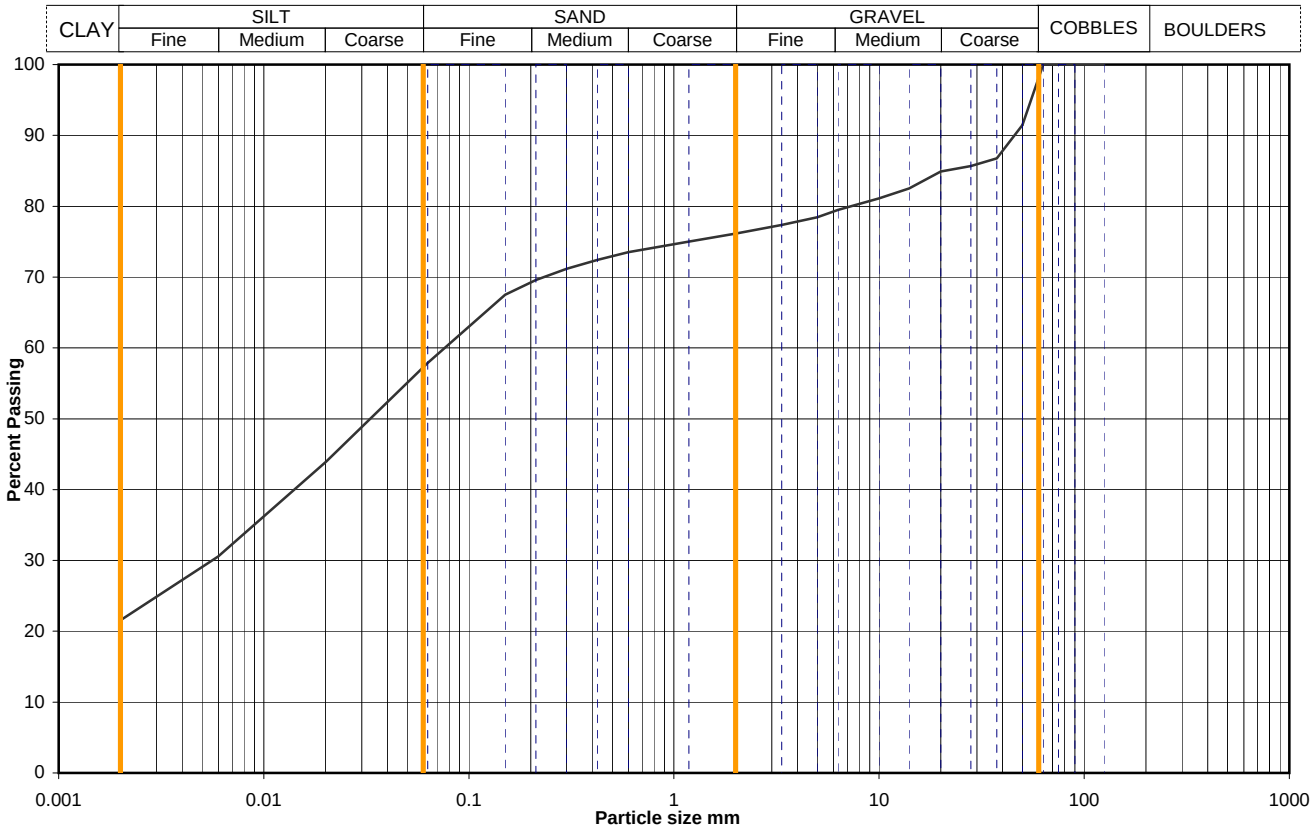
Soil description	COBBLES with much slightly sandy GRAVEL		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	72	0
	Gravel	27	96
	Sand	1	4
	Silt	silt+clay =	
	Clay	0	0

Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH105		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	3.00		
			Samp No	7	Type	B
			ID	ESGH807620080916000000312		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	44
90	100	0.0060	31
75	100	0.0020	22
63	100		
50	91		
37.5	87		
28	86		
20	85		
14	83		
10	81		
6.3	79		
5.0	78		
3.35	77		
2.00	76		
1.18	75	Particle density, Mg/m3	
0.600	74		
0.425	72	2.65 assumed	
0.300	71	Dry mass of sample, kg	
0.212	70		
0.150	67	9.3	
0.063	58		

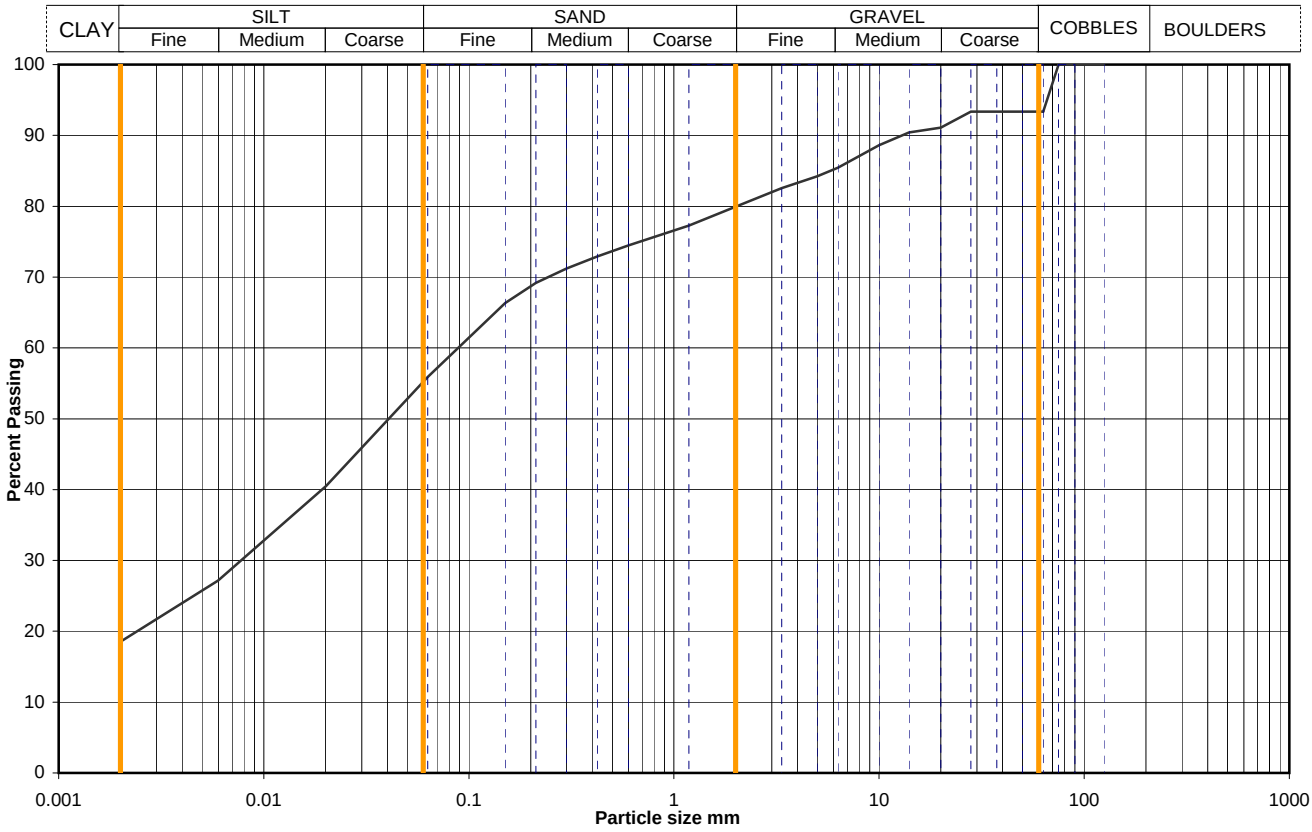
Soil description	Brown grey slightly gravelly slightly sandy slightly organic SILT with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	2	0
	Gravel	22	22
	Sand	19	19
	Silt	36	37
	Clay	21	21

Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH106		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	2.00		
			Samp No	6	Type	B
			ID	ESGH8076200809160000000322		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	40
90	100	0.0060	27
75	100	0.0020	19
63	93		
50	93		
37.5	93		
28	93		
20	91		
14	90		
10	89		
6.3	85		
5.0	84		
3.35	83		
2.00	80		
1.18	77	Particle density, Mg/m3	
0.600	74		
0.425	73	2.65 assumed	
0.300	71	Dry mass of sample, kg	
0.212	69		
0.150	66	5.8	
0.063	56		

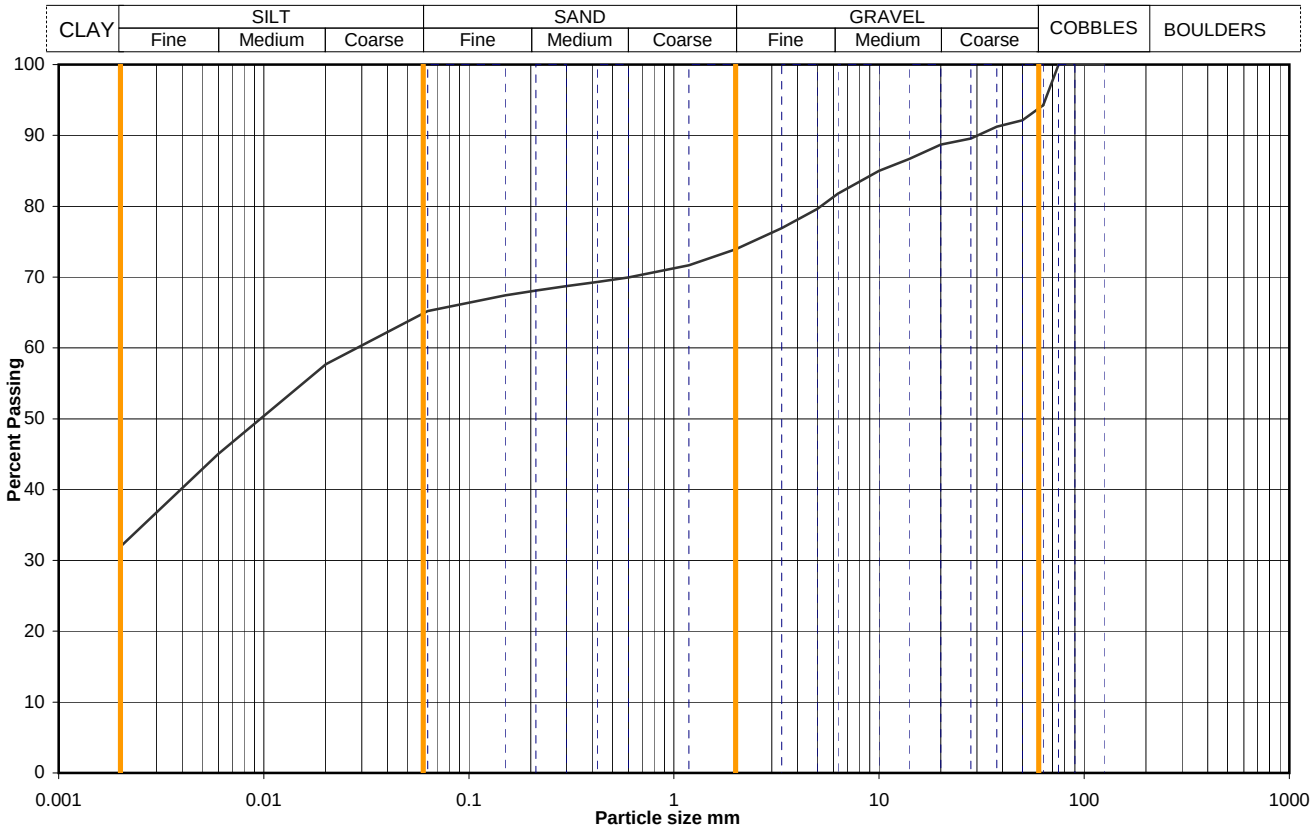
Soil description	Brown grey slightly gravelly slightly sandy SILT with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	7	0
	Gravel	13	14
	Sand	25	27
	Silt	37	40
	Clay	18	19

Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH107		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	3.00		
			Samp No	6	Type	B
			ID	ESGH807620080916000000330		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	58
90	100	0.0060	45
75	100	0.0020	32
63	94		
50	92		
37.5	91		
28	90		
20	89		
14	87		
10	85		
6.3	82		
5.0	80		
3.35	77		
2.00	74		
1.18	72	Particle density, Mg/m3	
0.600	70		
0.425	69	2.65 assumed	
0.300	69	Dry mass of sample, kg	
0.212	68		
0.150	67	8.5	
0.063	65		

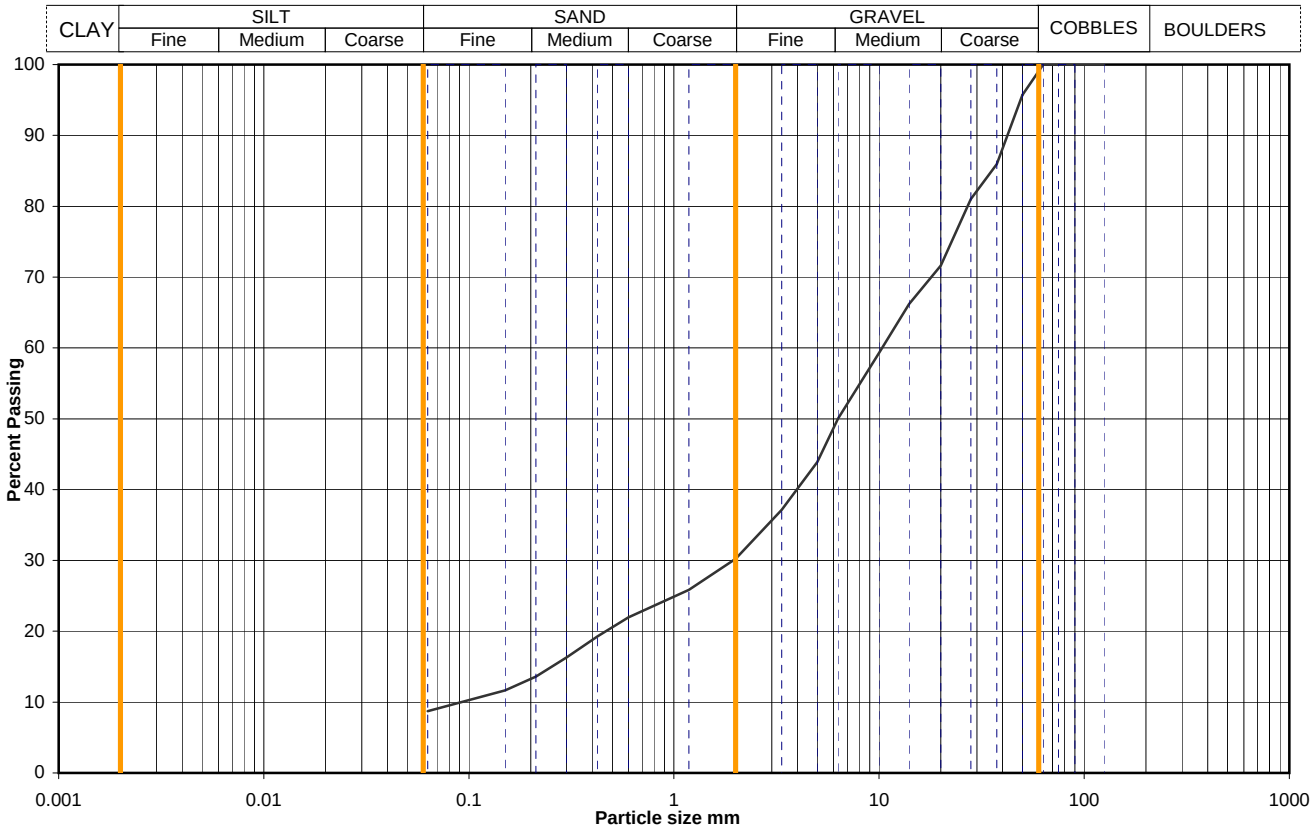
Soil description	Brown grey slightly gravelly slightly sandy CLAY with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	6	0
	Gravel	20	21
	Sand	9	10
	Silt	33	35
	Clay	32	34

Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	BH109		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	1.20		
			Samp No	3	Type	B
			ID	ESGH807620080916000000340		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	96		
37.5	86		
28	81		
20	72		
14	66		
10	59		
6.3	50		
5.0	44		
3.35	37		
2.00	30		
1.18	26		
0.600	22		
0.425	19		
0.300	16	Dry mass of sample, kg	
0.212	14		
0.150	12	11.4	
0.063	9		

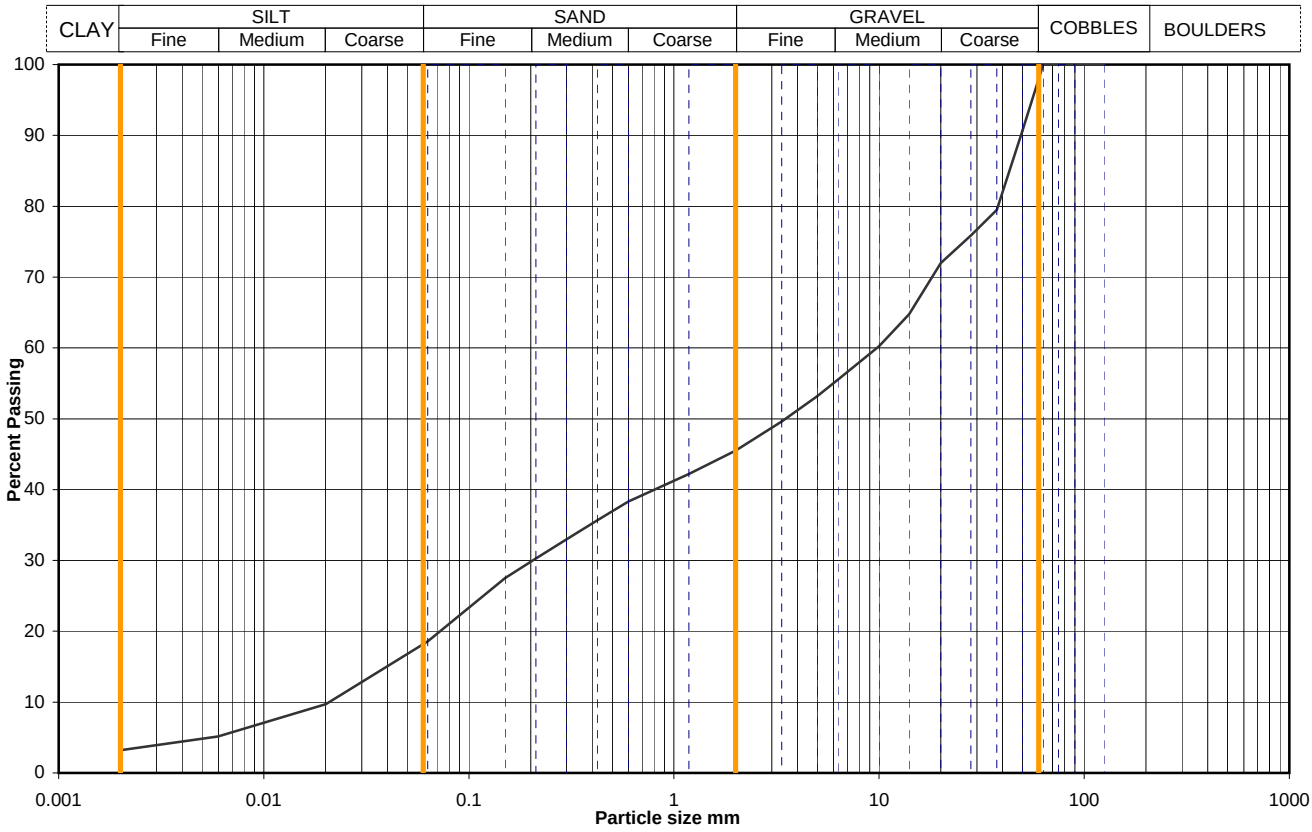
Soil description	Brown grey slightly clayey very sandy fine to coarse subangular GRAVEL with low cobble content		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	69	70
	Sand	21	21
	Silt	silt+clay =	
	Clay	9	9

Uniformity Coefficient	D_{60} / D_{10}	113

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP11A		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	1.30		
			Samp No	9	Type	B
			ID	ESGH807620080827000000034		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	10
90	100	0.0060	5
75	100	0.0020	3
63	100		
50	91		
37.5	79		
28	76		
20	72		
14	65		
10	60		
6.3	56		
5.0	53		
3.35	50		
2.00	45		
1.18	42	Particle density, Mg/m3	
0.600	38		
0.425	36	2.65 assumed	
0.300	33	Dry mass of sample, kg	
0.212	30		
0.150	28	18.0	
0.063	19		

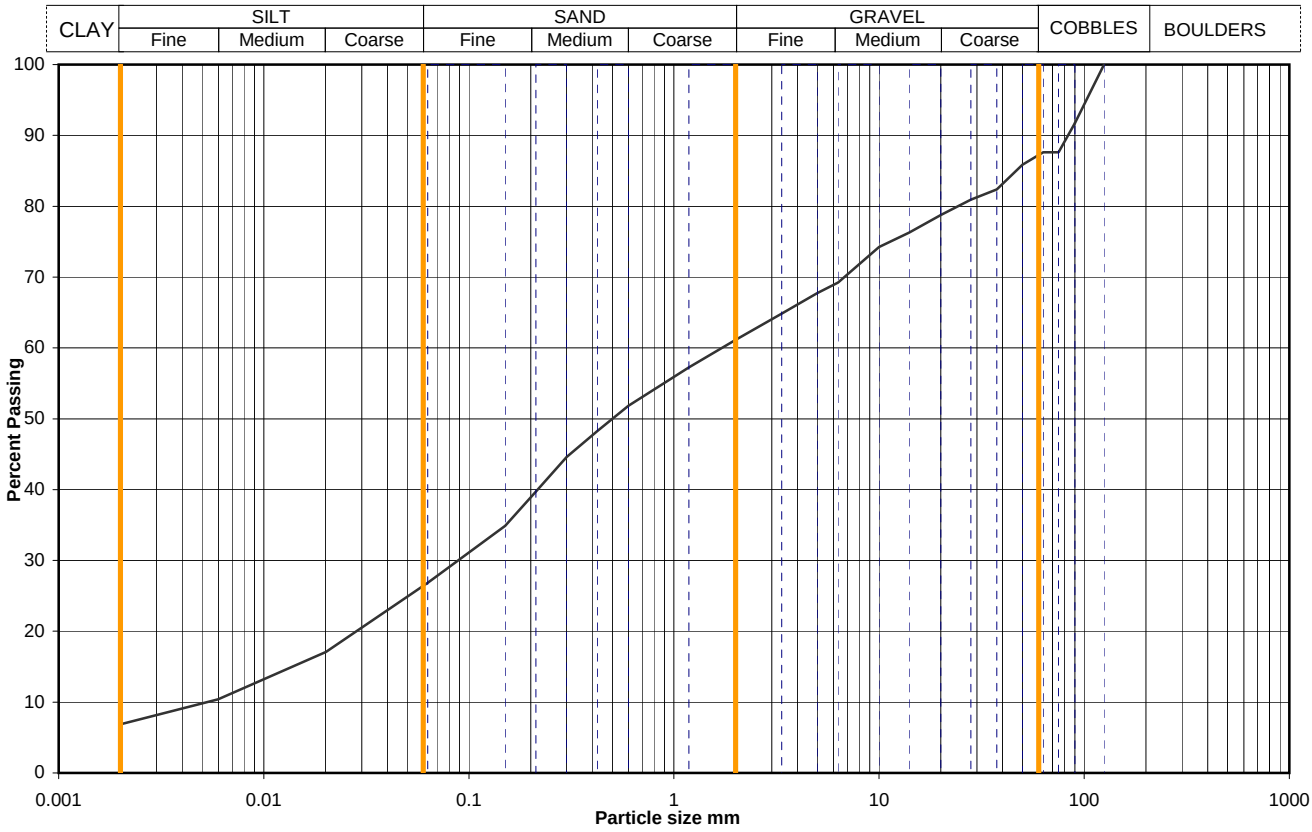
Soil description	Brown grey silty very sandy GRAVEL with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	2	0
	Gravel	53	54
	Sand	27	28
	Silt	15	15
	Clay	3	3

Uniformity Coefficient	D_{60} / D_{10}	468

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP3		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	1.20		
			Samp No	11	Type	B
			ID	ESGH807620080827000000140		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	17
90	92	0.0060	10
75	88	0.0020	7
63	88		
50	86		
37.5	82		
28	81		
20	79		
14	76		
10	74		
6.3	69		
5.0	68		
3.35	65		
2.00	61		
1.18	57	Particle density, Mg/m3	
0.600	52		
0.425	48	2.65 assumed	
0.300	45	Dry mass of sample, kg	
0.212	40		
0.150	35	18.8	
0.063	27		

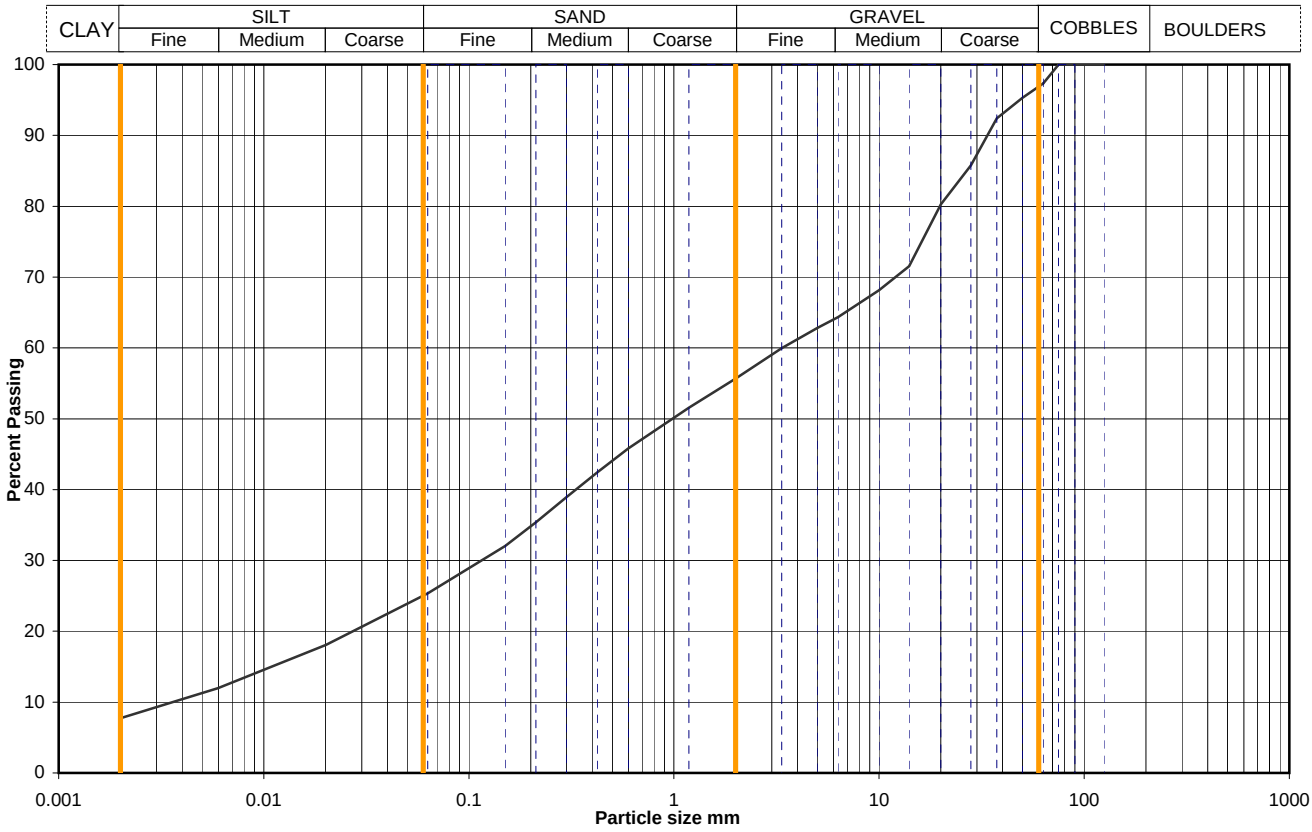
Soil description	Brown very silty very gravelly SAND with medium cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	13	0
	Gravel	26	30
	Sand	35	40
	Silt	19	22
	Clay	7	8

Uniformity Coefficient	D_{60} / D_{10}	323

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP5		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	1.20		
			Samp No	13	Type	B
			ID	ESGH807620080827000000166		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	18
90	100	0.0060	12
75	100	0.0020	8
63	97		
50	95		
37.5	92		
28	86		
20	80		
14	72		
10	68		
6.3	64		
5.0	63		
3.35	60		
2.00	56		
1.18	52	Particle density, Mg/m3	
0.600	46		
0.425	42	2.65 assumed	
0.300	39	Dry mass of sample, kg	
0.212	35		
0.150	32	12.0	
0.063	25		

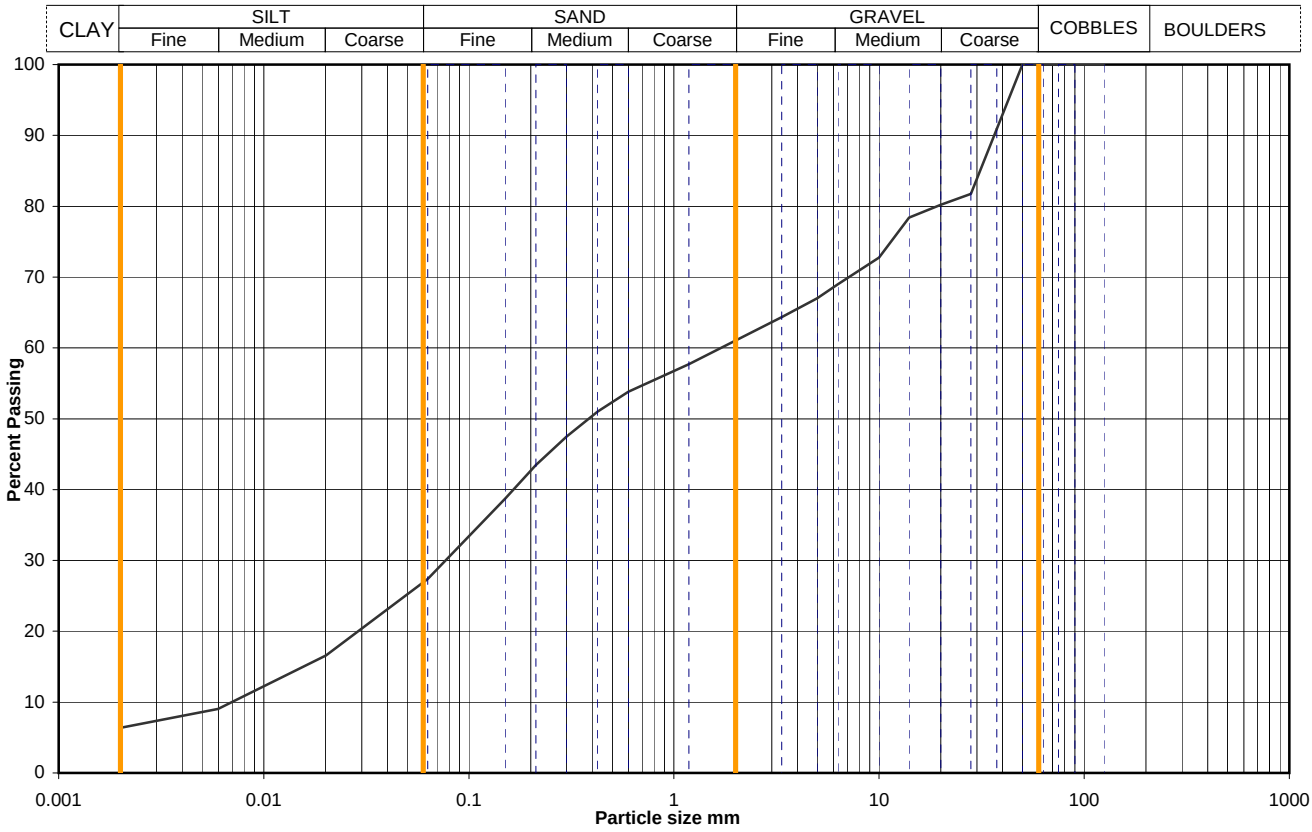
Soil description	Grey brown very silty very sandy GRAVEL with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	3	0
	Gravel	41	42
	Sand	31	32
	Silt	17	18
	Clay	8	8

Uniformity Coefficient	D_{60} / D_{10}	940

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP7		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	2.20		
			Samp No	10	Type	D
			ID	ESGH807620080827000000020l		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	17
90	100	0.0060	9
75	100	0.0020	6
63	100		
50	100		
37.5	91		
28	82		
20	80		
14	78		
10	73		
6.3	69		
5.0	67		
3.35	64		
2.00	61		
1.18	58	Particle density, Mg/m3	
0.600	54		
0.425	51	2.65 assumed	
0.300	48	Dry mass of sample, kg	
0.212	43		
0.150	39	1.5	
0.063	27		

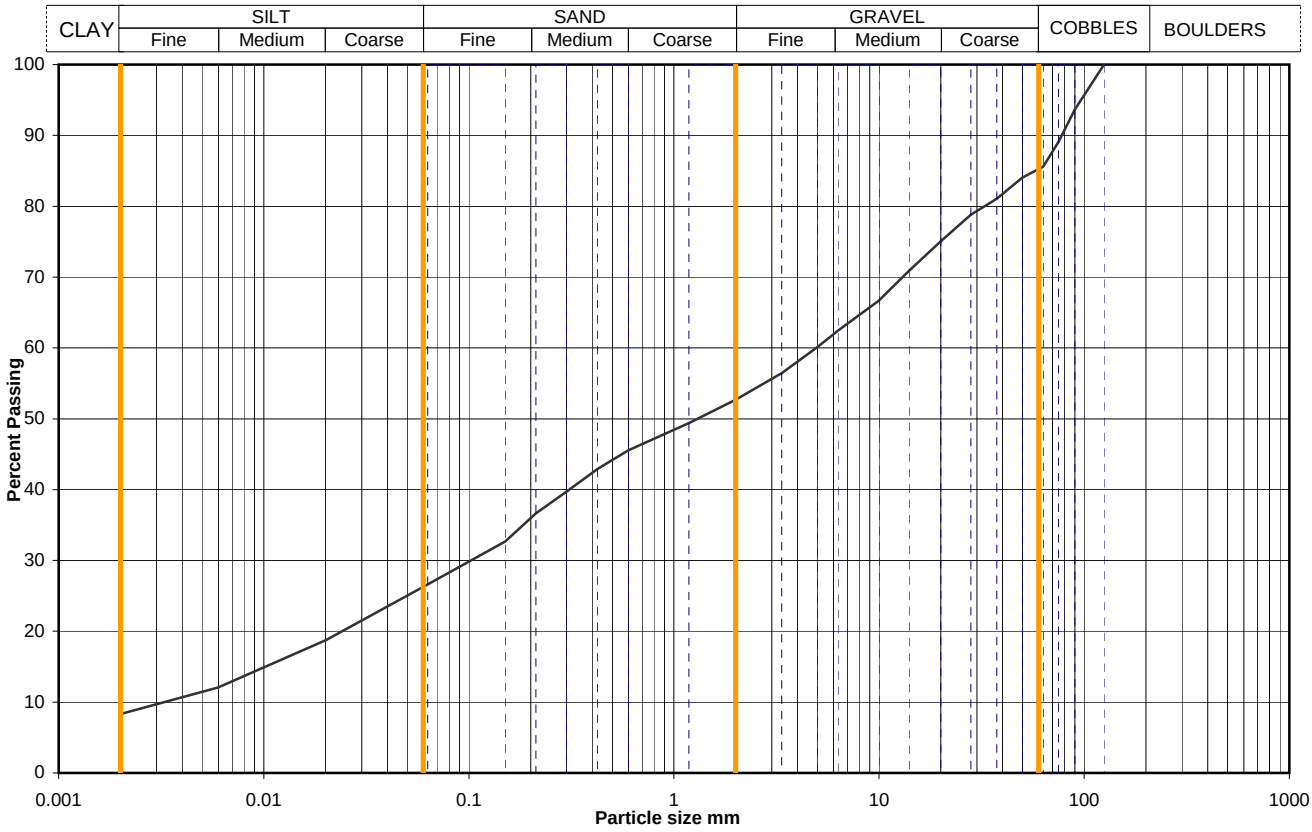
Soil description	Grey brown very silty very sandy GRAVEL		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	39	39
	Sand	34	34
	Silt	21	21
	Clay	6	6

Uniformity Coefficient	D_{60} / D_{10}	242

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP8		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	1.50		
			Samp No	13	Type	B
			ID	ESGH807620080827000000218		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	19
90	94	0.0060	12
75	89	0.0020	8
63	86		
50	84		
37.5	81		
28	79		
20	75		
14	71		
10	67		
6.3	62		
5.0	60		
3.35	56		
2.00	53		
1.18	49	Particle density, Mg/m3	
0.600	46		
0.425	43	2.65 assumed	
0.300	40	Dry mass of sample, kg	
0.212	37		
0.150	33	18.3	
0.063	27		

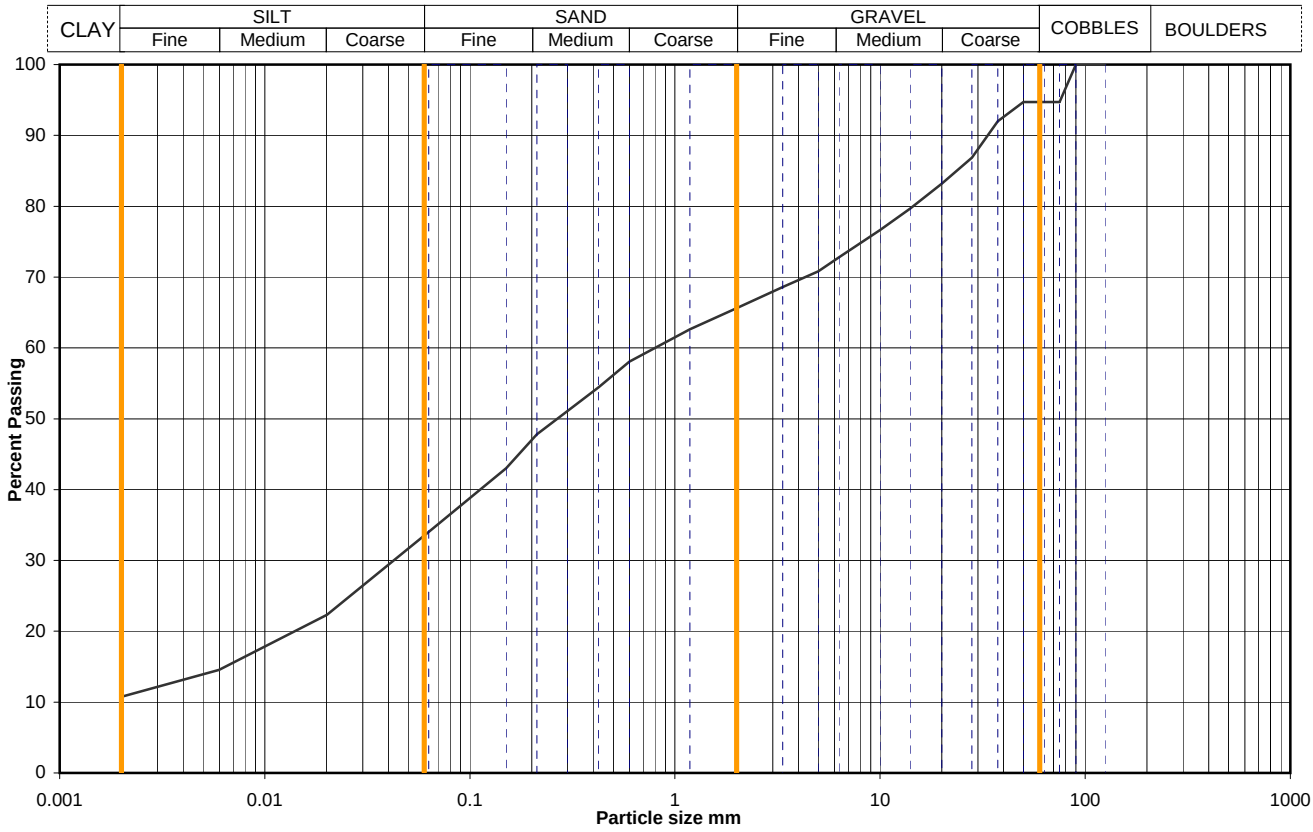
Soil description	Brown very silty very sandy GRAVEL with medium cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	15	0
	Gravel	32	38
	Sand	26	31
	Silt	18	21
	Clay	9	11

Uniformity Coefficient	D_{60} / D_{10}	1508

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

Particle Size Distribution Analysis

Project No	H8076	Sample Details:	Hole No	TP9		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	0.70		
			Samp No	12	Type	B
			ID	ESGH807620080827000000227		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	22
90	100	0.0060	15
75	95	0.0020	11
63	95		
50	95		
37.5	92		
28	87		
20	83		
14	80		
10	77		
6.3	73		
5.0	71		
3.35	69		
2.00	66		
1.18	63	Particle density, Mg/m3	
0.600	58		
0.425	54	2.65 assumed	
0.300	51	Dry mass of sample, kg	
0.212	48		
0.150	43	11.6	
0.063	34		

Soil description	Brown slightly gravelly slightly sandy SILT with low cobble content		
Preparation / Pretreatment	Sieve: pre dried, Pipette: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	5	0
	Gravel	29	31
	Sand	32	34
	Silt	23	24
	Clay	11	12

Uniformity Coefficient	D_{60} / D_{10}	#N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.4 pipette

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Project No	Project Name
H8076	Hirwaun Industrial Estate

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Density bulk Mg/m³	Density dry Mg/m³	*w* %	Test type	Dia. mm	$ó_3$ kPa	At failure / end of stage: Axial strain %	$ó_1 - ó_3$ kPa	c_u kPa	MODE	Remarks
BH103	9	3.00	3.50	U	Soft brown sandy CLAY	1.76	1.34	31	UU	104.7	60	7.1	48	24	P	

General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. See individual test reports for further details.

Legend					
	UU - single stage test (may be in sets of specimens)	$ó_3$	cell pressure	Mode of failure	P plastic
	UUM - multistage test on a single specimen	$ó_1 - ó_3$	deviator stress		B brittle
	suffix R - remoulded or recompacted	c_u	undrained shear strength		C compound

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK - SUMMARY OF RESULTS

Project No	Project Name
H8076	Hirwaun Industrial Estate

Hole No.	Sample				Rock Type	Specimen Dimensions[2]			Bulk Density[2]	Water Content[1]	Uniaxial Compression[3]				Remarks
	No.	Depth (m)		type		Dia.	Height	H/D			Load Rate	Time to failure	Mode of failure	UCS	
		from	to			mm	mm		Mg/m^3	%	kN/min	secs		MPa	
BH101R	4	16.71		C	SILTSTONE	72.0	178.0	2.5	2.66	1.1	42	405	AC	70.0	Sample below required test size.
BH105R	3	13.00	14.50	C	SANDSTONE	72.0	175.0	2.4	2.64	0.4	42	808	MS	141.0	Sample below required test size.
BH108R	2	11.00	12.00	C	SANDSTONE	72.0	196.0	2.7	2.62	0.6	42	978	AC	168.0	sample taken at 11.34m

Notes : Test Specification : International Society for Rock Mechanics (ISRM), Rock Characterization Testing and Monitoring, Suggested Methods, 1981

1 ISRM p83 test 1, water content at 105 ± 3 ^{o}C, specimen as received at the laboratory

2 ISRM p83 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p113 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

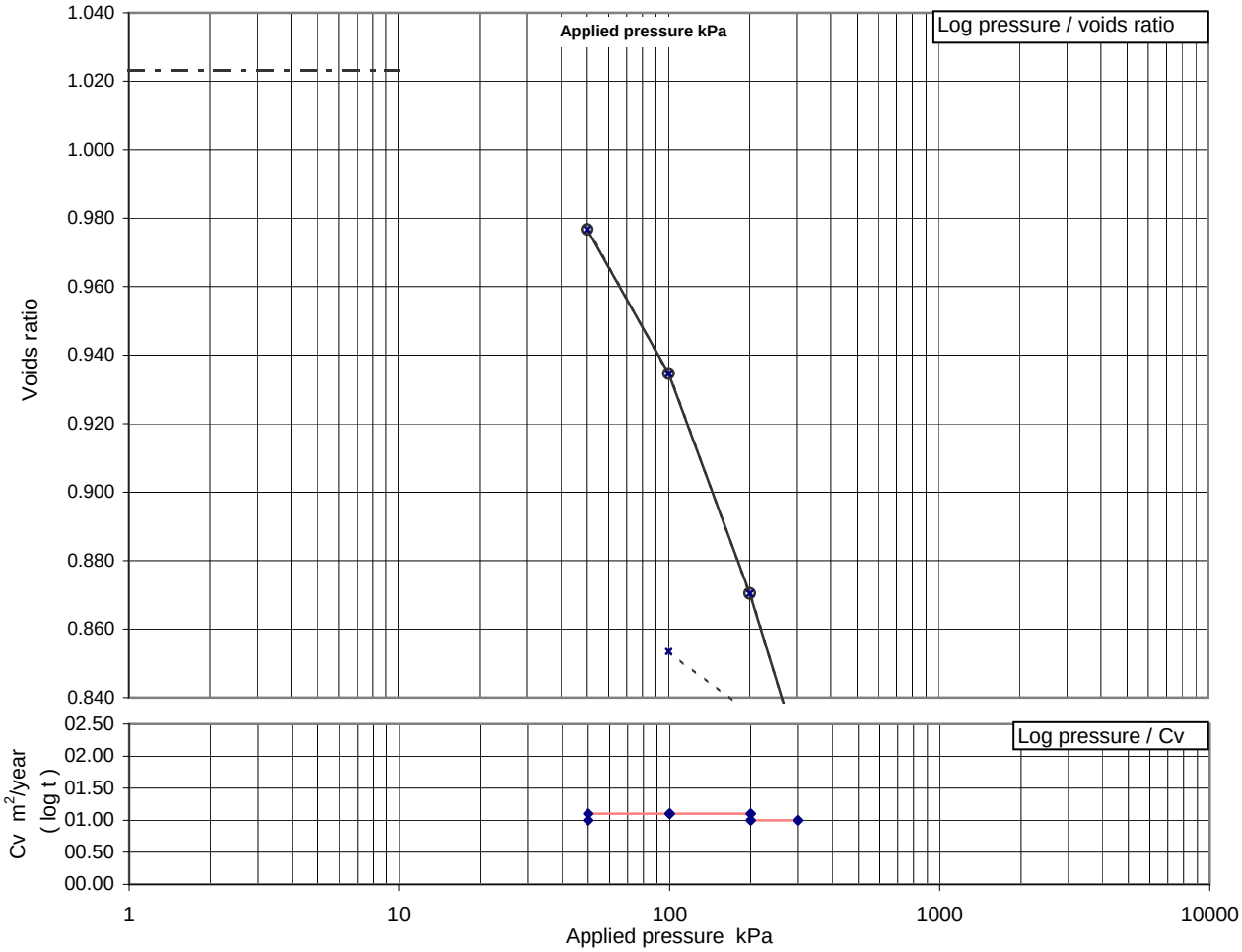
Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	H8076	Sample Details:	Hole No	BH103		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	3.00		
			Samp No	9	Type	U
			ID	ESGH807620080916000000274		
			Spec Ref			



Soil description	Soft brown sandy CLAY	Liquid limit %	
Preparation	Undisturbed	Plastic limit %	

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m^3
Diameter	74.66		mm
Height	18.80	17.22	mm
Voids ratio	1.023	0.853	
Moisture content	40	34	%
Bulk density	1.83	1.91	Mg/m^3
Dry density	1.31	1.43	Mg/m^3
Saturation	103	105	%
Average temperature for test	20		°C

Swelling pressure: not measured kPa

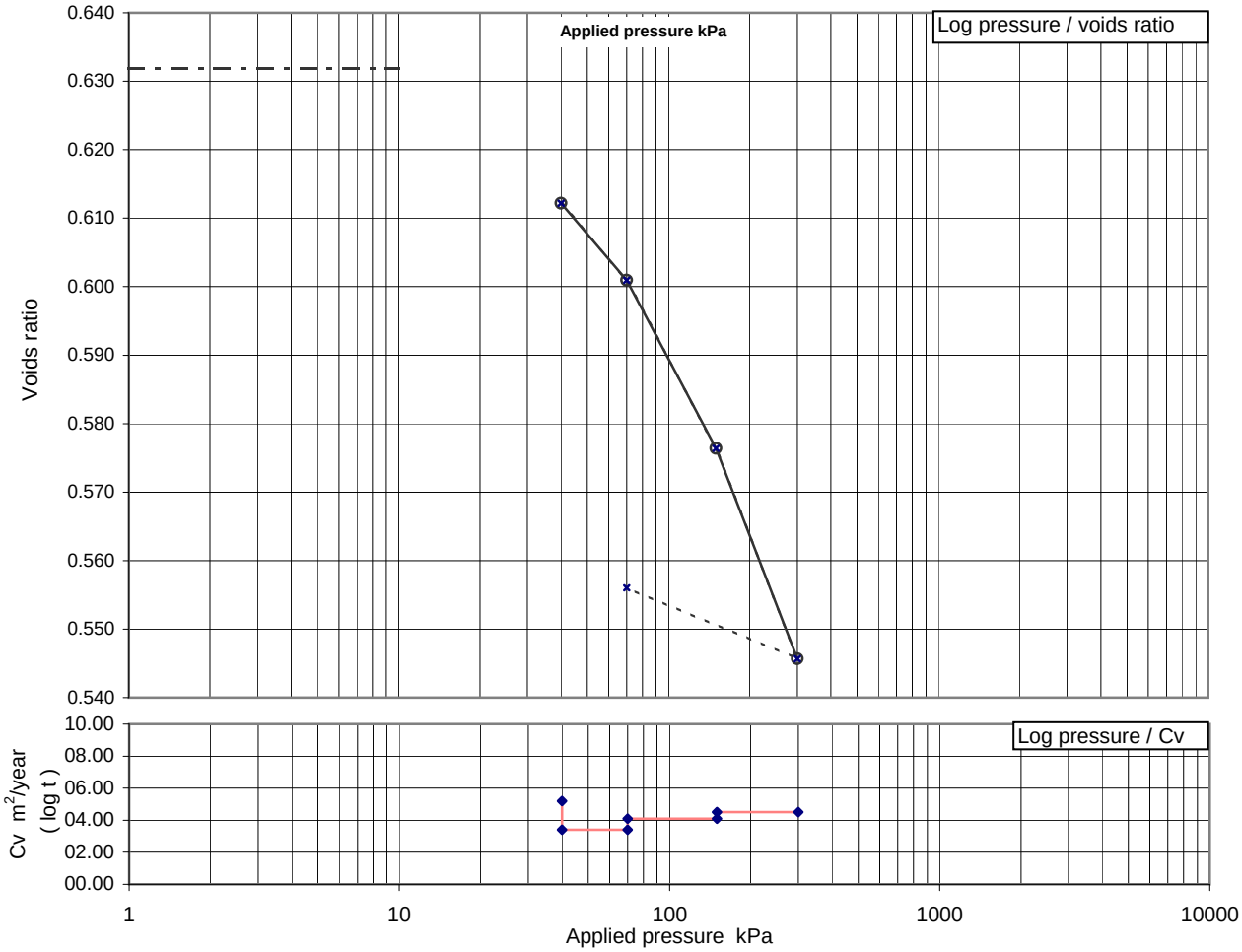
Notes :

Specimen taken 0 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	1.0231				
50	0.9767	0.459	1	1.6	
100	0.9346	0.426	1.1	1.9	
200	0.8704	0.332	1.1	1.7	
300	0.8252	0.242	1	1.7	
100	0.8535	0.078	1.7	2.9	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	H8076	Sample Details:	Hole No	BH104		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	3.00		
			Samp No	8	Type	U
			ID	ESGH807620080916000000293		
			Spec Ref			



Soil description	Brown sandy CLAY	Liquid limit %	
Preparation	Undisturbed	Plastic limit %	

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m³
Diameter	74.64		mm
Height	18.75	17.88	mm
Voids ratio	0.632	0.556	
Moisture content	24	22	%
Bulk density	2.01	2.08	Mg/m³
Dry density	1.62	1.70	Mg/m³
Saturation	101	105	%
Average temperature for test	20		°C

Swelling pressure: not measured kPa

Notes :

Specimen taken 0 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.6318				
40	0.6122	0.301	5.2	16	
70	0.6009	0.232	3.4	13	
150	0.5764	0.192	4.1	6.2	
300	0.5457	0.130	4.5	8.8	
70	0.5560	0.029	5.1	9	

CHEMICAL TESTS - SUMMARY OF RESULTS

Project No	Project Name
H8076	Hirwaun Industrial Estate

Hole No.	Sample				Soil Description	pH	Org	LOI	Sulphate as SO_4			CO_2	Chloride, Cl		<2 mm	Remarks
	No.	Depth (m)		type					soil	2:1	water		water sol.	acid sol.		
		from	to				%	%	%	g/L	g/L	%	%	%	%	
BH101	11	5.00		B	Grey brown slightly sandy silty fine to coarse subrounded GRAVEL	8.3				0.04					54	
BH102	11	4.50	4.70	D	Grey brown slightly sandy CLAY	7.6				0.03					99	
BH103	14	5.00		B	Brown grey slightly sandy slightly gravelly CLAY	7.7				0.06					97	
BH104	12	5.00	5.45	B	Brown grey slightly gravelly CLAY	8.1				0.26					97	
BH105	11	5.00		B	Brown grey slightly clayey slightly sandy fine to coarse subangular	8.4				0.04					16	
BH106	6	2.00		B	Brown grey slightly gravelly slightly sandy SILT with low cobble content	4.9				0.03					80	
BH107	6	3.00	3.45	B	Brown grey slightly gravelly slightly sandy CLAY with low cobble content	8.1				0.03					74	
BH109	3	1.20	1.29	B	Brown grey slightly clayey very sandy fine to coarse subangular GRAVEL	8.9				0.04					30	
TP10	10	0.70		B	Grey brown slightly sandy slightly gravelly CLAY	8.8				0.10					81	
TP11	11	1.20		B	Grey brown slightly sandy slightly gravelly slightly organic CLAY	5.7				0.06					99	
TP11A	6	1.30		D	Brown grey gravelly clayey SAND	5.8				0.07					100	
TP12A	6	1.50		D	Brown grey sandy gravelly CLAY	5.2				0.04					77	
TP15	7	1.30		D	Brown slightly sandy slightly gravelly CLAY	5.3				0.05					84	
TP2	10	1.70		D	Grey brown slightly sandy slightly gravelly CLAY	8.0				0.04					72	
TP3	6	0.50		D	Grey brown slightly sandy slightly gravelly CLAY	7.9				0.02					86	
TP5	8	1.20		D	Grey brown slightly sandy slightly gravelly SILT	7.9				0.05					81	
TP5	9	2.00		D	Grey brown slightly sandy slightly gravelly CLAY	6.6				0.06					77	
TP6	10	1.60		D	Brown grey sandy gravelly SILT	5.5				0.05					78	
TP7	8	0.70		D	Grey brown slightly sandy slightly gravelly CLAY	8.0				0.06					75	
TP8	8	0.80		D	Grey brown slightly sandy slightly gravelly CLAY	7.3				0.06					87	
TP9	9	2.40		D	Brown grey slightly sandy gravelly CLAY	8.2				0.01					72	

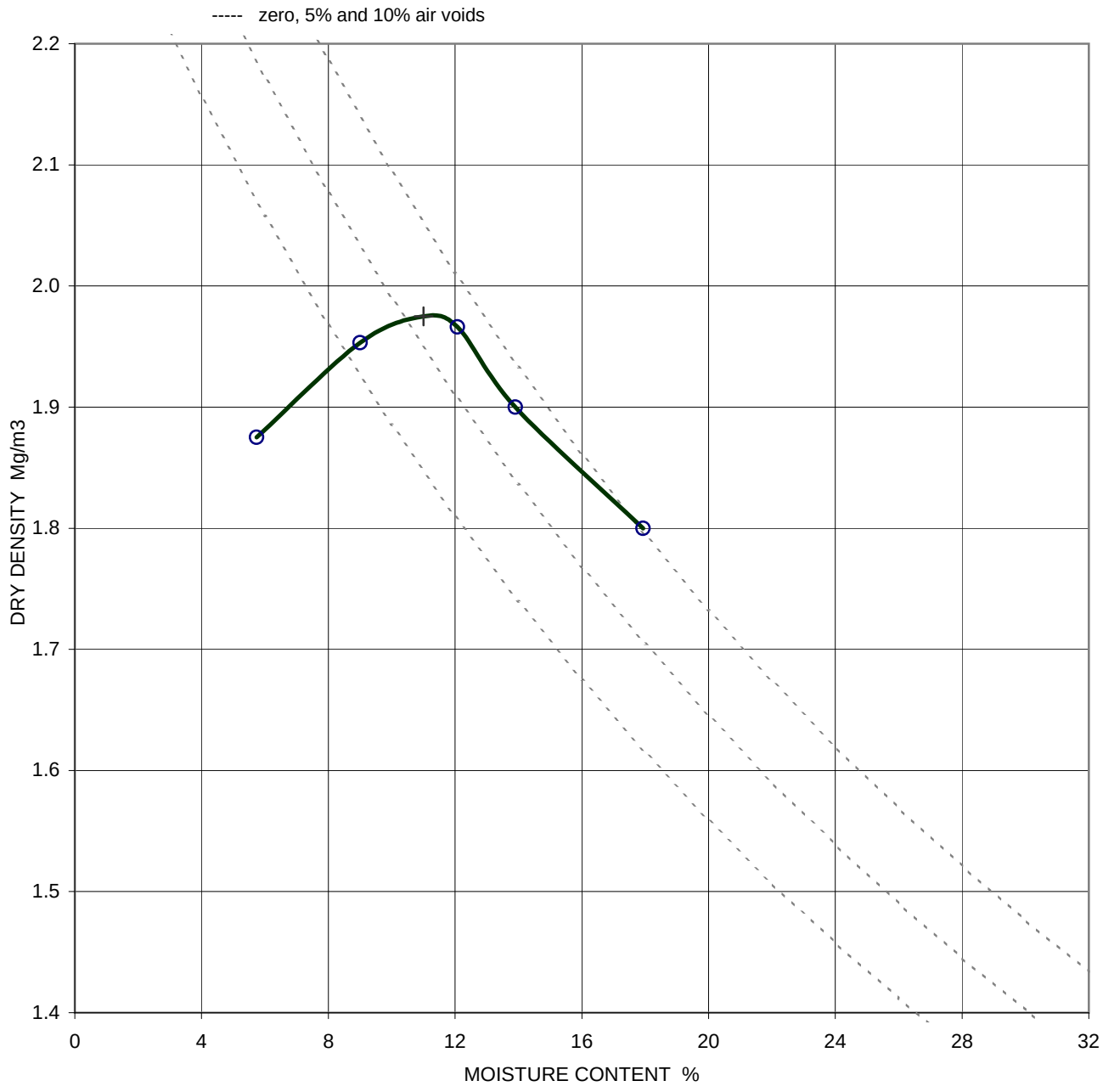
General notes: BS 1377:Part 3:1990 definitive method used in all cases unless annotated otherwise. See individual test reports for further details

Key : 2:1 2:1 water:soil extract from soil | Organic matter content | CO_2 Carbonate content (rapid titration)

< 2 mm material passing 2mm sieve | Mass loss on ignition

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	H8076	Sample Details:	Hole No	TP12A		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	0.20		
			Samp No	7	Type	B
			ID	ESGH807620080827000000046		
			Spec Ref			



Soil description	Brown grey slightly sandy gravelly CLAY		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	16	%	
Material < 37.5mm > 20mm	11	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks	X' Material tested at clients request.		

Derived Parameters +

Maximum dry density, Mg/m3

1.98

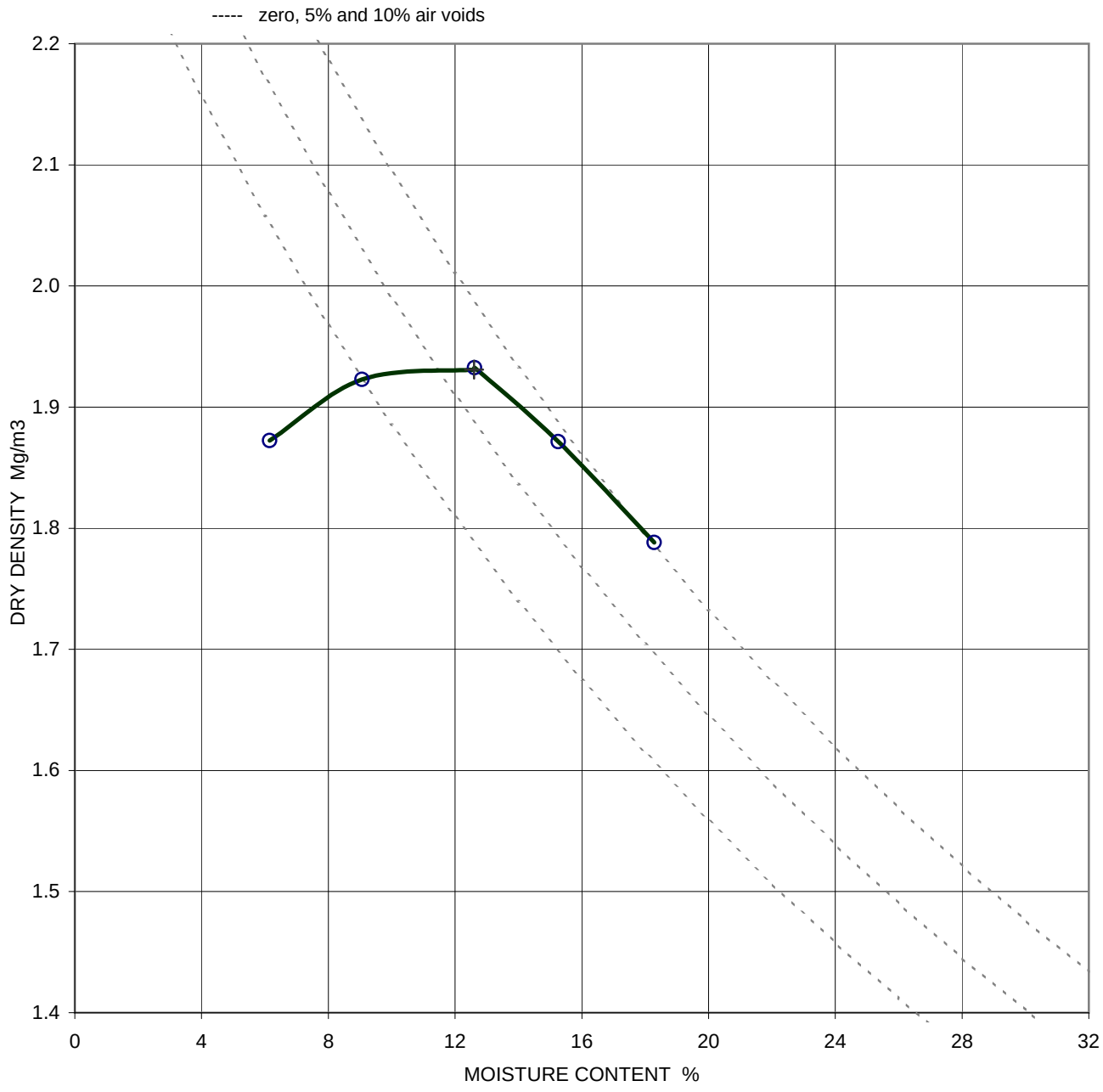
Optimum moisture content, %

11

QA Ref SLD 4, 3.3/4 Rev 62 Jul 07	Soil Mechanics	UKAS TESTING 4089	Printed:27/10/2008 14:32	**Figure** **COMPL 1**

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	H8076	Sample Details:	Hole No	TP15		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	0.30		
			Samp No	9	Type	B
			ID	ESGH807620080827000000067		
			Spec Ref			



Soil description	Grey brown slightly sandy gravelly CLAY		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	13	%	
Material < 37.5mm > 20mm	13	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks	X' Material tested at clients request		

Derived Parameters +

Maximum dry density, Mg/m3

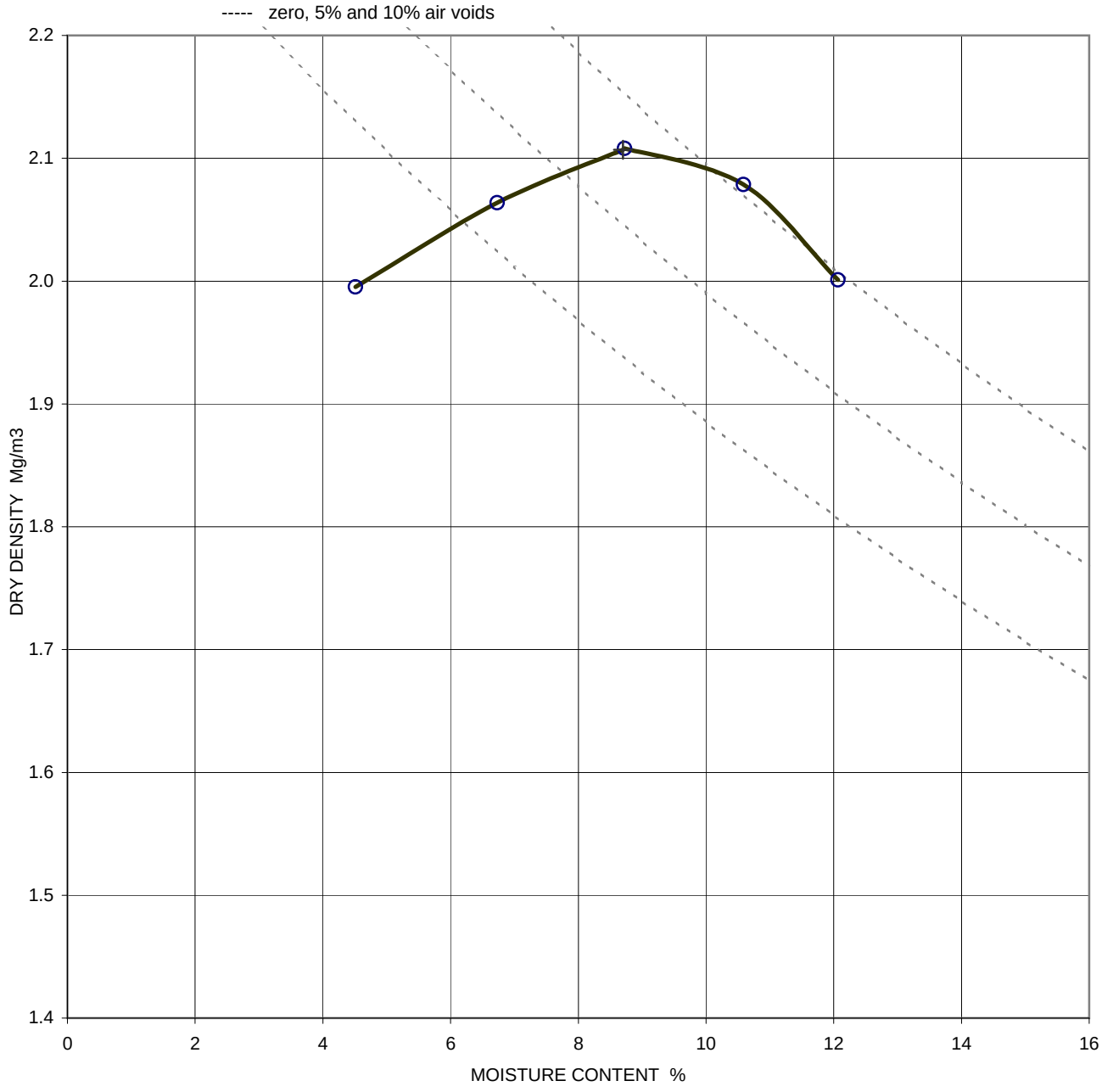
1.93

Optimum moisture content, %

13

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Project No	H8076	Sample Details:	Hole No	TP3		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	0.50		
			Samp No	10	Type	B
			ID	ESGH807620080827000000137		
			Spec Ref			



Soil description	Grey brown slightly sandy slightly gravelly CLAY		
Test method	BS 1377:part 4:1990: clause 3.6, 4.5 kg rammer in a CBR mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	5	%	
Material < 37.5mm > 20mm	4	%	
Particle density	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

2.11

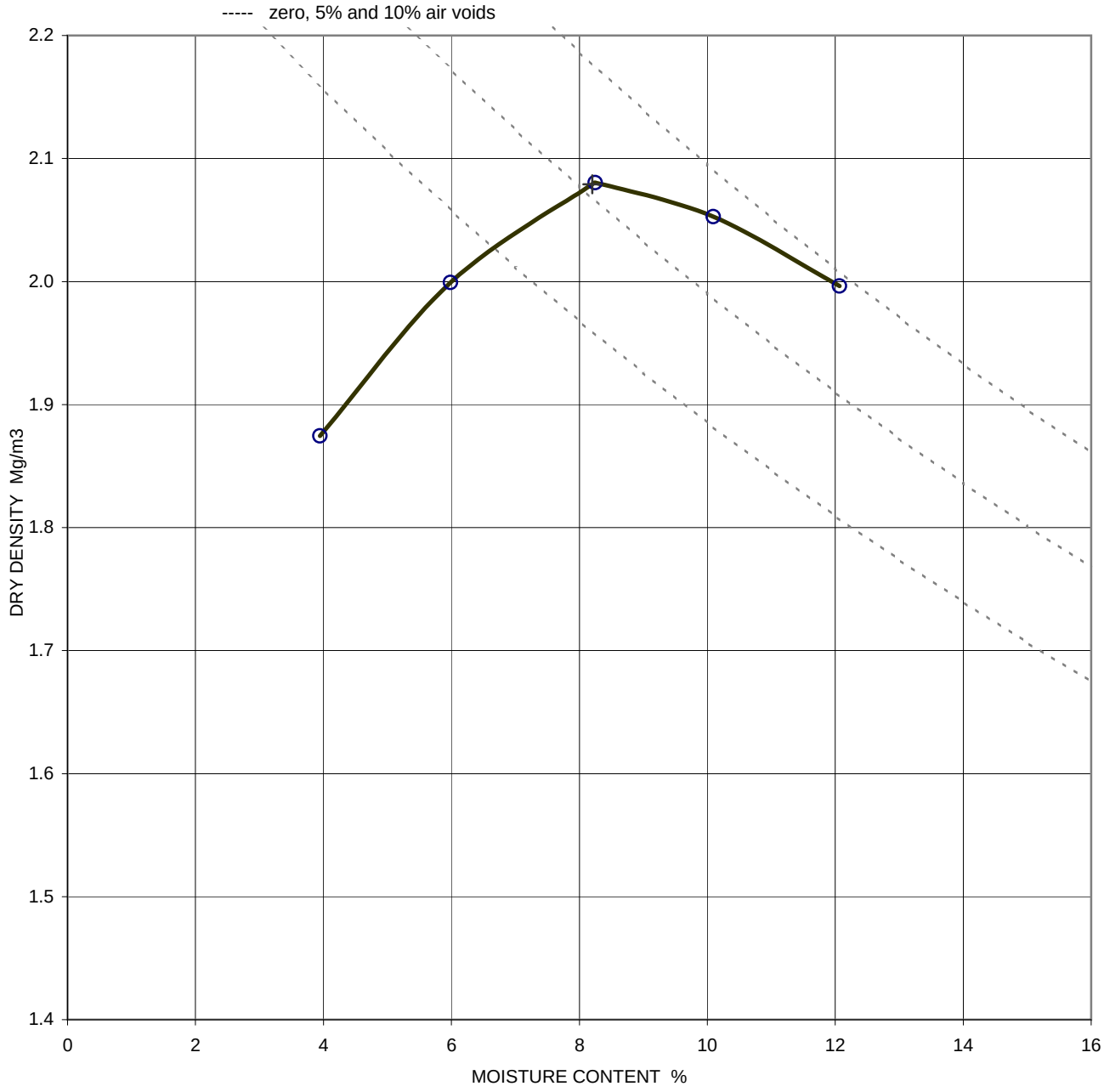
Optimum moisture content, %

8.7

QA Ref SLD 4, 3.5/6 Rev 62 Jul 07	Soil Mechanics	UKAS TESTING 4089	Printed:27/10/2008 14:31	**Figure** **COMPH 1**

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Project No	H8076	Sample Details:	Hole No	TP6		
Project Name	Hirwaun Industrial Estate		Depth (m BGL)	0.90		
			Samp No	14	Type	B
			ID	ESGH807620080827000000180		
			Spec Ref			



Soil description	Brown grey gravelly sandy CLAY		
Test method	BS 1377:part 4:1990: clause 3.6, 4.5 kg rammer in a CBR mould		
Preparation	Original material was natural, single sample tested		
Material > 37.5mm	18	%	
Material < 37.5mm > 20mm	7	%	
Particle density	2.65	assumed	
Remarks	X' Material tested at clients request		

Derived Parameters +

Maximum dry density, Mg/m3

2.08

Optimum moisture content, %

8.2

QA Ref SLD 4, 3.5/6 Rev 62 Jul 07	Soil Mechanics	UKAS TESTING 4089	Printed:27/10/2008 14:31	**Figure** **COMPH 2**

ENCLOSURE D

GEOENVIRONMENTAL LABORATORY TEST RESULTS

TES Report	TES Report no
	EFS/086407M (ver2)
	EFS/086384M
	EFS/086382M
	EFS/085713M
	EXR/088900

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

Amended Report
TES Report No. EFS/086407M (Ver. 2)

Soil Mechanics
Unit 15
Crosby Yard
Bridgend
Mid Glamorgan
CF31 1JZ

Site: Hirwaun Industrial Estate

The 16 samples described in this report were logged for analysis by TES Bretby on 06-Oct-2008.This is an amended report that replaces the report issued on 22-Oct-2008
The analysis was completed by: 05-Nov-2008

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of PCB Congener (12) Results (Page 5)
Table of TPH Texas banding (std) (Page 6)
GC-FID Chromatograms (Pages 7 to 22)
Table of Report Notes (Page 23)

On behalf of
TES Bretby :
Jane Colbourne

JNColbourne
Project Co-ordinator

Date of Issue: 05-Nov-2008

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105°C unless otherwise stated. (except QC samples)
TES Bretby accepts no responsibility for any sampling not carried out by our personnel.

Sample Descriptions

Client : Soil Mechanics

Site : Hirwaun Industrial Estate

Report Number : S08_6407M

Lab ID Number	Client ID	Description
CL/0829481	TP1A ES 1 0.30	Brown Gravel SILT
CL/0829482	TP1A ES 3 1.50	Brown SILT
CL/0829483	TP2 ES 1 0.30	Brown SILT
CL/0829484	TP2 ES 5 2.70	Brown SILT
CL/0829485	TP2 ES 6 3.30	Brown CLAY
CL/0829486	TP3 ES 2 0.50	Brown Gravel SILT
CL/0829487	TP4 ES 2 0.70	Brown SILT
CL/0829488	TP5 ES 1 0.30	Brown SILT
CL/0829489	TP6 ES 1 0.30	Brown Gravel CLAY
CL/0829490	TP7 ES 1 0.30	Brown Gravel SILT
CL/0829491	TP8 ES 1 0.30	Brown Gravel CLAY
CL/0829492	TP8 ES 3 0.80	Brown Gravel SILT
CL/0829493	TP9 ES 2 0.70	Brown SILT
CL/0829494	TP10 ES 1 0.30	Brown SILT
CL/0829495	TP10 ES 2 0.70	Brown SILT
CL/0829496	TP11 ES 2 1.60	Brown SILT

Units :		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg
Method Codes :		ELESULP	ICPACIDS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	TMSS	TPHFIDUS	TPHFIDUS
Method Reporting Limits :		20	20	0.1	2	0.1	3	3	3.5	0.10	0.5	2.5	0.5	19.5	0.2	10.0	10.0
Accreditation Code:		UM	UM	U	UM	U	UM	UM	UM	U	U	UM	U	UM	U	UM	
TES ID Number CL/	**Client Sample Description**	**Elemental Sulphur**	**SO4-- (acid sol)**	**Antimony (MS)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Molybdenum (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**Tot.Moisture @ 105C**	**TPH by GCFID (AR)**	**TPH Carbon Banding.**
0829481	TP1A ES 1 0.30	<20	72	<0.5	6.7	0.22	11.6‡	13	18.9	<0.1	<0.5	18.5	<0.5	47.8	10.5	25	Req
0829482	TP1A ES 3 1.50	<20	55	<0.5	5.8	0.19	10.6‡	11.4	14.9	<0.1	<0.5	18.2	<0.5	42	10.6	34	Req
0829483	TP2 ES 1 0.30	<20	<20	<0.5	5.1	0.17	7.8‡	9.7	11.9	<0.1	<0.5	12.1	<0.5	30.9	7.3	1000	Req
0829484	TP2 ES 5 2.70	968	690	1.7	17.9	0.42	14‡	14.1	30.3	0.12	1.4	12.4	0.7	203.1	30.8	611	Req
0829485	TP2 ES 6 3.30	36	318	<0.5	6.4	<0.1	19.6‡	4.9	25.6	0.12	<0.5	8.6	0.9	58.8	45.5	222	Req
0829486	TP3 ES 2 0.50	<20	<20	<0.5	6.1	0.2	11.3‡	19.4	13.4	<0.1	<0.5	18	<0.5	41.5	9.5	<11.0	Req
0829487	TP4 ES 2 0.70	<20	<20	<0.5	4.9	0.19	7.7‡	24.8	9.5	<0.1	<0.5	12.6	<0.5	66.2	9.6	44	Req
0829488	TP5 ES 1 0.30	<20	<20	<0.5	6.3	0.19	11.0‡	15.1	15.9	<0.1	<0.5	17.1	<0.5	47.5	10.2	15.6	Req
0829489	TP6 ES 1 0.30	<21	<21	<0.5	7	0.22	11.1‡	12.8	14.1	<0.1	0.5	18	<0.5	52.6	15.5	33	Req
0829490	TP7 ES 1 0.30	<20	<20	<0.5	6.4	0.22	10.8‡	13.5	15.7	<0.1	<0.5	17.6	<0.5	39.3	11.2	23	Req
0829491	TP8 ES 1 0.30	<21	<21	<0.5	7.1	0.27	10.2‡	28.3	15	<0.1	<0.5	18.8	<0.5	72.1	14.1	<11.6	Req
0829492	TP8 ES 3 0.80	<20	<20	<0.5	7.7	0.18	10.7‡	12.7	15.1	<0.1	<0.5	13.3	<0.5	56.4	11.3	19	Req
0829493	TP9 ES 2 0.70	<21	<21	<0.5	5.3	0.14	9.9‡	10.5	11.7	<0.1	<0.5	13.5	<0.5	30.1	10.7	<11.2	Req
0829494	TP10 ES 1 0.30	<20	<20	1	6.4	0.21	9.4‡	14.7	29.2	<0.1	<0.5	15.3	<0.5	56.6	11.3	13.5	Req
0829495	TP10 ES 2 0.70	13	495	1.4	7.8	2.01	14.9‡	187.2	52.1	0.22	1.1	18.6	<0.5	1220	11.4	444	Req
0829496	TP11 ES 2 1.60	22	470	0.6	27.8	0.77	18.4‡	14	39.2	<0.1	1.2	10.7	1.1	148	31.1	118	Req

TES Bretby

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Amended Report

Date Printed	05-Nov-08
Report Number	**EFS/086407M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Units :		pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% M/M		
Method Codes :		WSLM3	ICPBOR	ICPMAJ	KONECL	KONECR	PAHSCUV	PCBUSECD	SEN9	SFAPI	SFAPI	SFAPI	SFAPI	SFAS	WSLM59		
Method Reporting Limits :			0.5	1	5.0	0.1	10			0.5	0.5	0.5	2	0.5	0.02		
Accreditation Code:		U	N	N	N	N	N		N	N	N	N	N	N	N		
TES ID Number CL/	**Client Sample Description**	**pH units**	**Boron (H20 Soluble)**	**Barium**	**Chloride:**	**Chromium vi:**	**PAH (screening)**	**PCB (12 Congeners)**	**Asbestos (screening)**	**Cyanide(Free) (AR)**	**Cyanide(Total) (AR)**	**Phenol Index.(AR)**	**Thiocyanate(SCN)(AR)**	**Sulphide as S (AR)**	**F.O.C. %**		
0829481	TP1A ES 1 0.30	7.9	3.4	115	10.1	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	1.15		
0829482	TP1A ES 3 1.50	8.0	3.2	120	9.2	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	0.76		
0829483	TP2 ES 1 0.30	7.3	3.1	38	21	<0.1	<10		NBFO	<0.5	<0.5	<0.5	<2.2	<0.5	0.38		
0829484	TP2 ES 5 2.70	9.0	4.1	104	96	<0.1	227		NBFO	<0.7	<0.7	<0.7	<2.9	15.6	2.9		
0829485	TP2 ES 6 3.30	7.1	3.8	116	70	<0.1	<11		NBFO	<0.9	<0.9	<0.9	<3.7	1.5	5.08		
0829486	TP3 ES 2 0.50	8.0	3	142	47	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	0.58		
0829487	TP4 ES 2 0.70	8.4	3.1	106	15.4	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	0.56		
0829488	TP5 ES 1 0.30	8.2	3	123	13.3	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	0.57		
0829489	TP6 ES 1 0.30	8.2	2.9	112	26	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	0.63		
0829490	TP7 ES 1 0.30	8.3	2.7	190	50	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.55		
0829491	TP8 ES 1 0.30	8.2	2.7	104	7.2	<0.1	<10	Req	NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.51		
0829492	TP8 ES 3 0.80	7.8	2.8	96	21	<0.1	<10	Req	NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.54		
0829493	TP9 ES 2 0.70	6.8	2.9	30	15.4	<0.1	<10	Req	NBFO	<0.6	<0.6	<0.6	<2.2	<0.6	0.29		
0829494	TP10 ES 1 0.30	7.9	2.6	78	12.2	<0.1	<10		NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.73		
0829495	TP10 ES 2 0.70	8.3	3	419	28	<0.1	36		NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	2.31		
0829496	TP11 ES 2 1.60	6.6	3.4	153	12.5	<0.1	<10		NBFO	<0.7	<0.7	<0.7	<2.9	<0.7	3.24		

TES Bretby

PO Box 100, Bretby Business Park,

Burton-on-Trent, Staffordshire, DE15 0XD

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Amended Report

Date Printed	05-Nov-08
Report Number	**EFS/086407M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Units :		ug/kg	ug/kg	ug/kg	ug/kg												
Method Codes :		BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA												
Method Reporting Limits :		10	10	10	20												
Accreditation Code:		N	N	N	N												
TES ID Number CL/	**Client Sample Description**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**												
0829481	TP1A ES 1 0.30	<11	<11	<11	<22												
0829482	TP1A ES 3 1.50	<11	<11	<11	<22												
0829483	TP2 ES 1 0.30	<11	<11	<11	<22												
0829484	TP2 ES 5 2.70	<14	<14	<14	<29												
0829485	TP2 ES 6 3.30	<18	<18	<18	<37												
0829486	TP3 ES 2 0.50	<11	<11	<11	<22												
0829487	TP4 ES 2 0.70	<11	<11	<11	<22												
0829488	TP5 ES 1 0.30	<11	<11	<11	<22												
0829489	TP6 ES 1 0.30	<12	<12	<12	<24												
0829490	TP7 ES 1 0.30	<11	<11	<11	<23												
0829491	TP8 ES 1 0.30	<12	<12	<12	<23												
0829492	TP8 ES 3 0.80	<11	<11	<11	<23												
0829493	TP9 ES 2 0.70	<11	<11	<11	<22												
0829494	TP10 ES 1 0.30	<11	<11	<11	<23												
0829495	TP10 ES 2 0.70	<11	<11	<11	<23												
0829496	TP11 ES 2 1.60	<15	<15	<15	<29												

TES Bretby

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Amended Report

Date Printed	05-Nov-08
Report Number	**EFS/086407M**
Table Number	**1**

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Polychlorinated Biphenyls (congeners)

Customer and Site Details: Soil Mechanics: Hirwaun Industrial Estate
Job Number: S08_6407M
QC Batch Number: 083657
Directory: 1016PCB.GC11
Method: Ultrasonic
Accreditation code: N

Matrix: Soil
Date Booked in: 06-Oct-08
Date Extracted: 17-Oct-08
Date Analysed: 20-Oct-08

		Concentration, (µg/kg)											
Sample ID	**Customer ID**	**PCB 81**	**PCB 77**	**PCB 123**	**PCB 118**	**PCB 114**	**PCB 105**	**PCB 126**	**PCB 167**	**PCB 156**	**PCB 157**	**PCB 169**	**PCB 189**
* CL0829491	TP8 ES 1 0.30	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
* CL0829492	TP8 ES 3 0.80	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
* CL0829493	TP9 ES 2 0.70	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Total Petroleum Hydrocarbons (TPH) Carbon Ranges

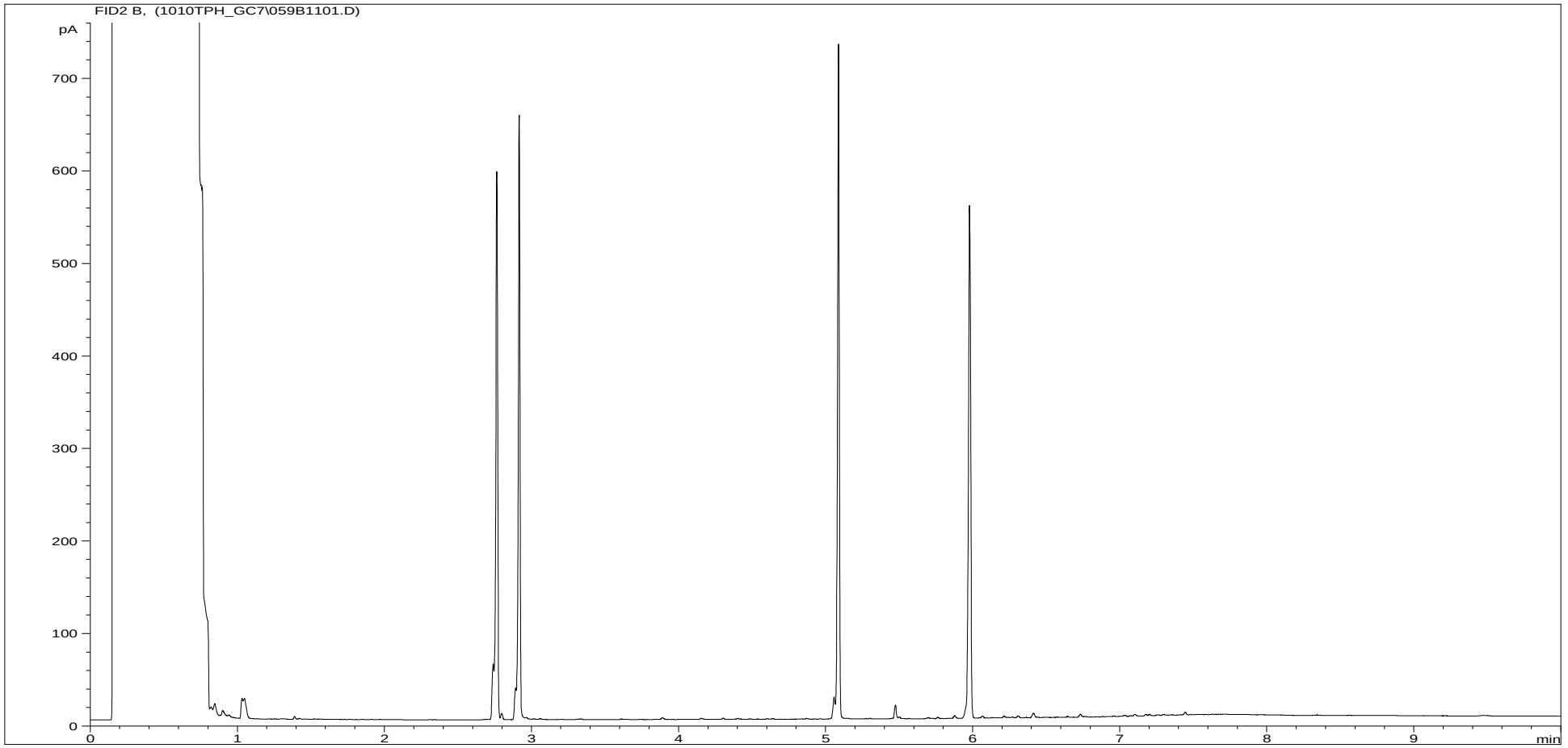
Customer and Site Details: Soil Mechanics : Hirwaun Industrial Estate
Job Number: S08_6407M
QC Batch Number: 83558
Directory: D:\TES\DATA\Y2008\1010TPH_GC7\074B2801.D
Method: Ultra Sonic
Accreditation code: U

Matrix: Soil
Date Booked in: 06-Oct-08
Date Extracted: 09-Oct-08
Date Analysed: 10-Oct-08

		Concentration, (mg/kg) - as dry weight.				
Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
CL0829481	TP1A ES 1 0.30	<2	<2	<2	<2	15
CL0829482	TP1A ES 3 1.50	<2	<2	2.37	2.86	21.5
CL0829483	TP2 ES 1 0.30	<2	<2	17.6	148	727
CL0829484	TP2 ES 5 2.70	4.73	29.9	198	223	136.7
CL0829485	TP2 ES 6 3.30	<4	<4	<4	4.17	141.1
CL0829486	TP3 ES 2 0.50	<2	<2	<2	<2	<4.84
CL0829487	TP4 ES 2 0.70	<2	<2	2.75	8.76	25.8
CL0829488	TP5 ES 1 0.30	<2	<2	<2	<2	10.5
CL0829489	TP6 ES 1 0.30	<2	<2	4.18	3.57	17
CL0829490	TP7 ES 1 0.30	<2	<2	<2	<2	14
CL0829491	TP8 ES 1 0.30	<2	<2	<2	<2	5.8
CL0829492	TP8 ES 3 0.80	<2	<2	<2	<2	13
CL0829493	TP9 ES 2 0.70	<2	<2	<2	<2	<4.90
CL0829494	TP10 ES 1 0.30	<2	<2	<2	<2	8.62
CL0829495	TP10 ES 2 0.70	<2	<2	5.79	68	314
CL0829496	TP11 ES 2 1.60	<3	<3	2.98	15.7	79.5

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appropriat e, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

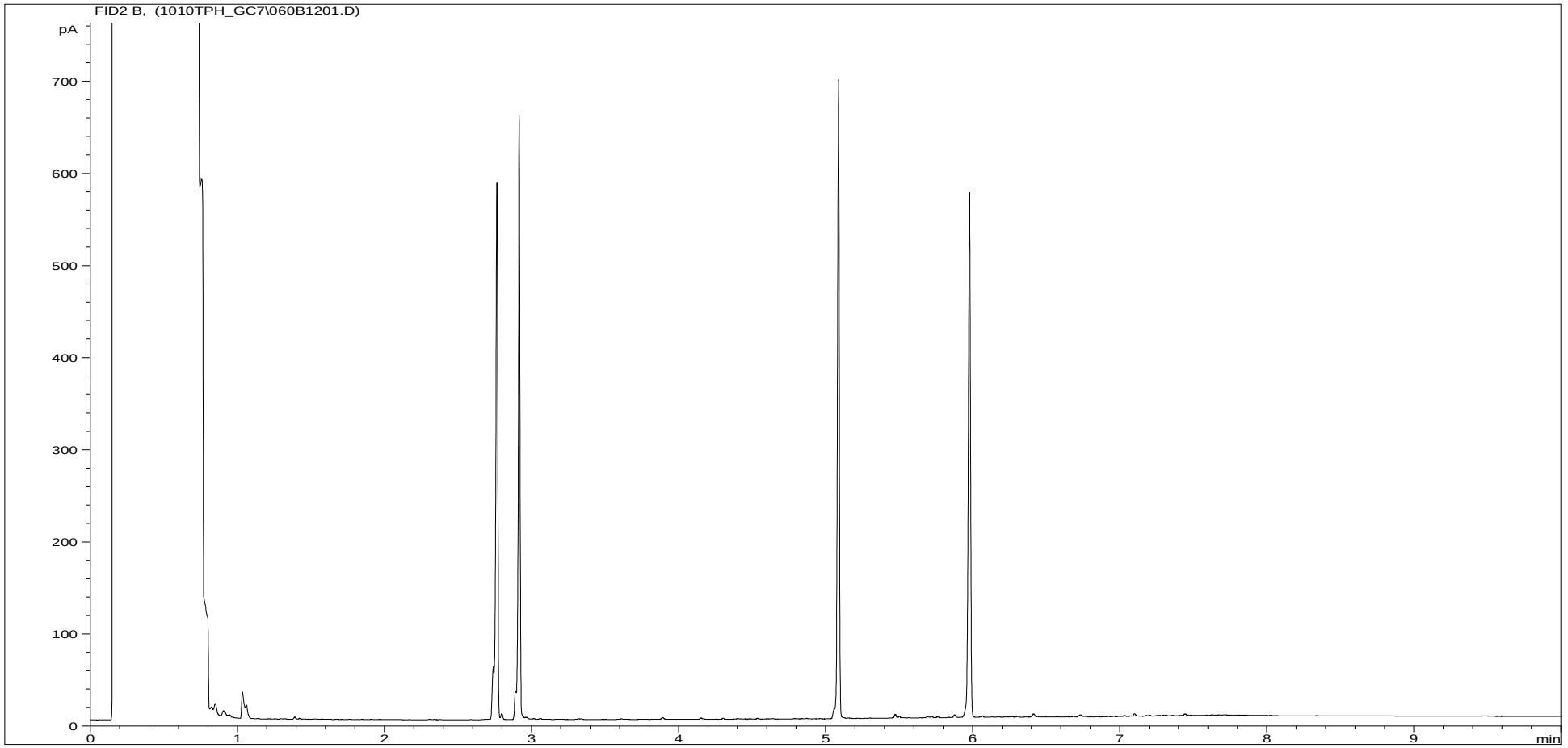


Sample ID:	CL0829481	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP1A ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\059B1101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

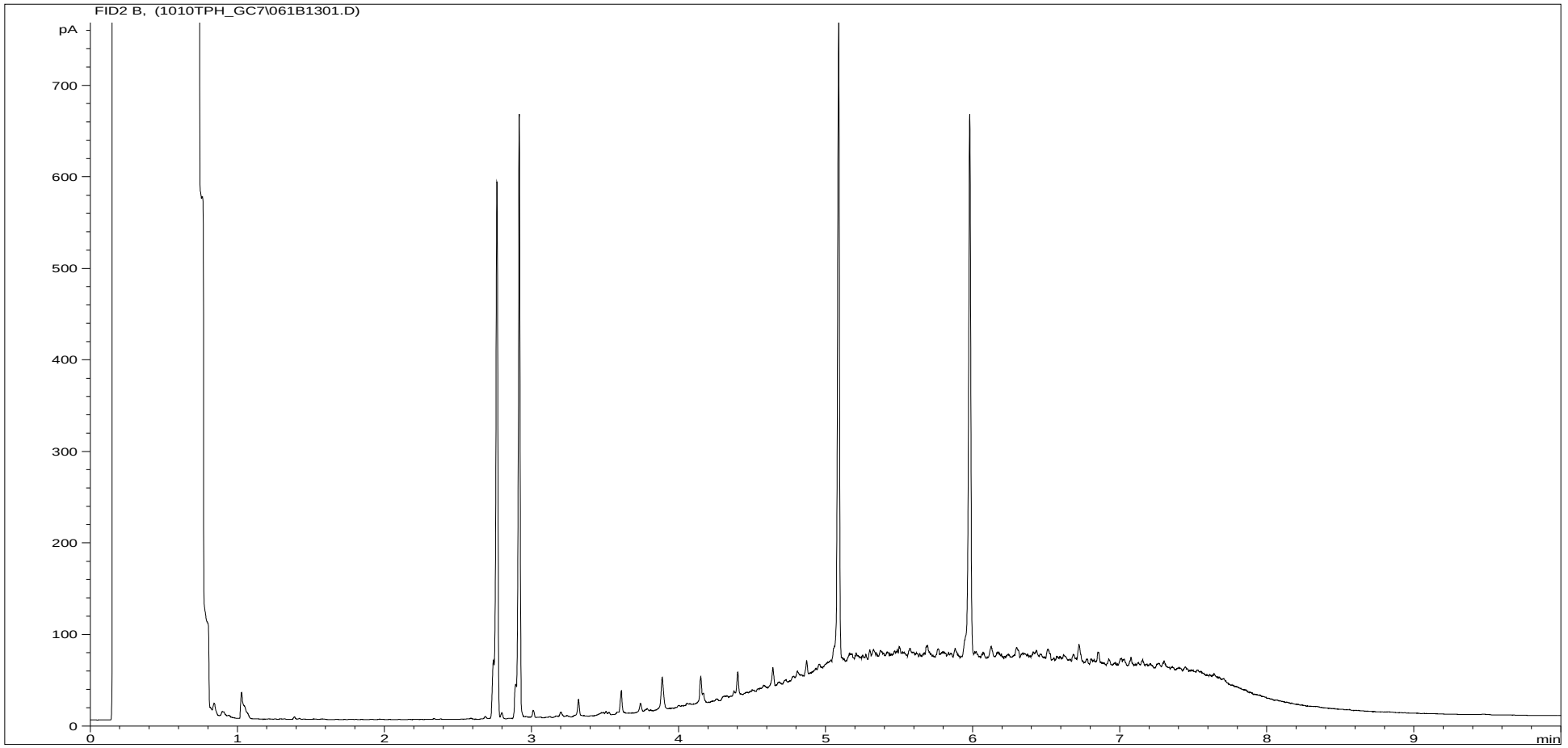


Sample ID:	CL0829482	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP1A ES 3 1.50
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\060B1201.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

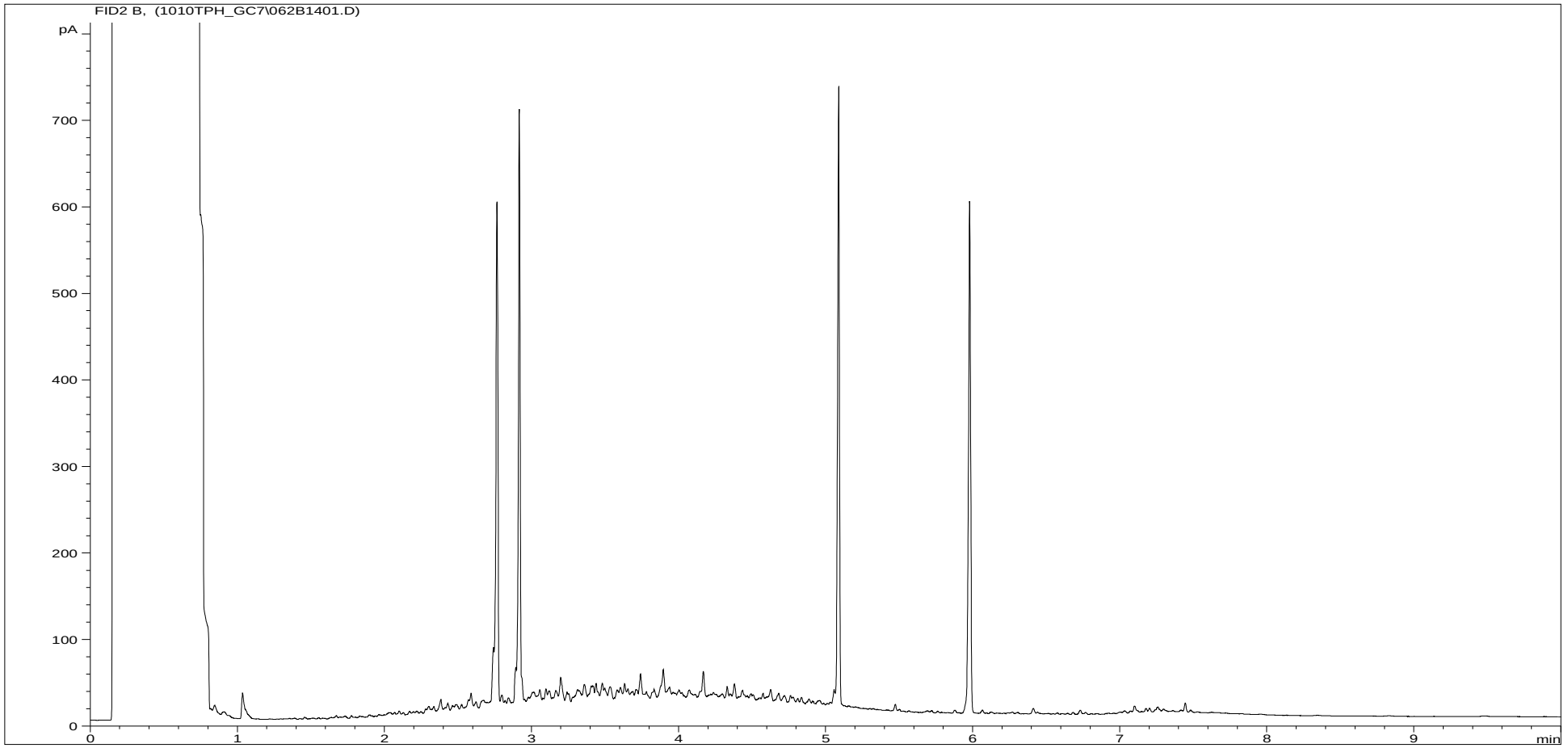


Sample ID:	CL0829483	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP2 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\061B1301.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

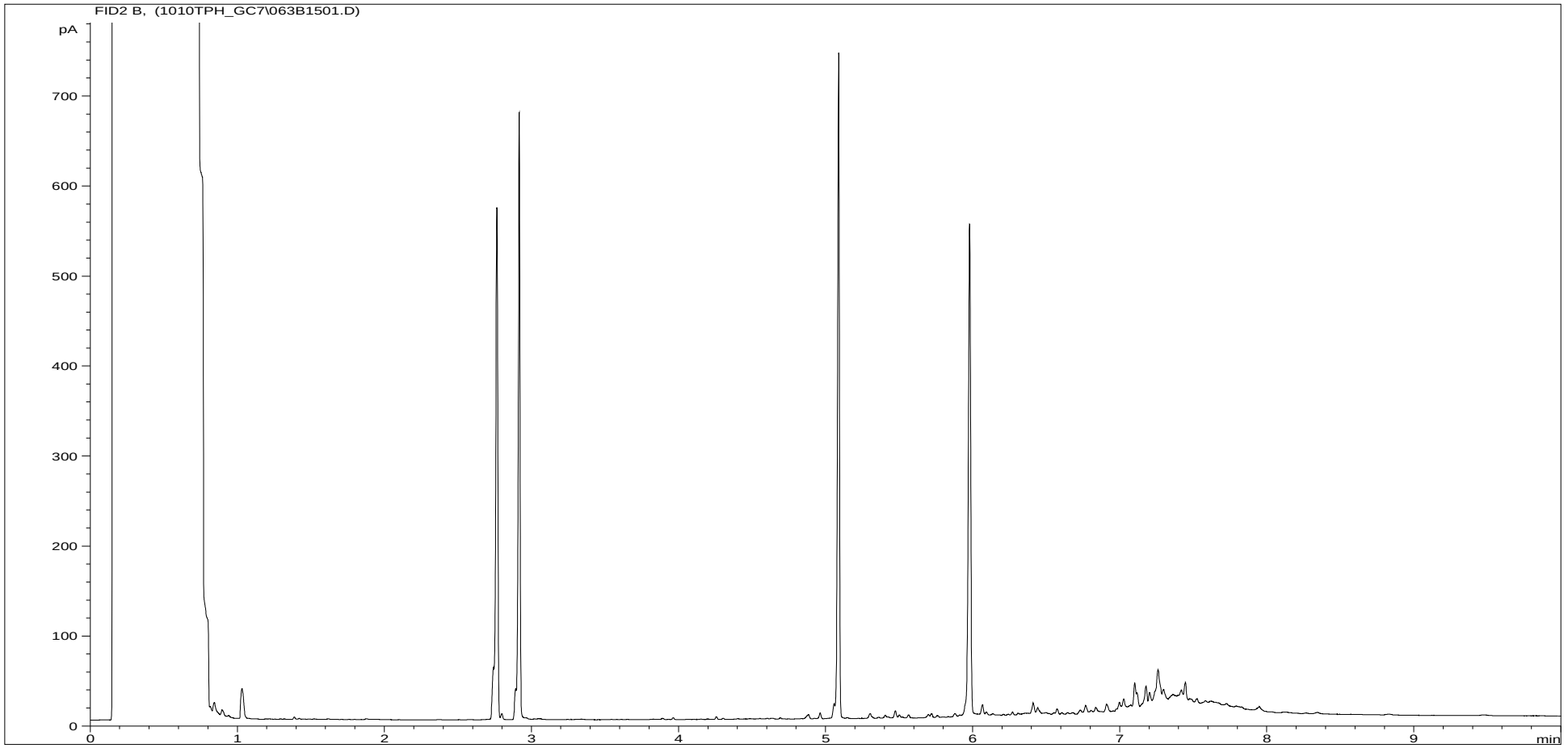


Sample ID:	CL0829484	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP2 ES 5 2.70
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\062B1401.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

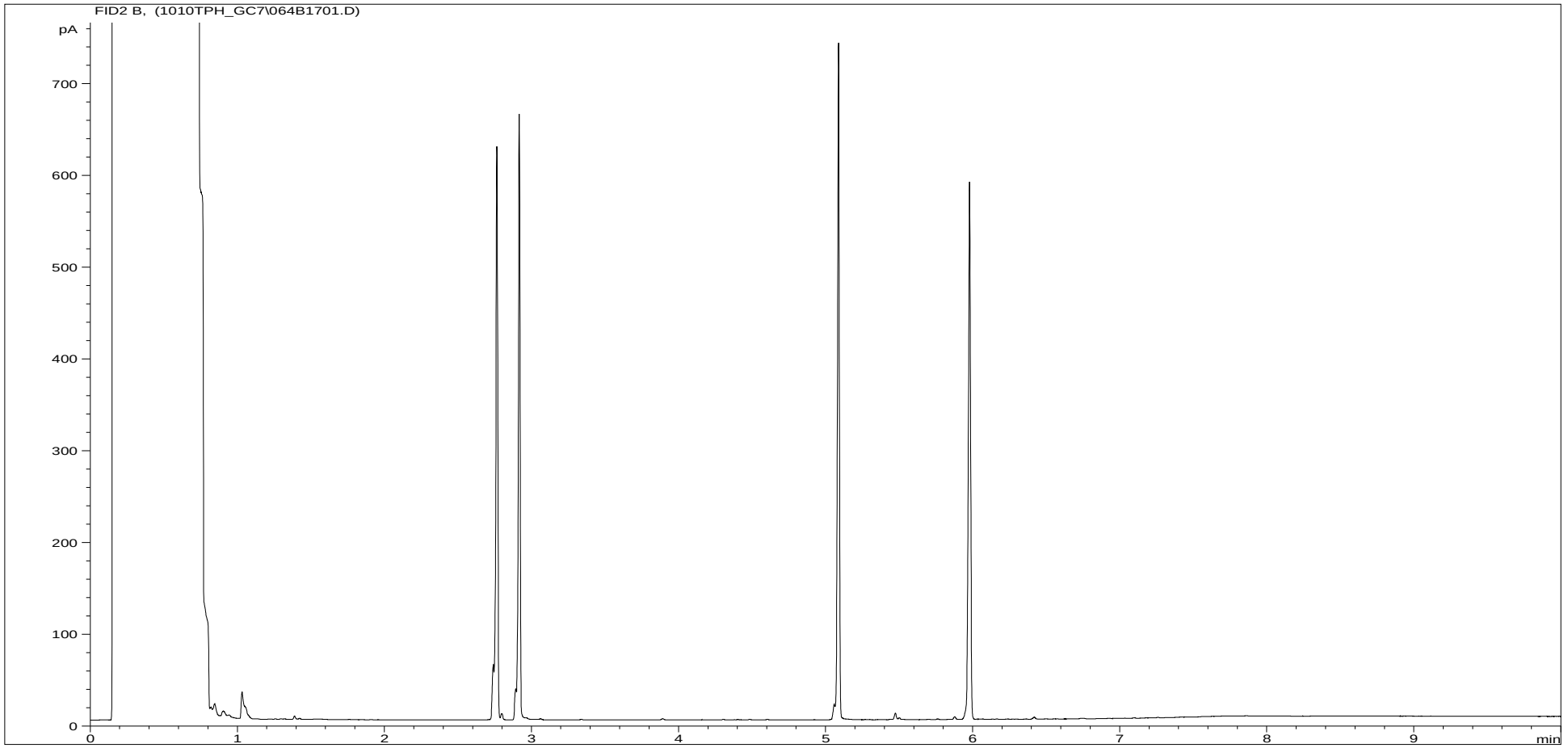


Sample ID:	CL0829485	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP2 ES 6 3.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\063B1501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

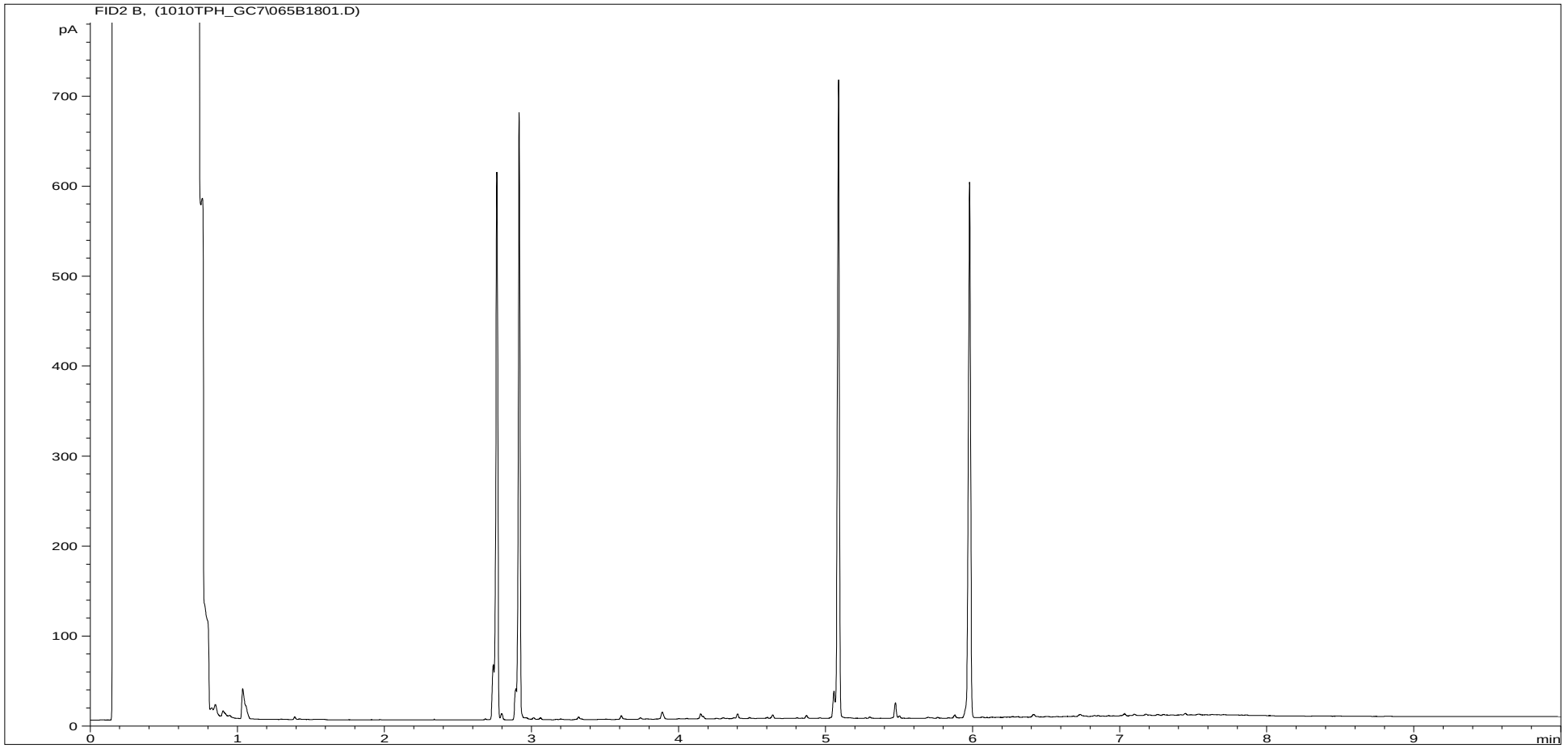


Sample ID:	CL0829486	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP3 ES 2 0.50
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\064B1701.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

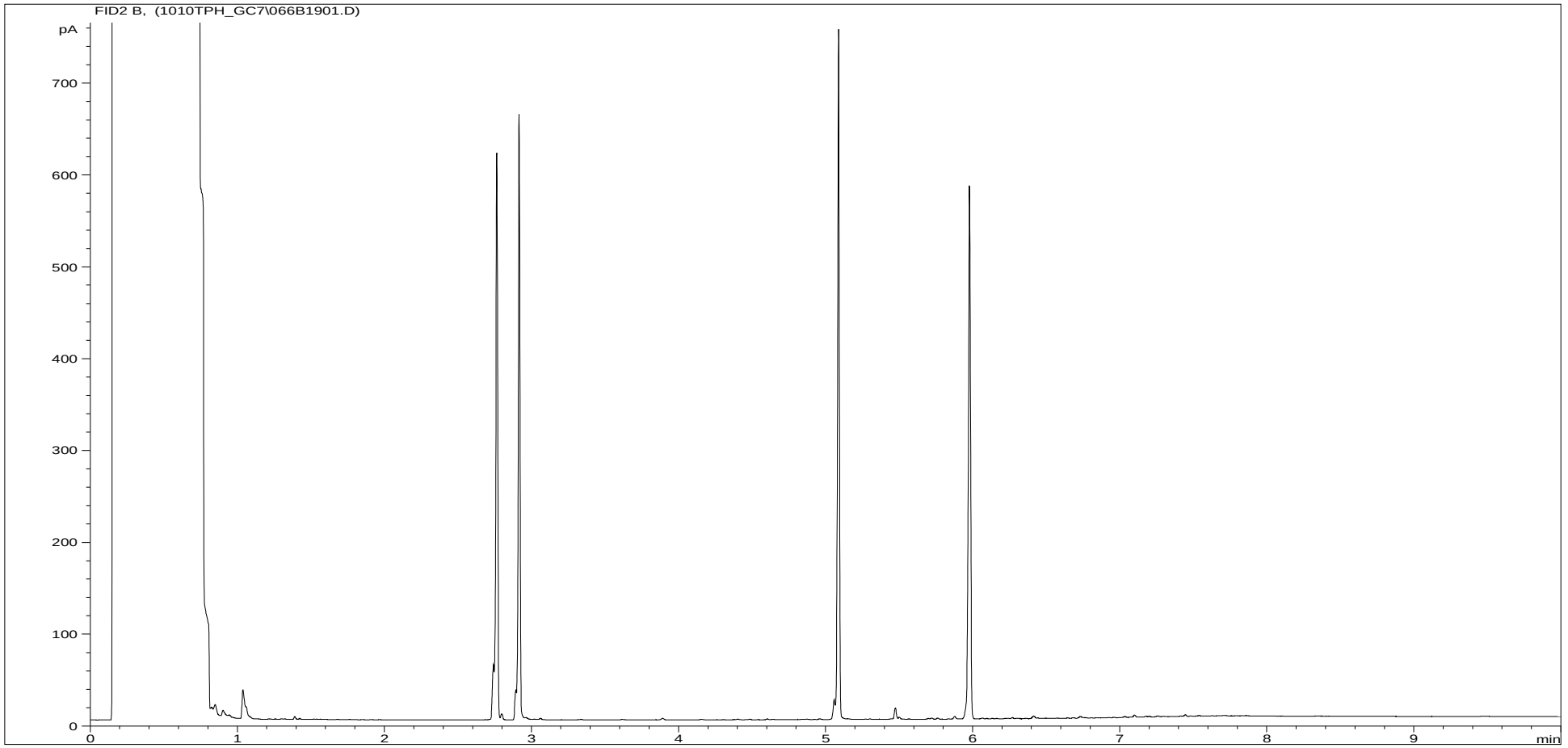


Sample ID:	CL0829487	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP4 ES 2 0.70
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\065B1801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

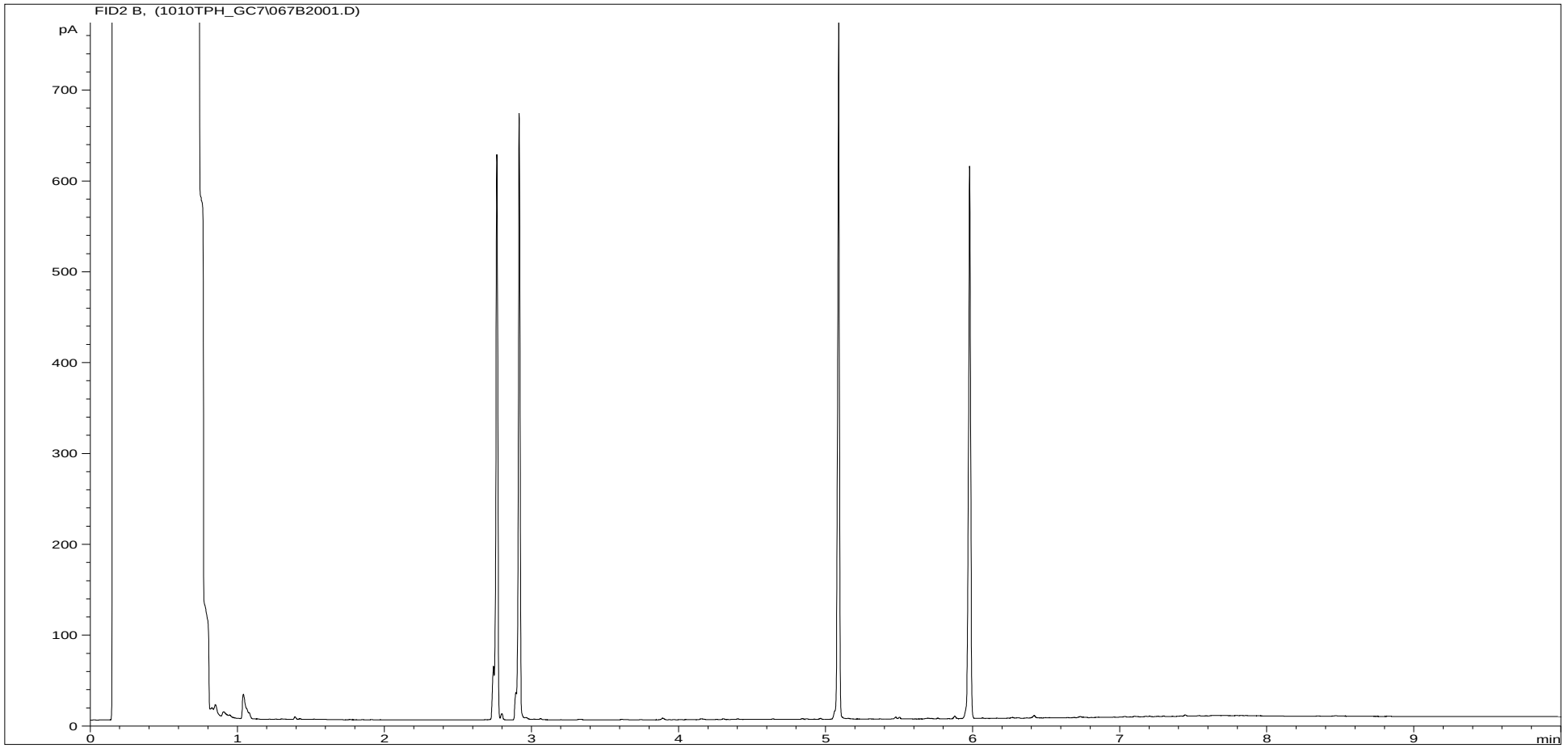


Sample ID:	CL0829488	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP5 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\066B1901.D		

Where individual results are flagged see report notes for for status.

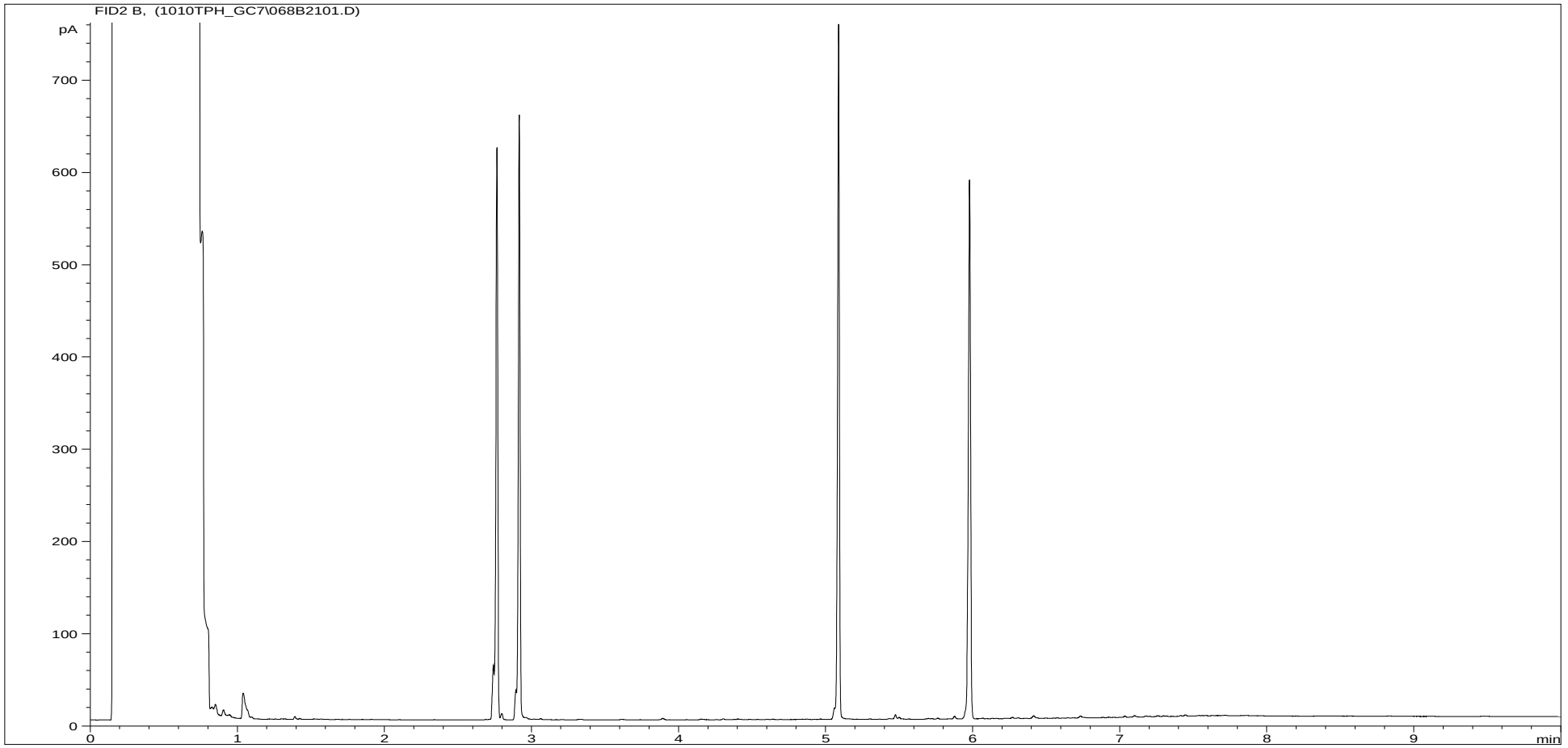
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL0829489	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP6 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\067B2001.D		

Petroleum Hydrocarbons (C8 to C40) by GC/FID

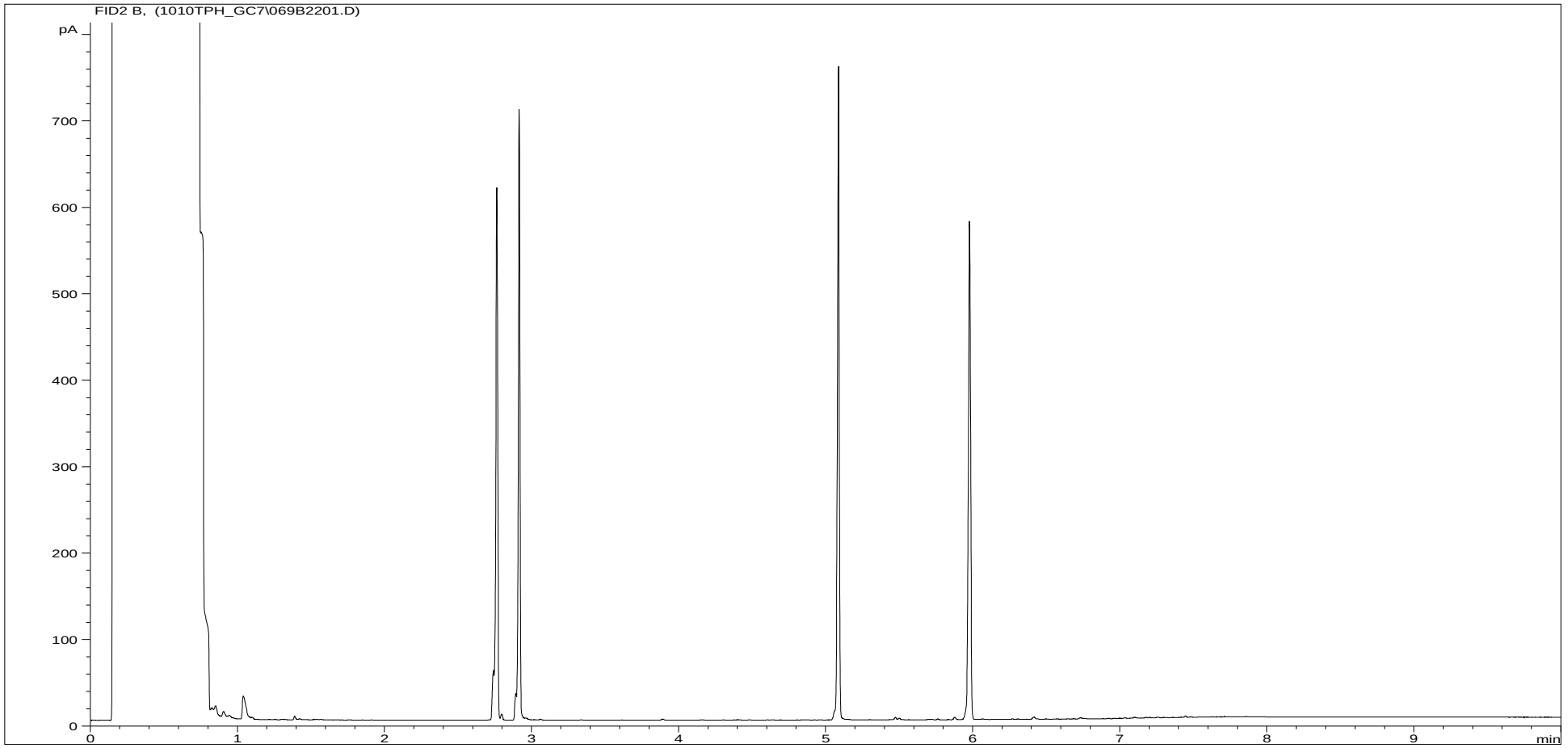


Sample ID:	CL0829490	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP7 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\068B2101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

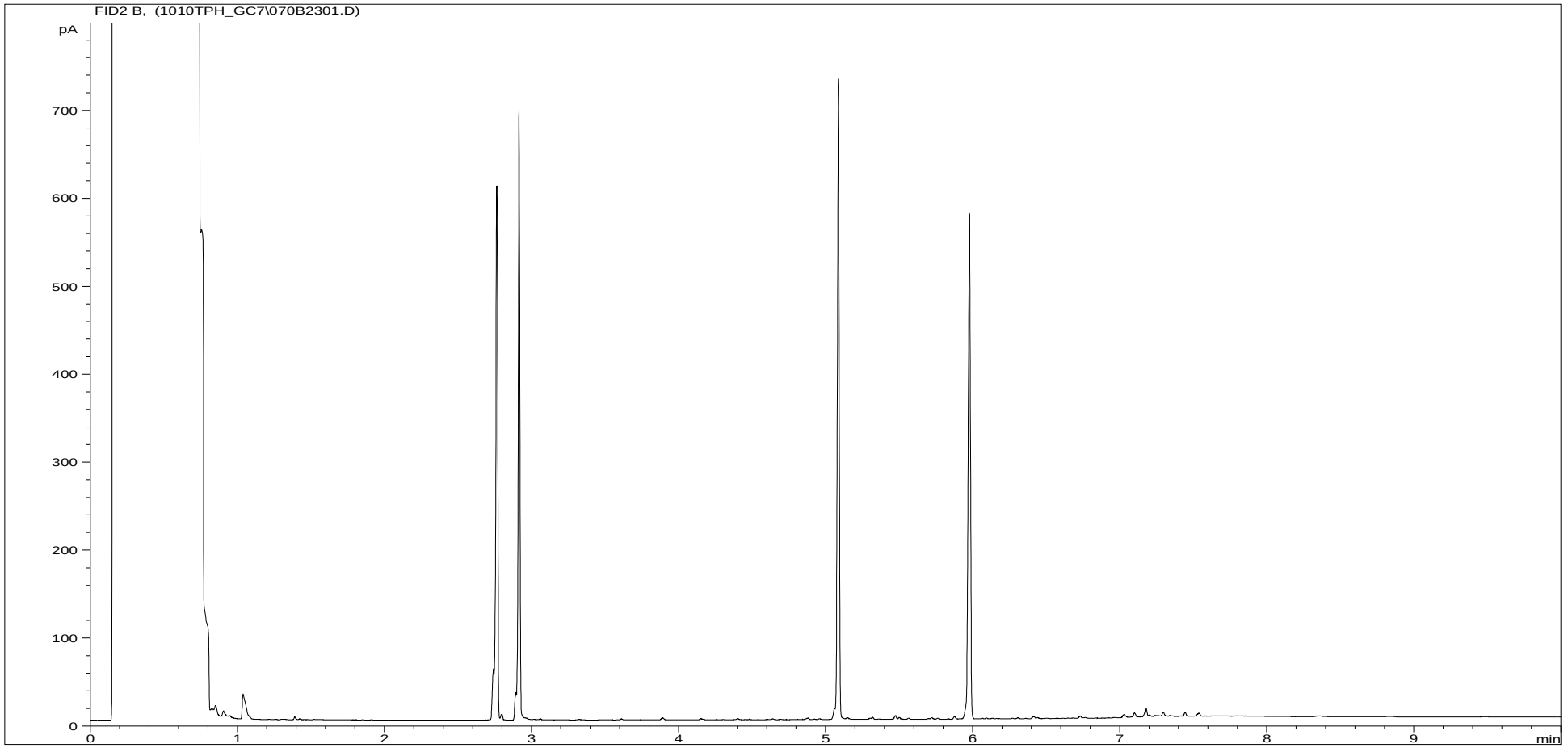


Sample ID:	CL0829491	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP8 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\069B2201.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

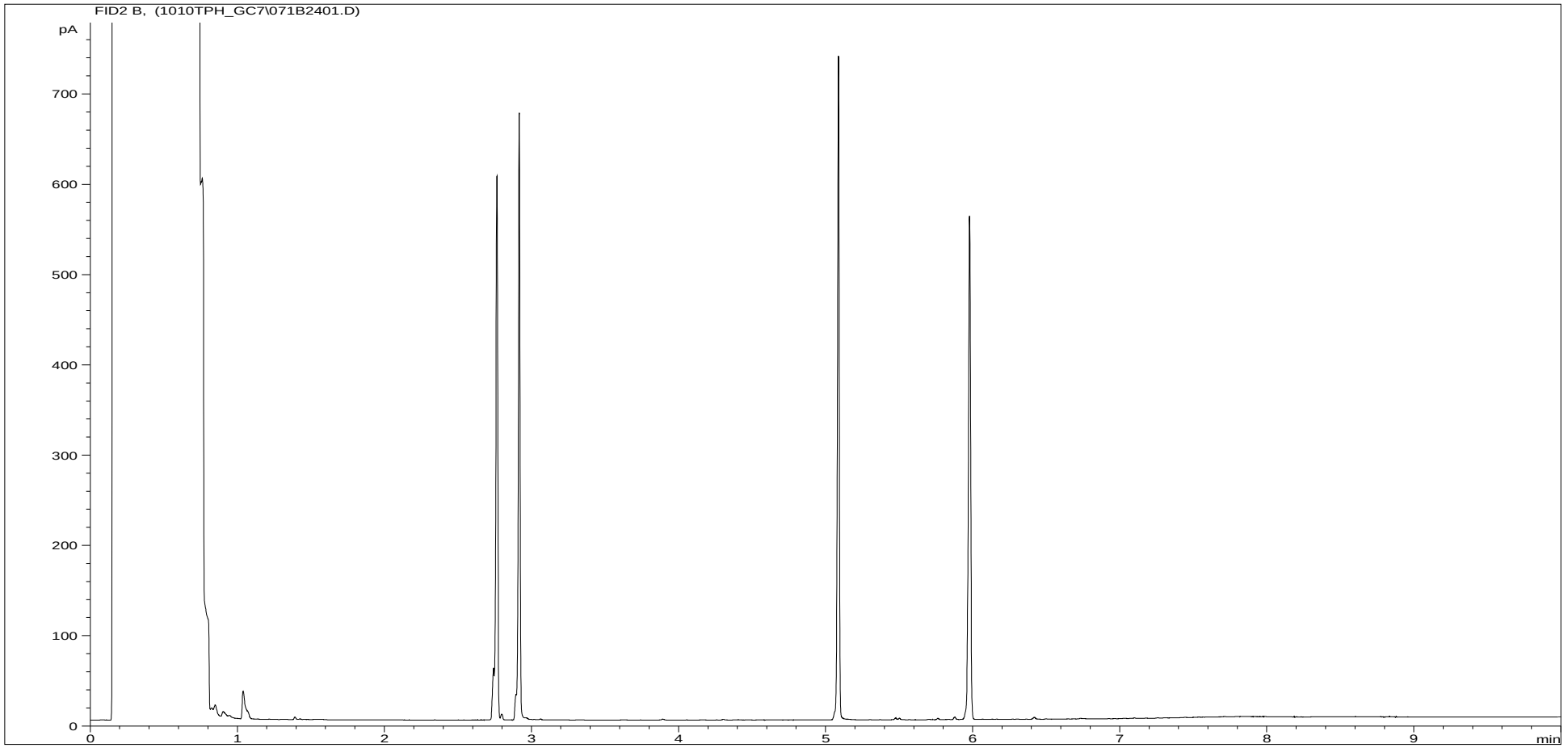


Sample ID:	CL0829492	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP8 ES 3 0.80
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\070B2301.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

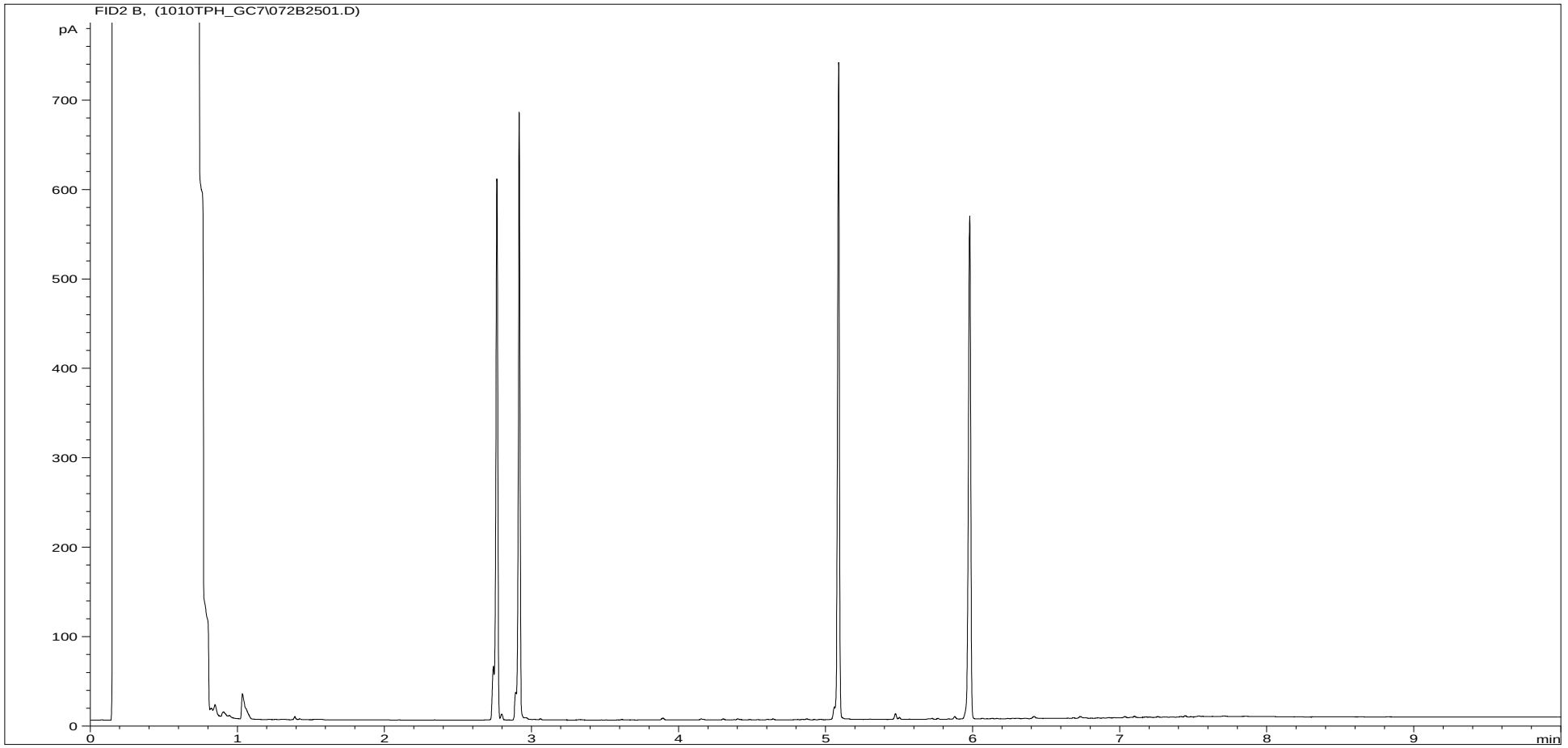


Sample ID:	CL0829493	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP9 ES 2 0.70
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\071B2401.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

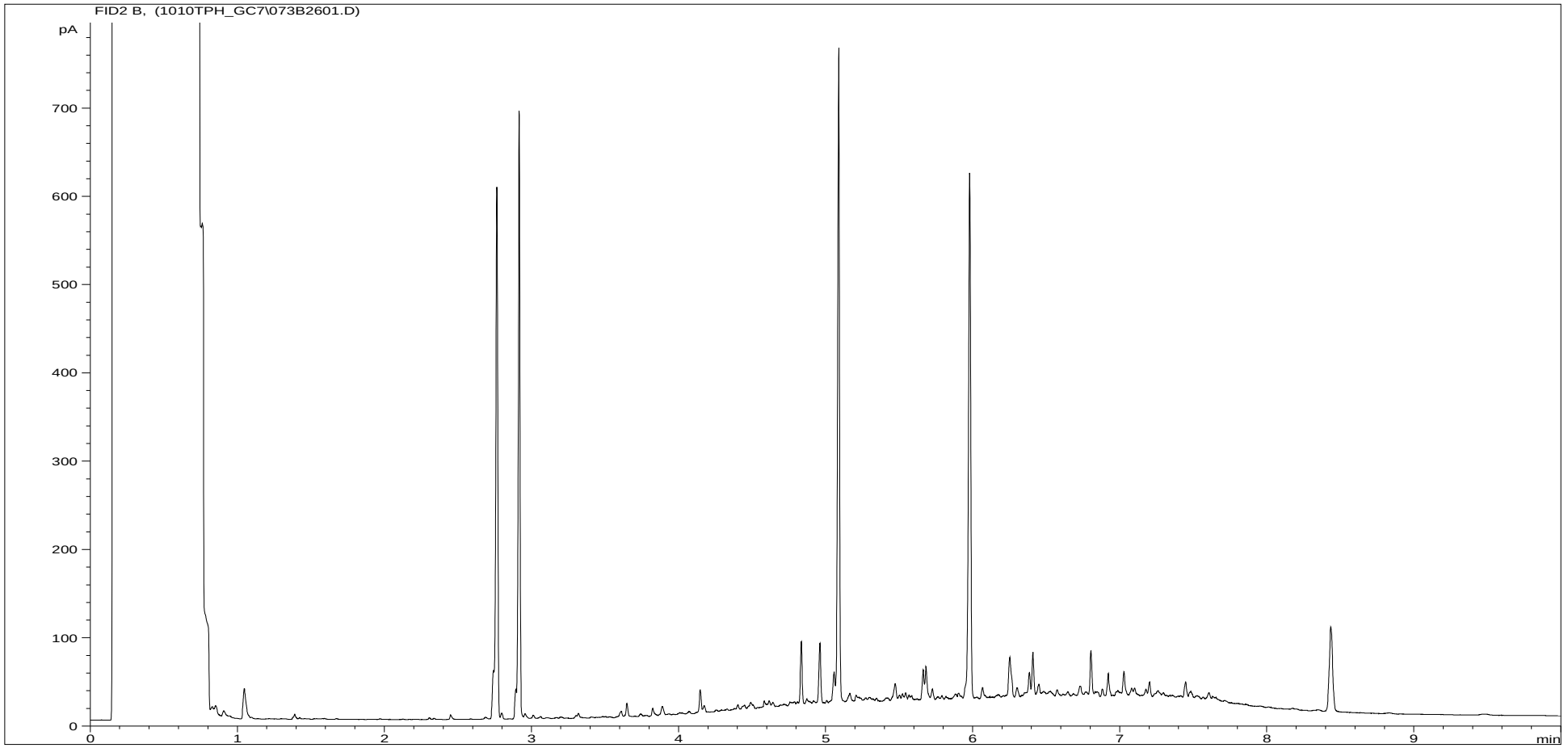


Sample ID:	CL0829494	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP10 ES 1 0.30
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\072B2501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

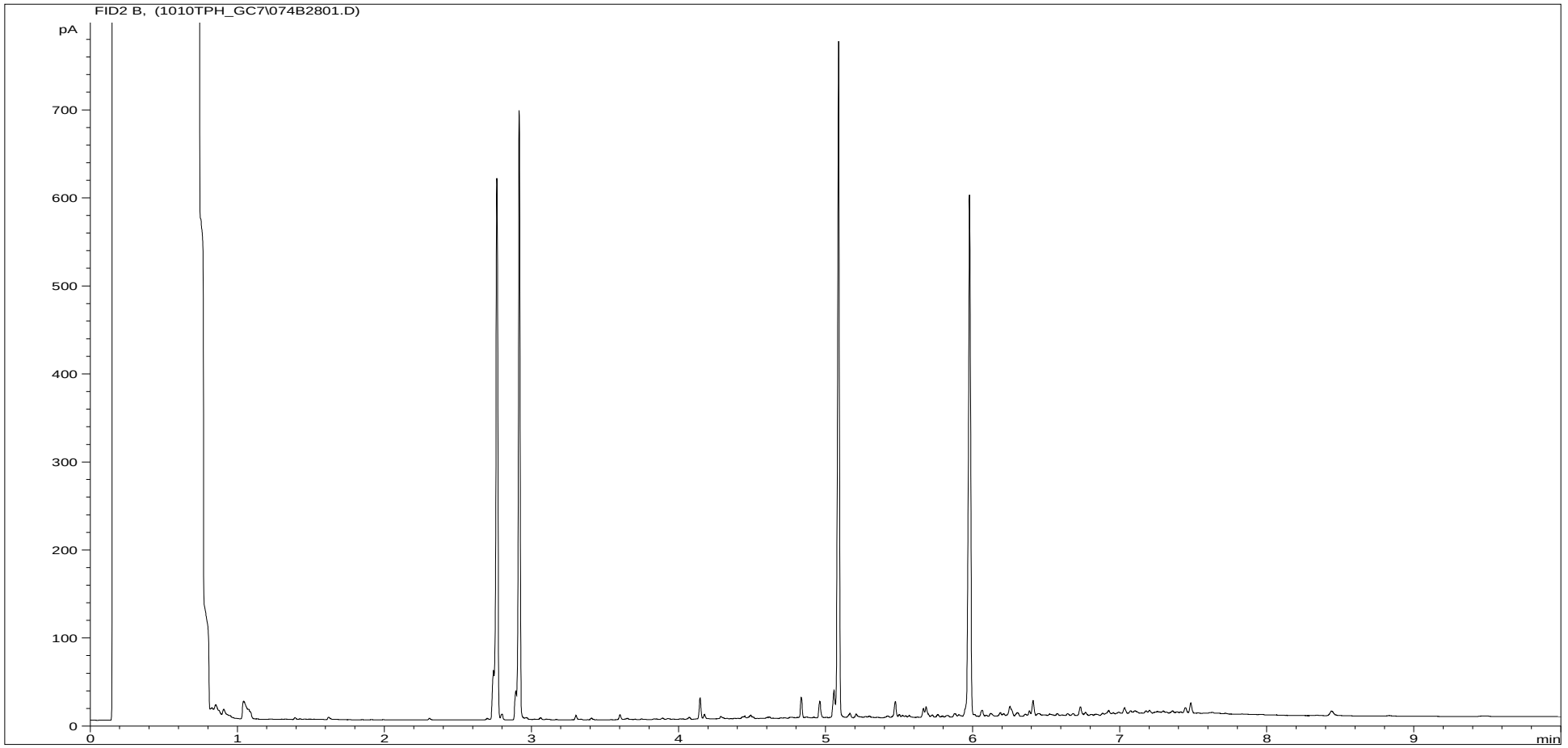


Sample ID:	CL0829495	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP10 ES 2 0.70
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\073B2601.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL0829496	**Job Number:**	S08_6407M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP11 ES 2 1.60
Acquisition Date/Time:	10-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1010TPH_GC7\074B2801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Report Notes

Soil/Solid analysis specific:

S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15^{o}C

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
***** denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
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 you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

TES Report No. EFS/086384M (Ver. 1)

Soil Mechanics
Unit 15
Crosby Yard
Bridgend
Mid Glamorgan
CF31 1JZ

Site: Hirwaun Industrial Estate

The 20 samples described in this report were logged for analysis by TES Bretby on 05-Oct-2008.
The analysis was completed by: 21-Oct-2008

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of TPH Texas banding (std) (Page 5)
GC-FID Chromatograms (Pages 6 to 25)
Table of Report Notes (Page 26)

On behalf of
TES Bretby :
J Hannah

J. Hannah
Project Co-ordinator

Date of Issue: 21-Oct-2008

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105^{o}C unless otherwise stated. (except QC samples)
TES Bretby accepts no responsibility for any sampling not carried out by our personnel.

Sample Descriptions

Client : Soil Mechanics

Site : Hirwaun Industrial Estate

Report Number : S08_6384M

Lab ID Number	Client ID	Description
CL/0829247	TP3 ES 3 1.20	Brown SILT
CL/0829248	TP3 ES 4 1.90	Brown SILT
CL/0829249	TP5 ES 4 2.00	Brown SILT
CL/0829250	TP6 ES 5 2.60	Brown CLAY
CL/0829251	TP8 ES 4 1.50	Brown SILT
CL/0829252	BH101 ES 6 2.50	Brown Gravel SILT
CL/0829253	BH101 ES 10 4.50	Brown Stone SILT
CL/0829254	BH102 ES 7 2.50	Brown CLAY
CL/0829255	BH103 ES 3 0.70	Brown CLAY
CL/0829256	BH104 ES 9 3.50	Brown CLAY
CL/0829257	BH104 ES 13 5.50	Brown CLAY
CL/0829258	BH105 ES 6 2.50	Brown CLAY
CL/0829259	BH105 ES 8 3.50	Brown CLAY
CL/0829260	BH106 ES 10 1.50	Brown CLAY
CL/0829261	BH106 ES 7 2.50	Brown CLAY
CL/0829262	BH107 ES 2 0.70	Brown CLAY
CL/0829263	BH108 ES 2 0.70	Brown Gravel SILT
CL/0829264	BH109 ES 1 0.30	Brown CLAY
CL/0829265	BH109 ES 6 2.50	Brown Gravel SILT
CL/0829266	BH101 ES 0.70	Brown Gravel SILT

Units :		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg
Method Codes :		ELESULP	ICPACIDS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	TMSS	TPHFIDUS	TPHFIDUS
Method Reporting Limits :		20	20	0.5	2	0.1	3	3	3.5	0.10	0.5	2.5	0.5	19.5	0.2	10.0	10.0
Accreditation Code:		UM	UM	U	UM	U	UM	UM	UM	U	U	UM	U	UM	U	UM	
TES ID Number CL/	**Client Sample Description**	**Elemental Sulphur**	**SO4-- (acid sol)**	**Antimony (MS)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Molybdenum (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**Tot.Moisture @ 105C**	**TPH by GCFID (AR)**	**TPH Carbon Banding.**
0829266	BH101 ES 0.70	<19	<19	<0.5	5.4	<0.1	44.3‡	8	9.3	<0.1	4.2	13.5	<0.5	30.2	12.5	61	Req
0829252	BH101 ES 6 2.50	28	2310	<0.5	2.3	<0.1	21‡	4.9	33.2	<0.1	<0.5	5.1	1.1	<20.3	10.5	11.2	Req
0829253	BH101 ES 10 4.50	<22	70	<0.5	2.3	<0.1	9.8‡	6.6	9.7	<0.1	<0.5	15.9	<0.5	29.8	16.3	<11.9	Req
0829254	BH102 ES 7 2.50	<21	<21	<0.5	4.4	<0.1	7.9‡	7.4	9	<0.1	<0.5	13	<0.5	27.8	14.5	<11.7	Req
0829255	BH103 ES 3 0.70	21	144	<0.5	7.3	0.2	13.1‡	14.8	16.3	<0.1	<0.5	18.7	<0.5	54.1	16.3	<11.9	Req
0829256	BH104 ES 9 3.50	<21	142	<0.5	10	<0.1	17.8‡	18.5	20	<0.1	<0.5	25.4	<0.5	38.8	26.0	<13.5	Req
0829257	BH104 ES 13 5.50	<21	<21	<0.5	3	<0.1	13.1‡	14	15.1	<0.1	<0.5	21.2	<0.5	38.2	14.9	<11.8	Req
0829258	BH105 ES 6 2.50	<21	118	<0.5	6.5	0.16	14.5‡	22.8	17.8	<0.1	<0.5	18.9	<0.5	103.1	19.9	<12.5	Req
0829259	BH105 ES 8 3.50	<21	<21	<0.5	7.9	<0.1	14.5‡	14.7	14.8	<0.1	<0.5	18.7	<0.5	36.5	17.1	94	Req
0829260	BH106 ES 10 1.50	<21	240	<0.5	6.7	0.25	12.5‡	12.2	14.3	<0.1	<0.5	11.5	0.6	93	18.6	12.3	Req
0829261	BH106 ES 7 2.50	<21	32	<0.5	9.4	<0.1	18.9‡	20.3	21	<0.1	<0.5	22	<0.5	49.5	19.1	<12.4	Req
0829262	BH107 ES 2 0.70	<20	34	<0.5	7.2	0.1	14.9‡	16	18.9	<0.1	<0.5	23.8	<0.5	46.6	12.7	<11.5	Req
0829263	BH108 ES 2 0.70	<19	<19	<0.5	5	<0.1	8.3‡	8.2	13	<0.1	<0.5	16	<0.5	36.8	14.2	<11.7	Req
0829264	BH109 ES 1 0.30	<21	95	0.7	9.6	0.23	11.5‡	16	21.6	<0.1	<0.5	19.8	<0.5	67.4	13.4	104	Req
0829265	BH109 ES 6 2.50	20	205	<0.5	6.3	0.12	9.4‡	8.2	12.5	<0.1	<0.5	13.4	<0.5	28.1	16.8	302	Req
0829247	TP3 ES 3 1.20	<20	103	<0.5	5.6	<0.1	8.8‡	10.5	12.6	<0.1	<0.5	13.4	<0.5	30.7	10.6	<11.2	Req
0829248	TP3 ES 4 1.90	<21	22	<0.5	5	<0.1	11.1‡	16	15.5	<0.1	<0.5	15.4	<0.5	37.7	8.9	<11.0	Req
0829249	TP5 ES 4 2.00	<20	68	<0.5	6.1	0.15	10‡	12.3	14.2	<0.1	<0.5	16	<0.5	43.8	9.6	<11.1	Req
0829250	TP6 ES 5 2.60	<22	29	0.6	8.6	0.21	11.2‡	12.4	15.3	0.94	<0.6	16.8	<0.6	51.5	13.0	<11.5	Req
0829251	TP8 ES 4 1.50	<20	57	<0.5	5.5	<0.1	8.8‡	10.6	11.3	<0.1	<0.5	13.9	<0.5	33.9	10.2	<11.1	Req

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
Report Number	**EFS/086384M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Units :		pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% M/M			
Method Codes :		WSLM3	ICPBOR	ICPMAJ	KONECL	KONECR	PAHSCUV	SEN9	SFAPI	SFAPI	SFAPI	SFAPI	SFAS	WSLM59			
Method Reporting Limits :			0.5	1	5.0	0.1	10		0.5	0.5	0.5	2	0.5	0.02			
Accreditation Code:		U	N	N	N	N	N	N	N	N	N	N	N	N			
TES ID Number CL/	**Client Sample Description**	**pH units**	**Boron (H20 Soluble)**	**Barium**	**Chloride:**	**Chromium vi:**	**PAH (screening)**	**Asbestos (screening)**	**Cyanide(Free) (AR)**	**Cyanide(Total) (AR)**	**Phenol Index.(AR)**	**Thiocyanate(SCN)(AR)**	**Sulphide as S (AR)**	**F.O.C. %**			
0829266	BH101 ES 0.70	8.5	<0.5	61	17	<0.1	<10	NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.44			
0829252	BH101 ES 6 2.50	11.5	<0.5	611	53	<0.1	<10		<0.6	<0.6	<0.6	<2.2	<0.6	2.13			
0829253	BH101 ES 10 4.50	8.6	<0.5	45	20	<0.1	<11		<0.6	<0.6	<0.6	<2.4	<0.6	0.55			
0829254	BH102 ES 7 2.50	7.8	<0.5	63	11.4	<0.1	<10		<0.6	<0.6	<0.6	<2.3	<0.6	0.3			
0829255	BH103 ES 3 0.70	8.3	<0.5	110	24	<0.1	<10		<0.6	<0.6	<0.6	<2.4	<0.6	1.14			
0829256	BH104 ES 9 3.50	5.7	<0.5	82	21	<0.1	<11		<0.7	<0.7	<0.7	<2.7	<0.7	0.43			
0829257	BH104 ES 13 5.50	7.9	<0.5	75	21	<0.1	<10		<0.6	<0.6	<0.6	<2.4	<0.6	0.61			
0829258	BH105 ES 6 2.50	7.3	<0.5	155	26	<0.1	<10		<0.6	<0.6	<0.6	<2.5	<0.6	0.85			
0829259	BH105 ES 8 3.50	5.8	<0.5	88	35	<0.1	<10		<0.6	<0.6	<0.6	<2.4	<0.6	0.72			
0829260	BH106 ES 10 1.50	7.8	<0.5	255	37	<0.1	14		<0.6	<0.6	<0.6	<2.5	<0.6	1.1			
0829261	BH106 ES 7 2.50	6.8	<0.5	123	23	<0.1	<10		<0.6	<0.6	<0.6	<2.5	<0.6	0.53			
0829262	BH107 ES 2 0.70	8.0	<0.5	190	23	<0.1	<10		<0.6	<0.6	<0.6	<2.3	<0.6	0.5			
0829263	BH108 ES 2 0.70	7.7	<0.5	134	16	<0.1	32		<0.6	<0.6	<0.6	<2.3	<0.6	0.27			
0829264	BH109 ES 1 0.30	7.9	<0.5	121	20	<0.1	22		<0.6	<0.6	<0.6	<2.3	<0.6	1.51			
0829265	BH109 ES 6 2.50	8.7	0.6	75	43	<0.1	17		<0.6	<0.6	<0.6	<2.4	<0.6	1.26			
0829247	TP3 ES 3 1.20	6.7	<0.5	22	18	<0.1	<10		<0.6	<0.6	<0.6	<2.2	<0.6	0.52			
0829248	TP3 ES 4 1.90	6.8	<0.5	3	21	<0.1	<10		<0.5	<0.5	<0.5	<2.2	<0.5	0.28			
0829249	TP5 ES 4 2.00	7.5	<0.5	71	19	<0.1	<10		<0.6	<0.6	<0.6	<2.2	<0.6	0.58			
0829250	TP6 ES 5 2.60	7.5	<0.6	91	28	<0.1	<11		<0.6	<0.6	<0.6	<2.3	<0.6	1.2			
0829251	TP8 ES 4 1.50	6.5	<0.5	19	22	<0.1	<10		<0.6	<0.6	<0.6	<2.2	<0.6	0.38			

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
Report Number	**EFS/086384M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

	Units :	ug/kg	ug/kg	ug/kg	ug/kg												
	Method Codes :	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA												
	Method Reporting Limits :	10	10	10	20												
	Accreditation Code:	N	N	N	N												
TES ID Number CL/	**Client Sample Description**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**												
0829266	BH101 ES 0.70	<11	<11	<11	<23												
0829252	BH101 ES 6 2.50	<11	<11	<11	<22												
0829253	BH101 ES 10 4.50	<12	<12	<12	<24												
0829254	BH102 ES 7 2.50	<12	<12	<12	<23												
0829255	BH103 ES 3 0.70	<12	<12	<12	<24												
0829256	BH104 ES 9 3.50	<14	<14	<14	<27												
0829257	BH104 ES 13 5.50	<29	<29	<29	<59												
0829258	BH105 ES 6 2.50	<31	<31	<31	<62												
0829259	BH105 ES 8 3.50	<12	<12	<12	<24												
0829260	BH106 ES 10 1.50	<12	<12	<12	<25												
0829261	BH106 ES 7 2.50	<12	<12	<12	<25												
0829262	BH107 ES 2 0.70	<11	<11	<11	<23												
0829263	BH108 ES 2 0.70	<12	<12	<12	<23												
0829264	BH109 ES 1 0.30	<12	<12	<12	<23												
0829265	BH109 ES 6 2.50	<12	<12	<12	<24												
0829247	TP3 ES 3 1.20	<11	<11	<11	<22												
0829248	TP3 ES 4 1.90	<11	<11	<11	<22												
0829249	TP5 ES 4 2.00	<11	<11	<11	<22												
0829250	TP6 ES 5 2.60	<11	<11	<11	<23												
0829251	TP8 ES 4 1.50	<11	<11	<11	<22												

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Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
Report Number	**EFS/086384M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Total Petroleum Hydrocarbons (TPH) Carbon Ranges

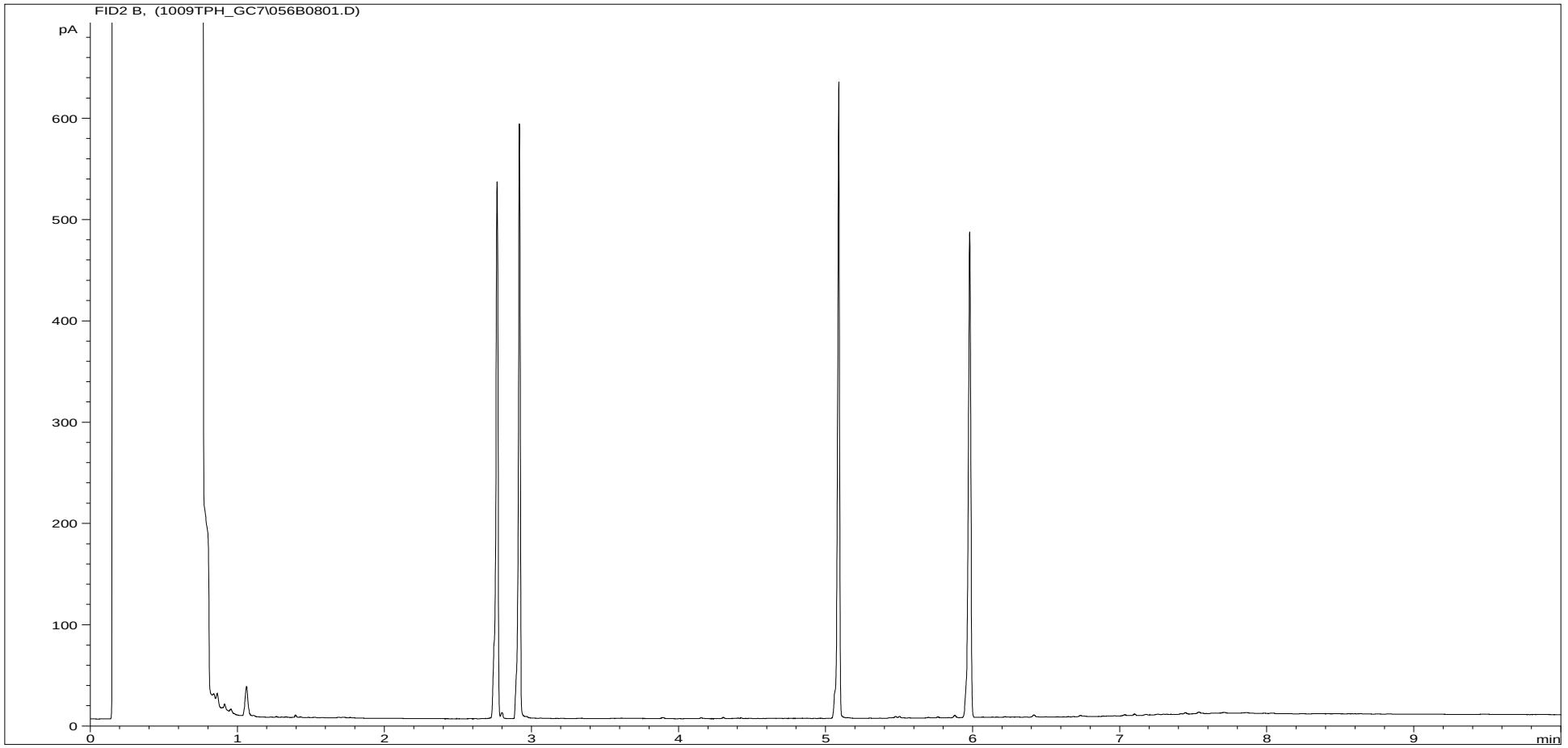
Customer and Site Details: Soil Mechanics : Hirwaun Industrial Estate
Job Number: S08_6384M
QC Batch Number: 83541
Directory: D:\TES\DATA\Y2008\1009TPH_GC7\075B2901.D
Method: Ultra Sonic
Accreditation code: U

Matrix: Soil
Date Booked in: 05-Oct-08
Date Extracted: 08-Oct-08
Date Analysed: 09-Oct-08

		Concentration, (mg/kg) - as dry weight.				
Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
CL0829247	TP3 ES 3 1.20	<2	<2	<2	<2	4.93
CL0829248	TP3 ES 4 1.90	<2	<2	<2	<2	<4.81
CL0829249	TP5 ES 4 2.00	<2	<2	<2	<2	<4.85
CL0829250	TP6 ES 5 2.60	<2	<2	<2	<2	<5.03
CL0829251	TP8 ES 4 1.50	<2	<2	<2	<2	<4.88
CL0829252	BH101 ES 6 2.50	<2	<2	<2	2.87	<4.89
CL0829253	BH101 ES 10 4.50	<2	<2	<2	<2	<5.23
CL0829254	BH102 ES 7 2.50	<2	<2	<2	<2	<5.12
CL0829255	BH103 ES 3 0.70	<2	<2	<2	<2	<5.23
CL0829256	BH104 ES 9 3.50	<3	<3	<3	<3	<5.92
CL0829257	BH104 ES 13 5.50	<2	<2	<2	<2	<5.15
CL0829258	BH105 ES 6 2.50	<2	<2	<2	<2	<5.47
CL0829259	BH105 ES 8 3.50	<2	<2	<2	<2	84.9
CL0829260	BH106 ES 10 1.50	<2	<2	<2	<2	8.02
CL0829261	BH106 ES 7 2.50	<2	<2	<2	<2	<5.41
CL0829262	BH107 ES 2 0.70	<2	<2	<2	<2	<5.02
CL0829263	BH108 ES 2 0.70	<2	<2	<2	<2	<5.10
CL0829264	BH109 ES 1 0.30	<2	<2	4.47	10.5	68
CL0829265	BH109 ES 6 2.50	<2	<2	4.53	59.9	226
CL0829266	BH101 ES 0.70	<2	<2	12.5	17.6	23.2

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appropriat e, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

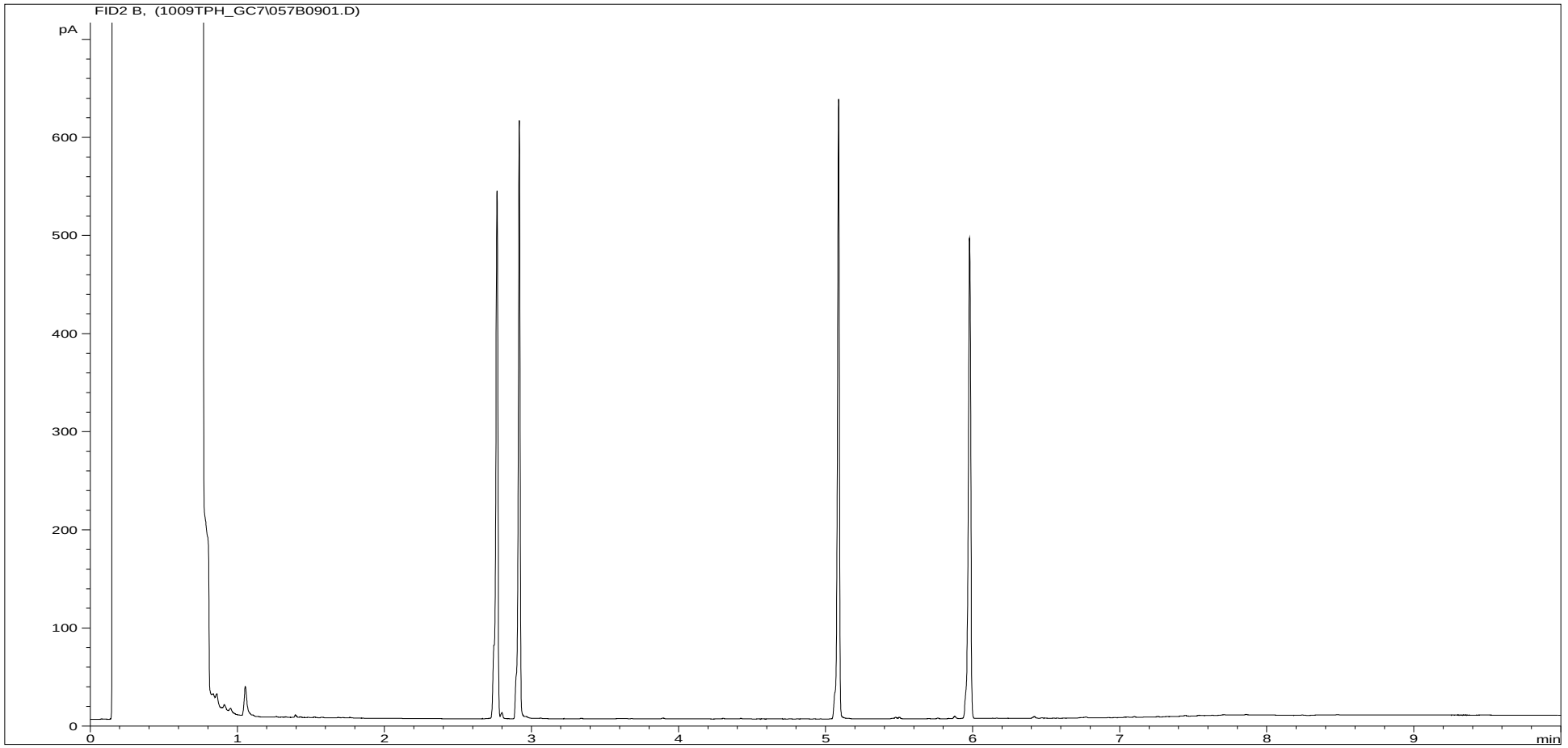


Sample ID:	CL0829247	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP3 ES 3 1.20
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\056B0801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

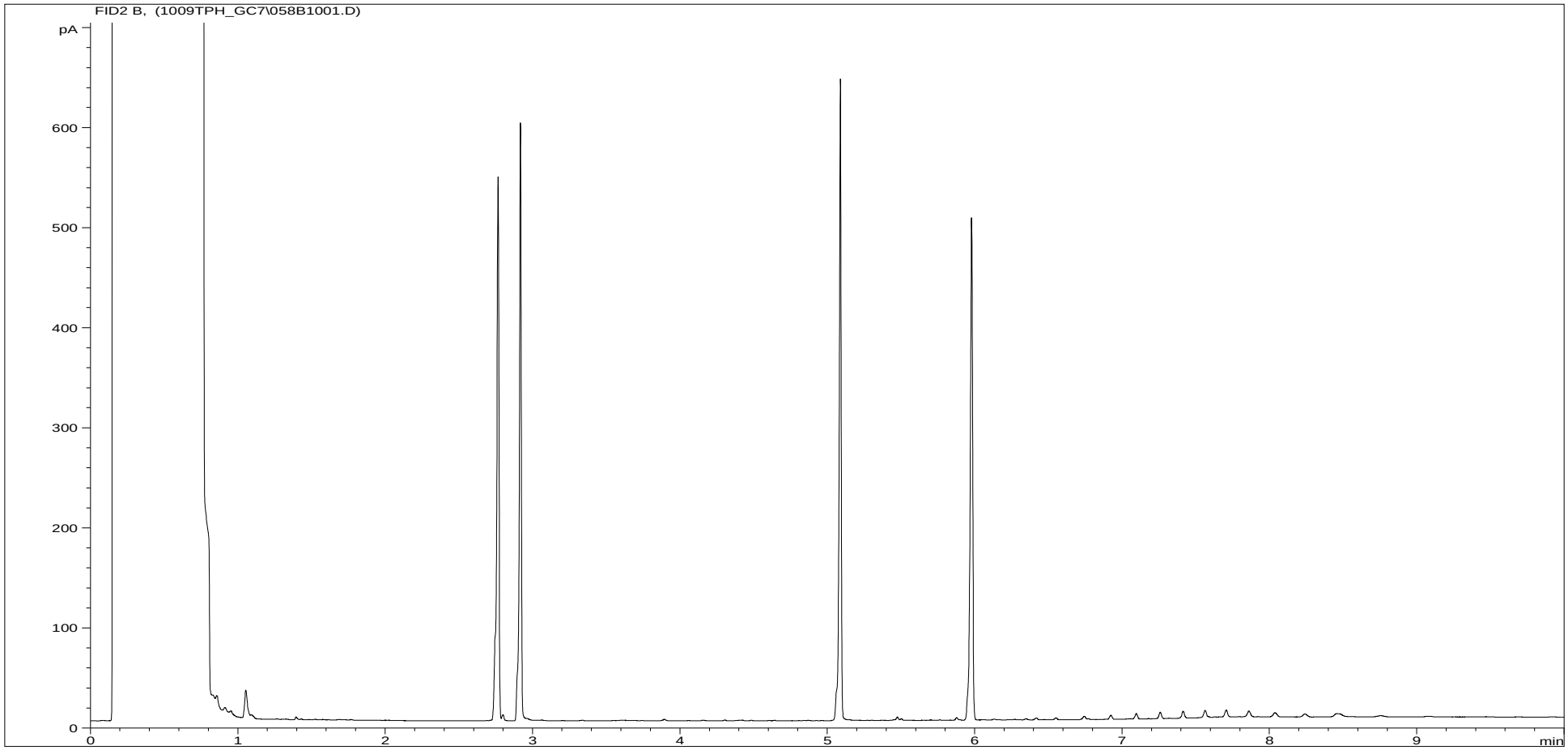


Sample ID:	CL0829248	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP3 ES 4 1.90
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\057B0901.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

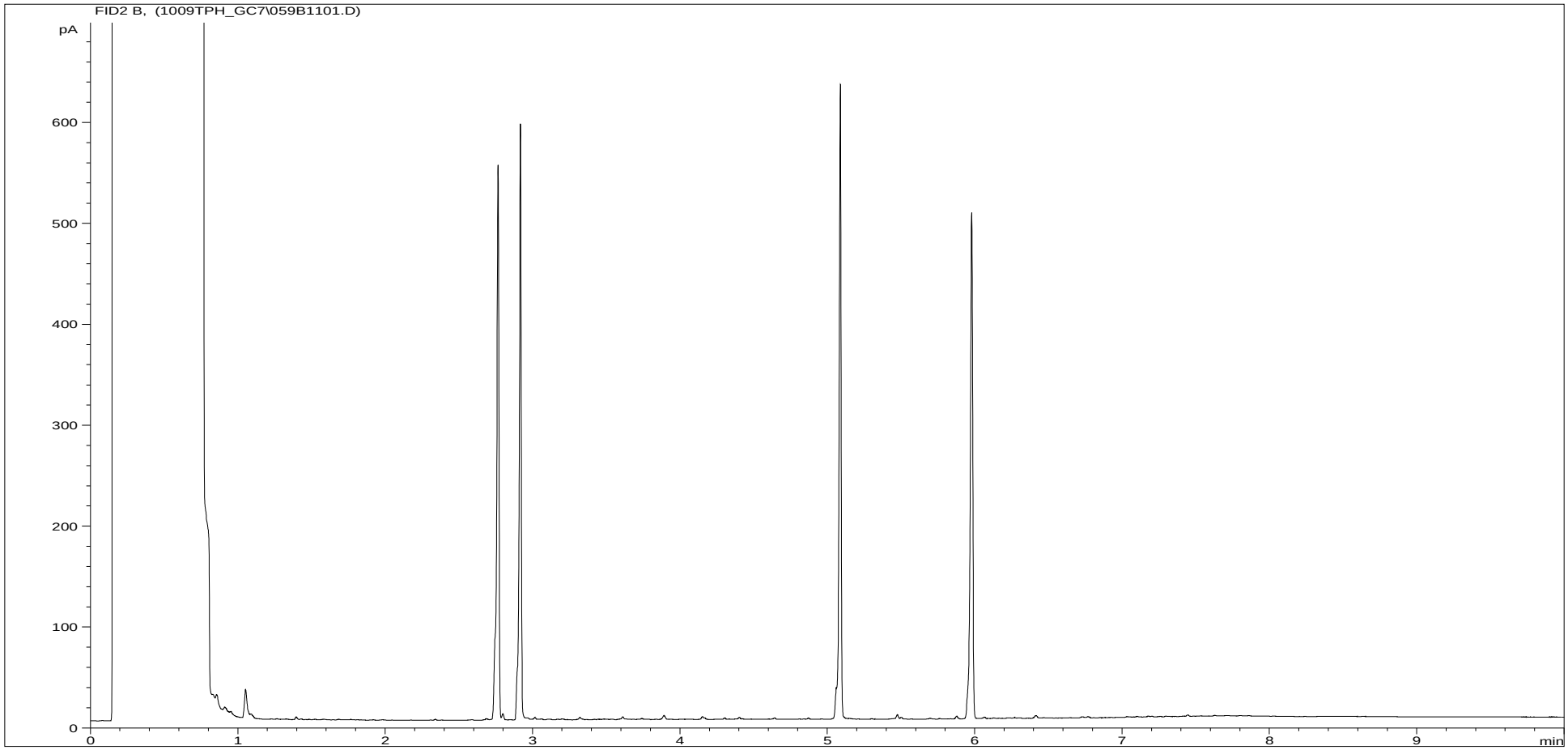


Sample ID:	CL0829249	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP5 ES 4 2.00
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\058B1001.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

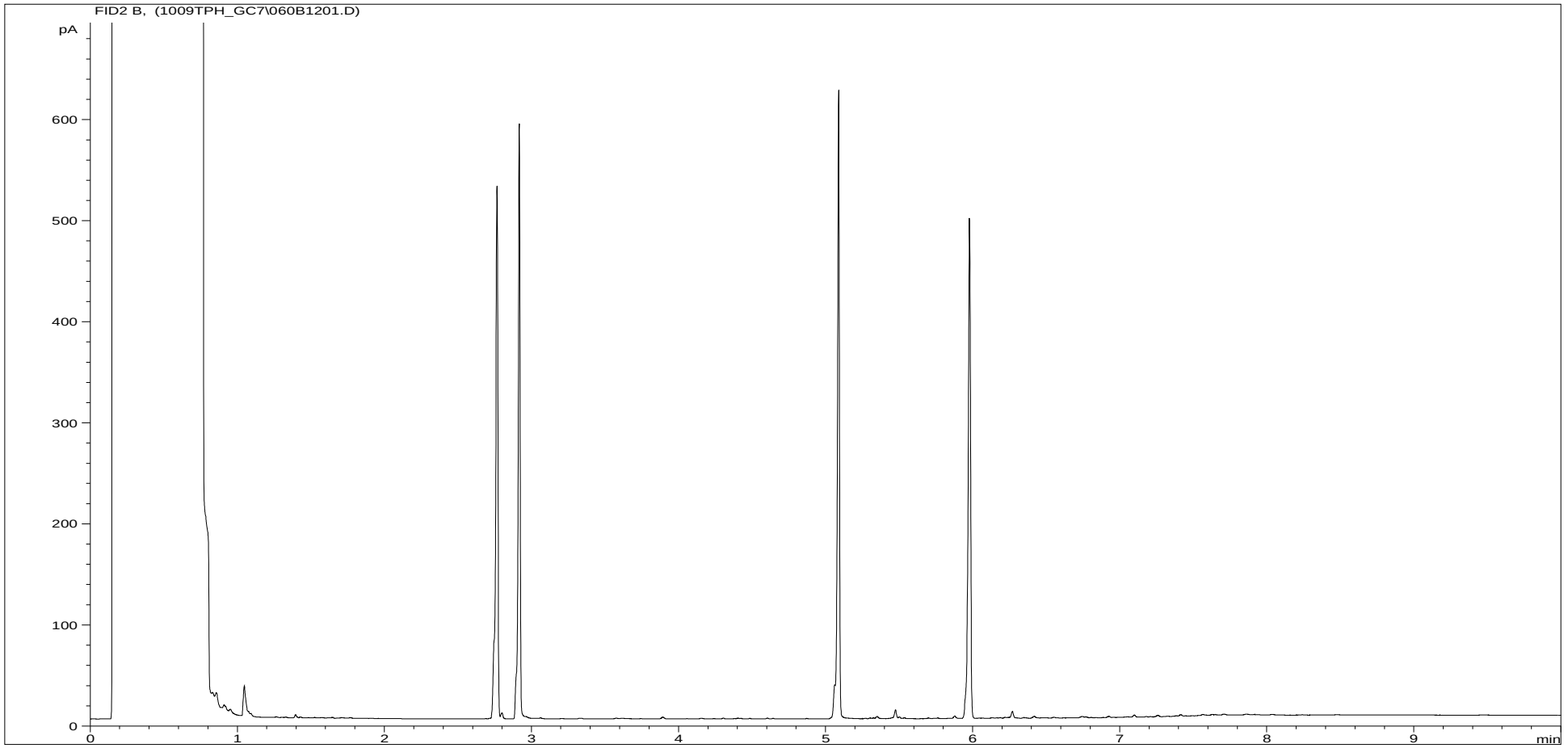


Sample ID:	CL0829250	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP6 ES 5 2.60
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\059B1101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

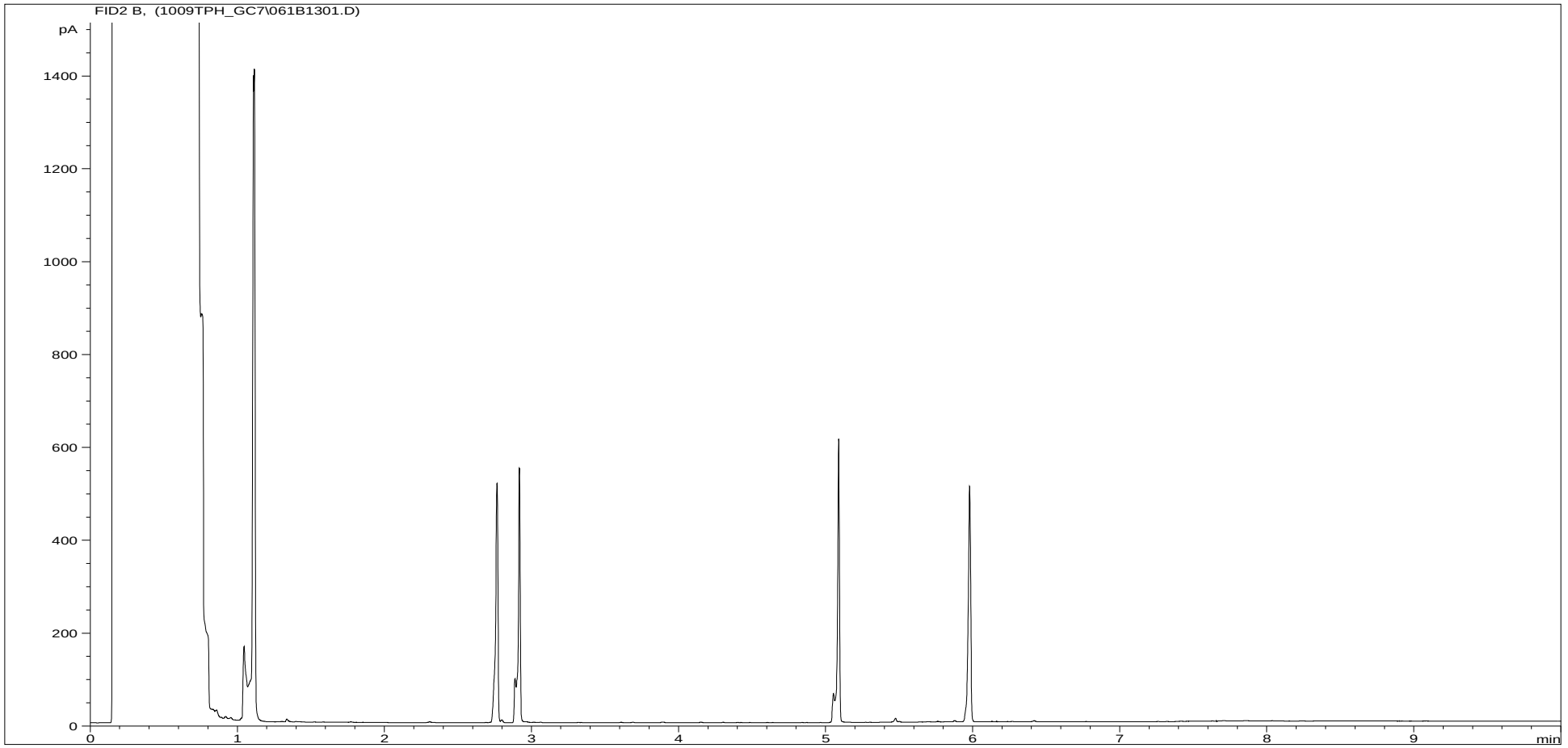


Sample ID:	CL0829251	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP8 ES 4 1.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\060B1201.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

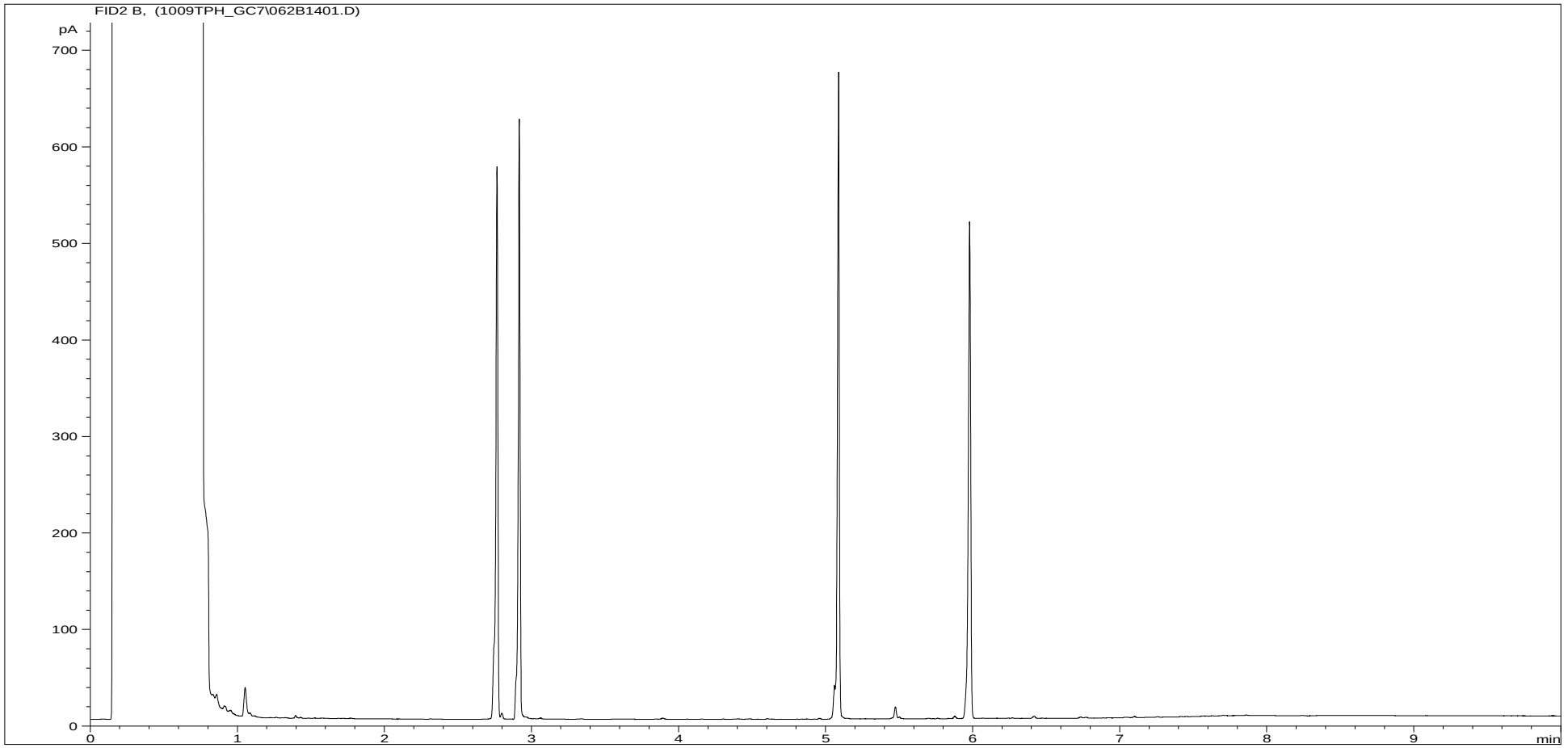


Sample ID:	CL0829252	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH101 ES 6 2.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\061B1301.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

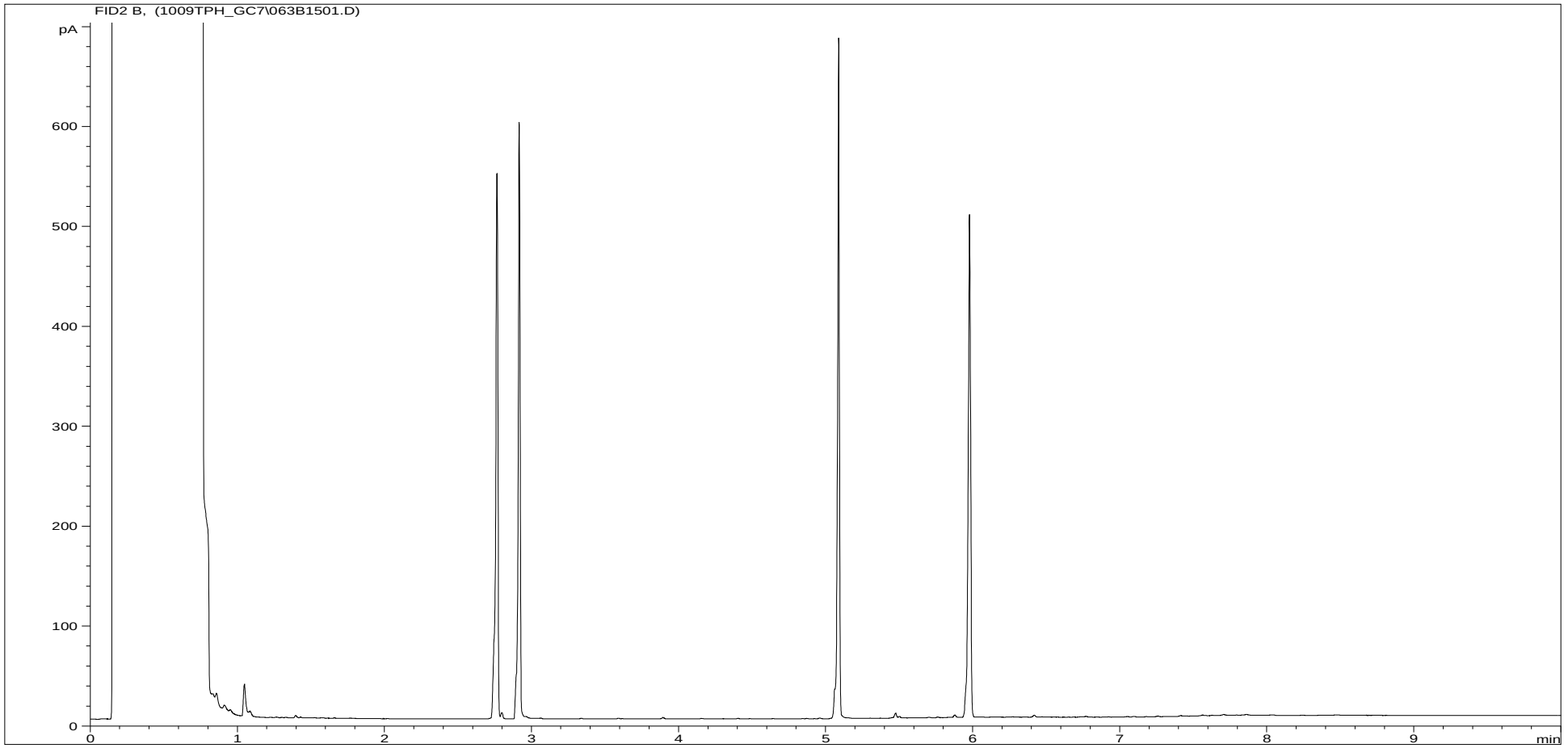


Sample ID:	CL0829253	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH101 ES 10 4.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\062B1401.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

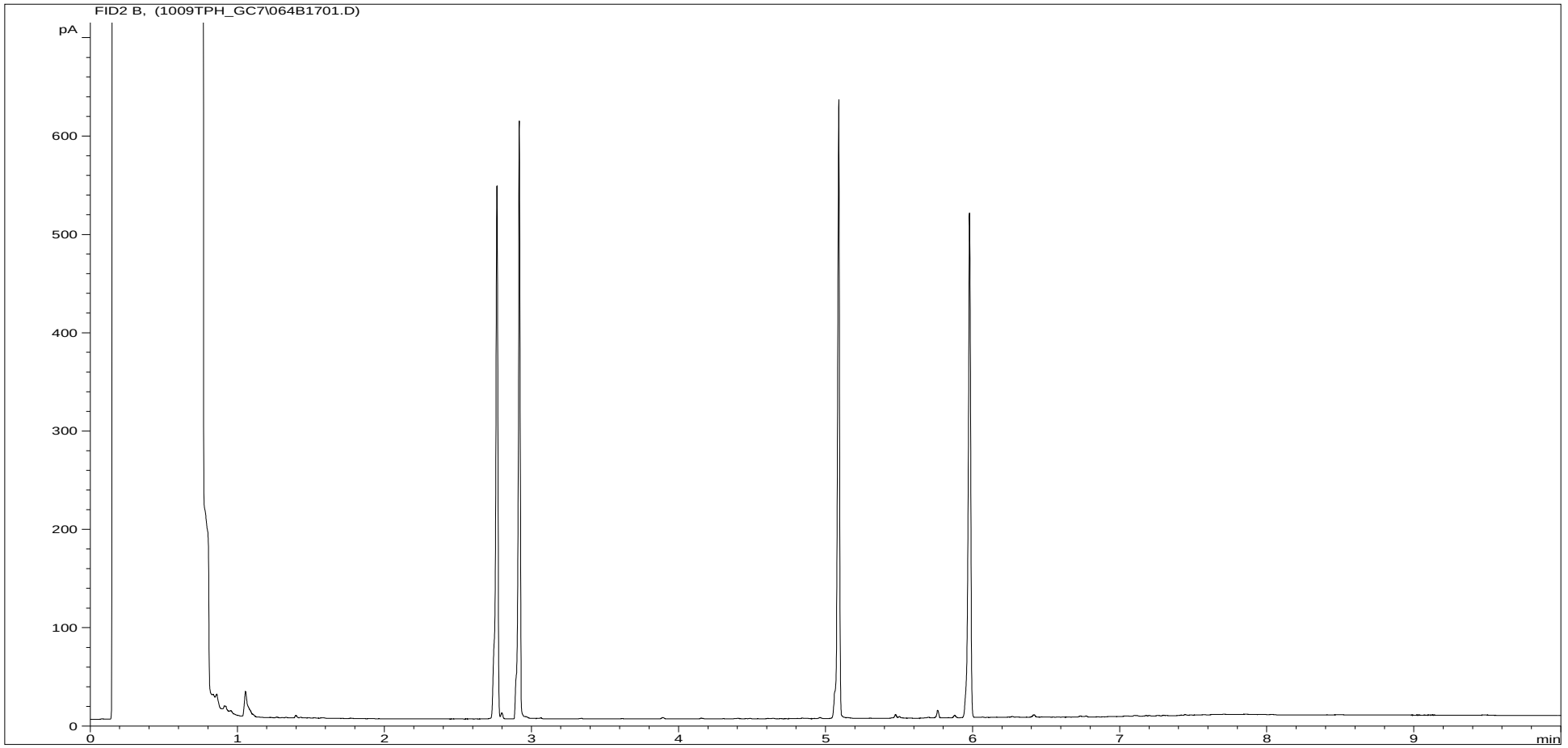


Sample ID:	CL0829254	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH102 ES 7 2.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\063B1501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

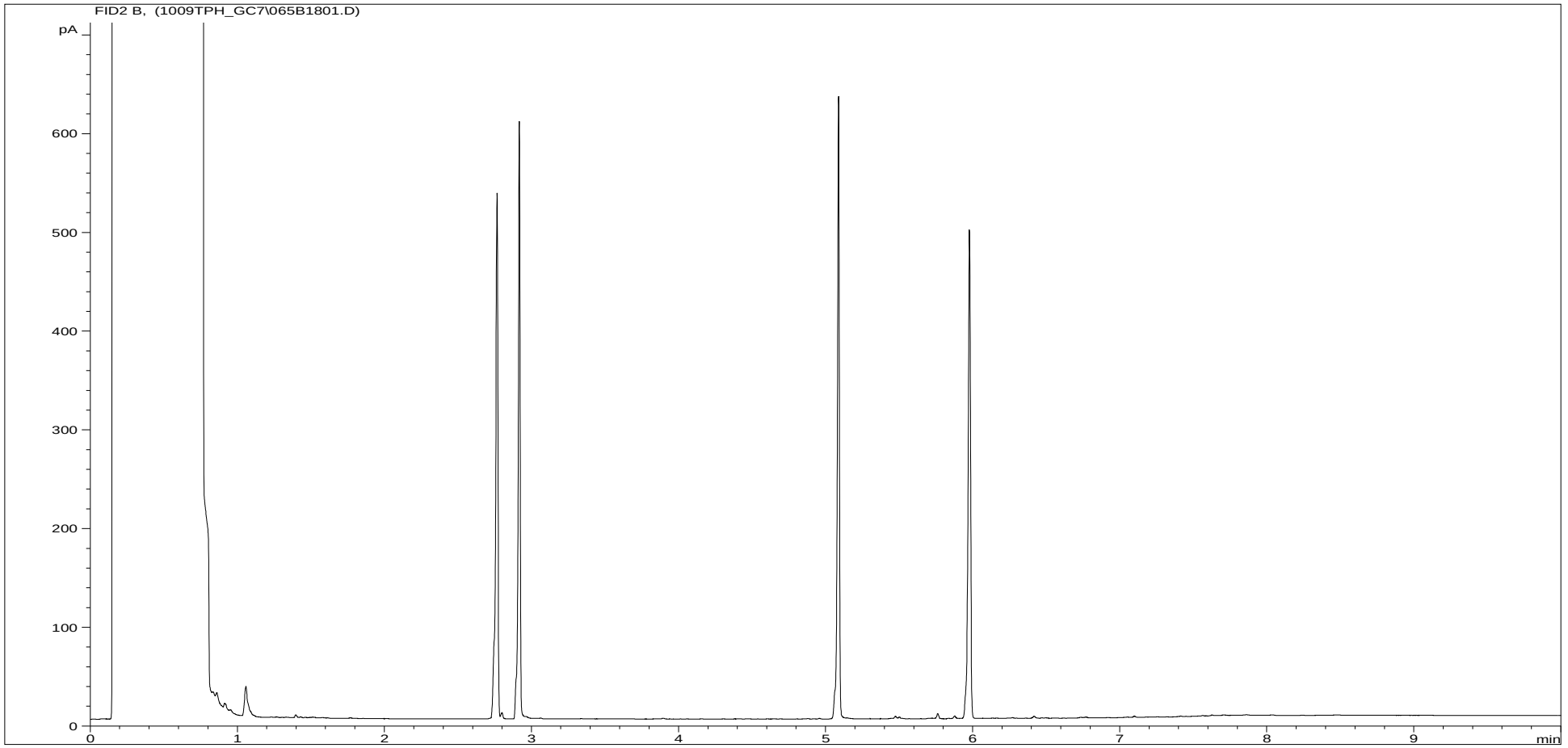


Sample ID:	CL0829255	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH103 ES 3 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\064B1701.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

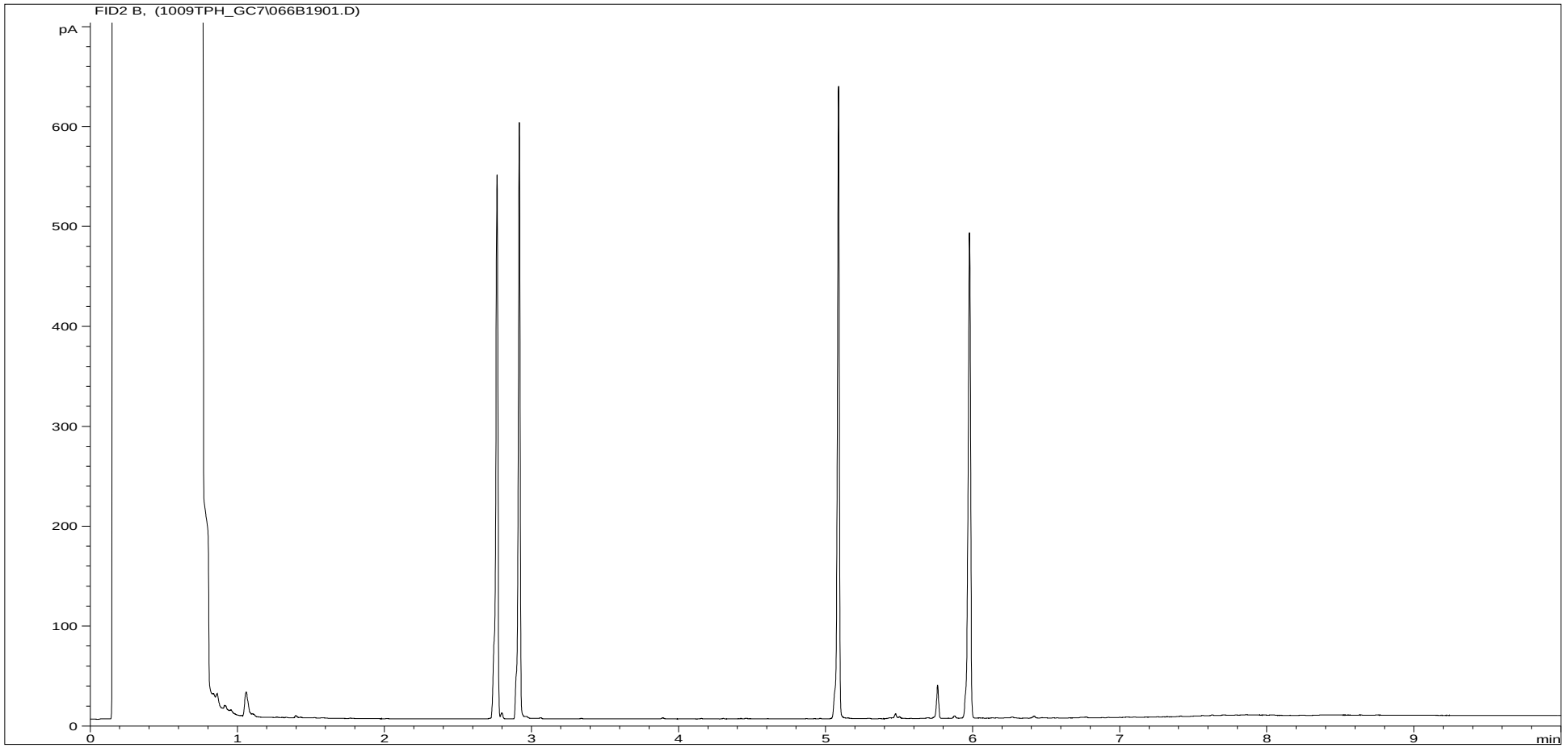


Sample ID:	CL0829256	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH104 ES 9 3.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\065B1801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

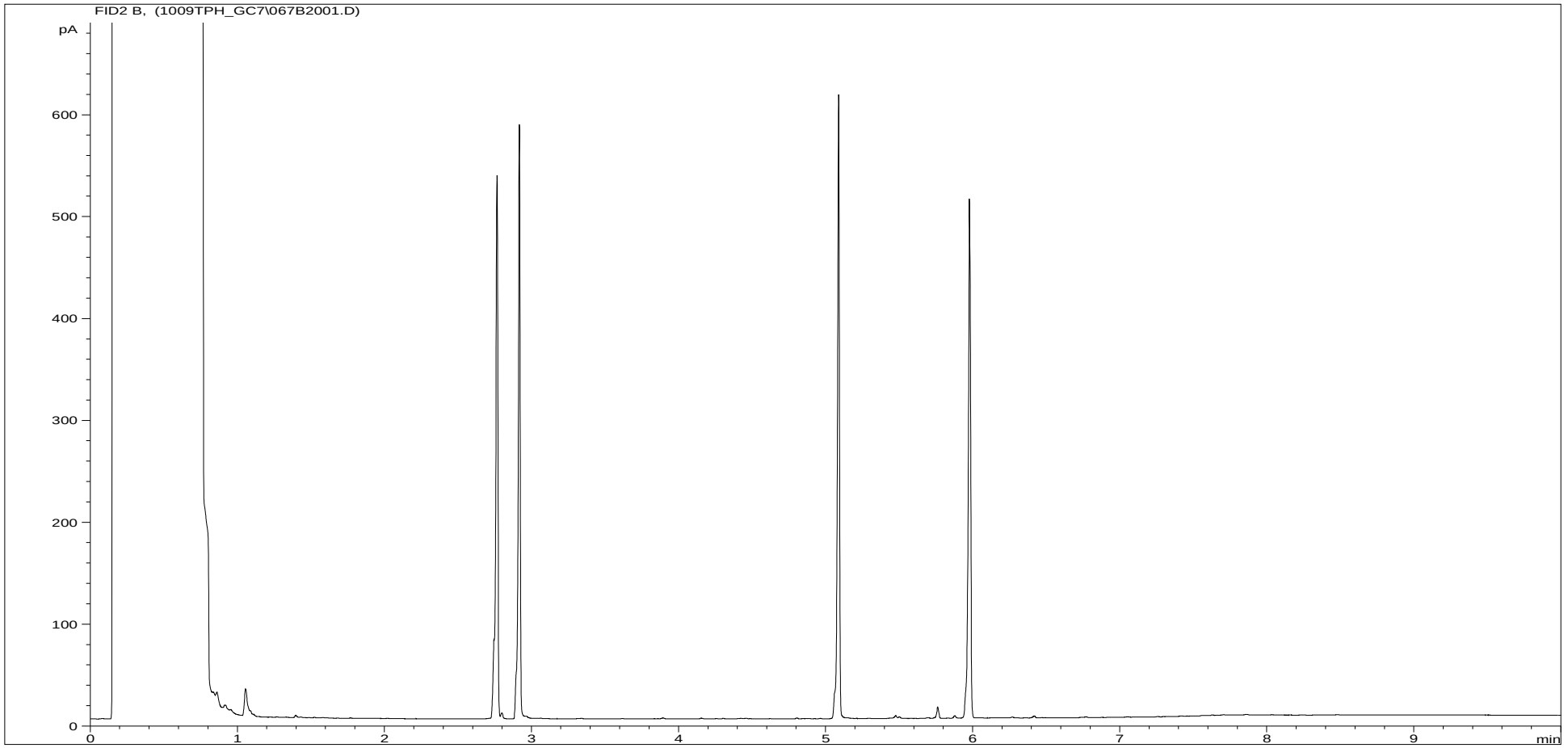


Sample ID:	CL0829257	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH104 ES 13 5.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\066B1901.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

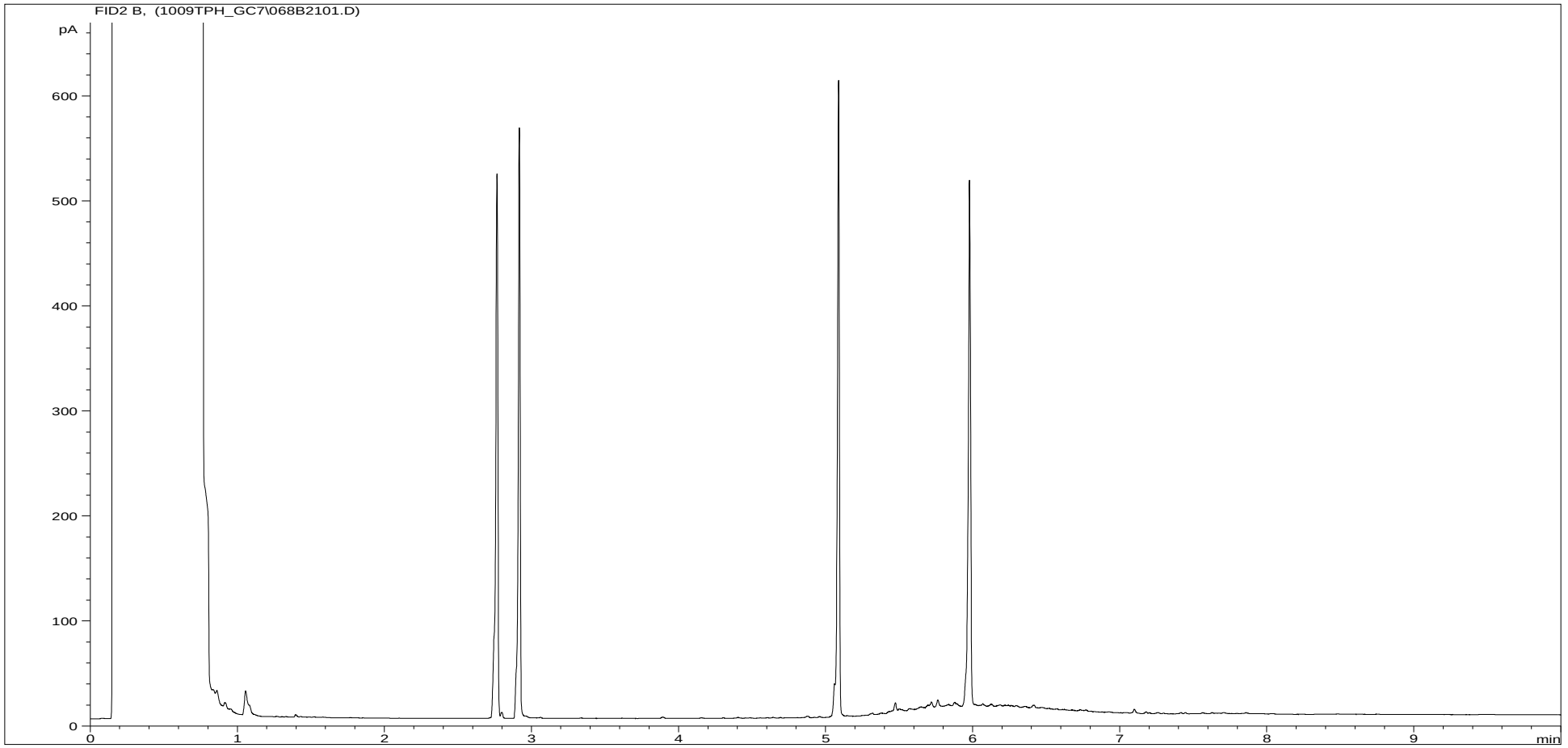


Sample ID:	CL0829258	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH105 ES 6 2.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\067B2001.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

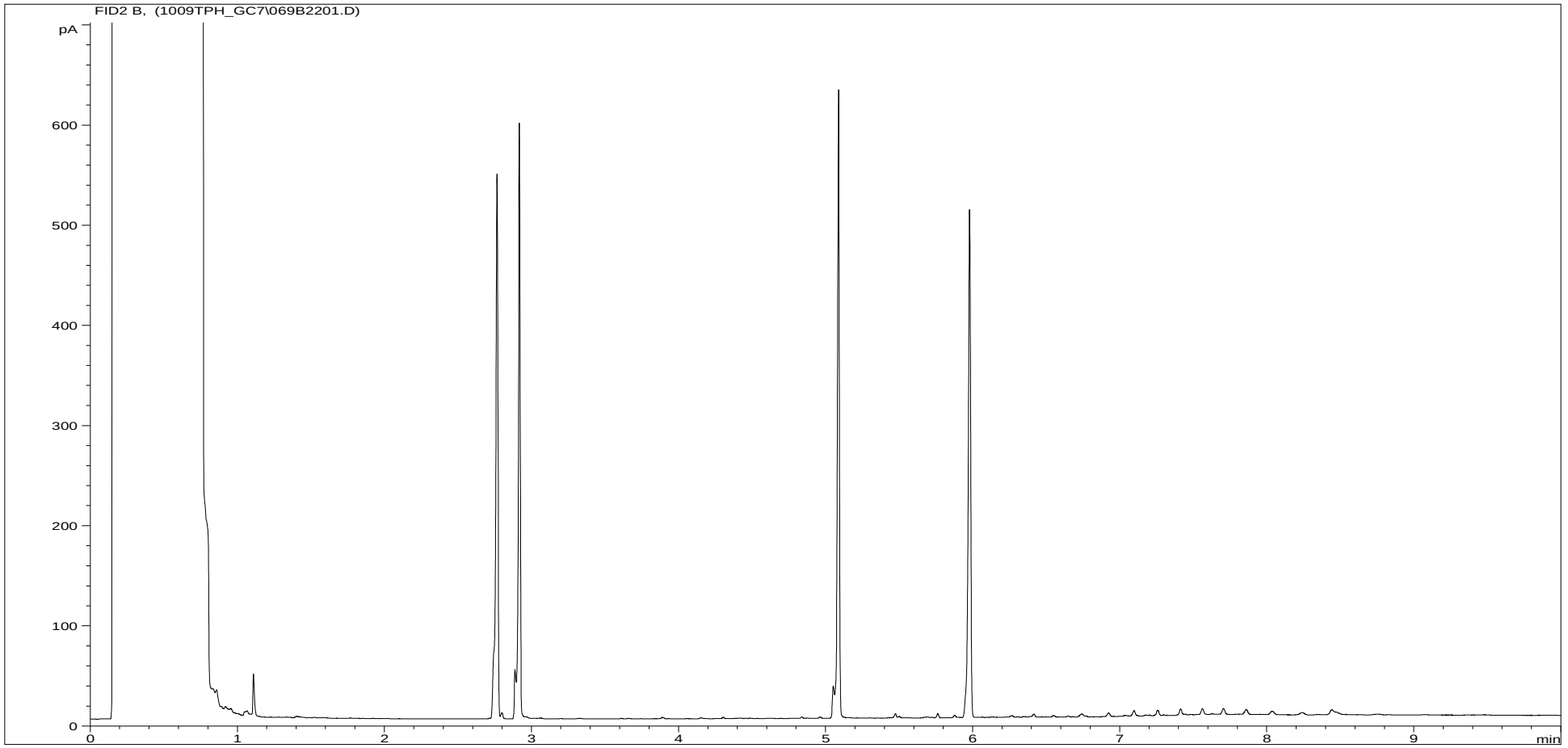


Sample ID:	CL0829259	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH105 ES 8 3.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\068B2101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

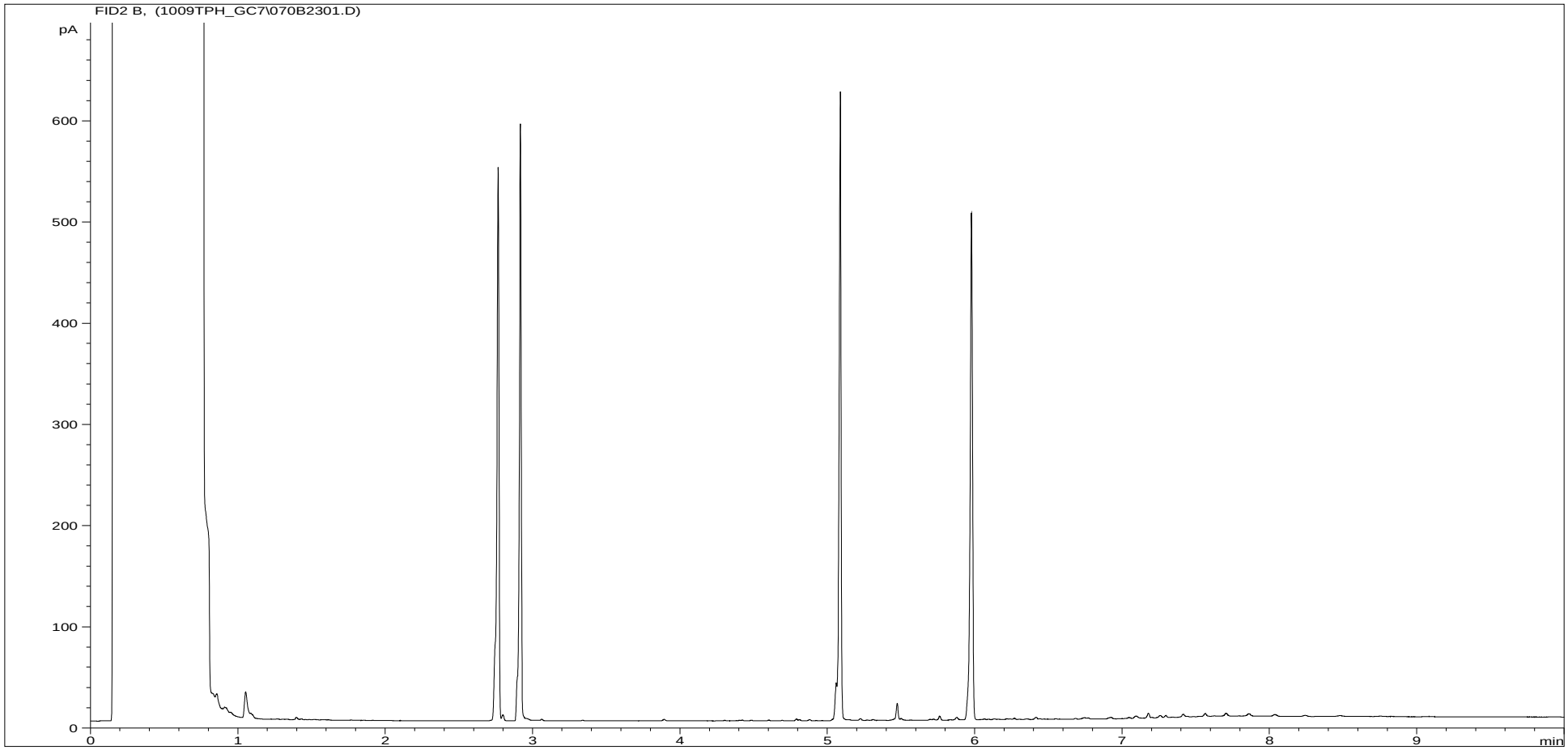


Sample ID:	CL0829260	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH106 ES 10 1.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\069B2201.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

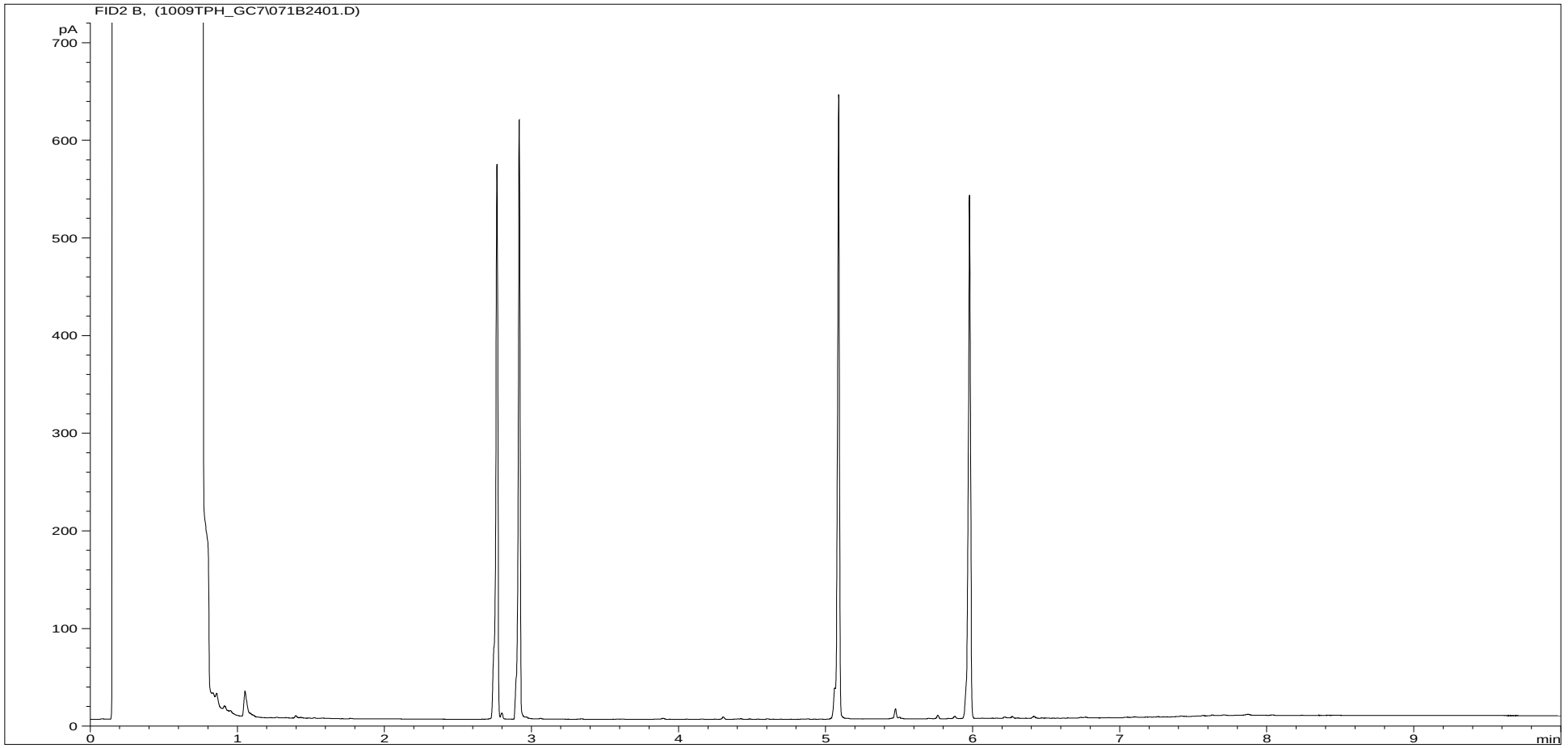


Sample ID:	CL0829261	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH106 ES 7 2.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\070B2301.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

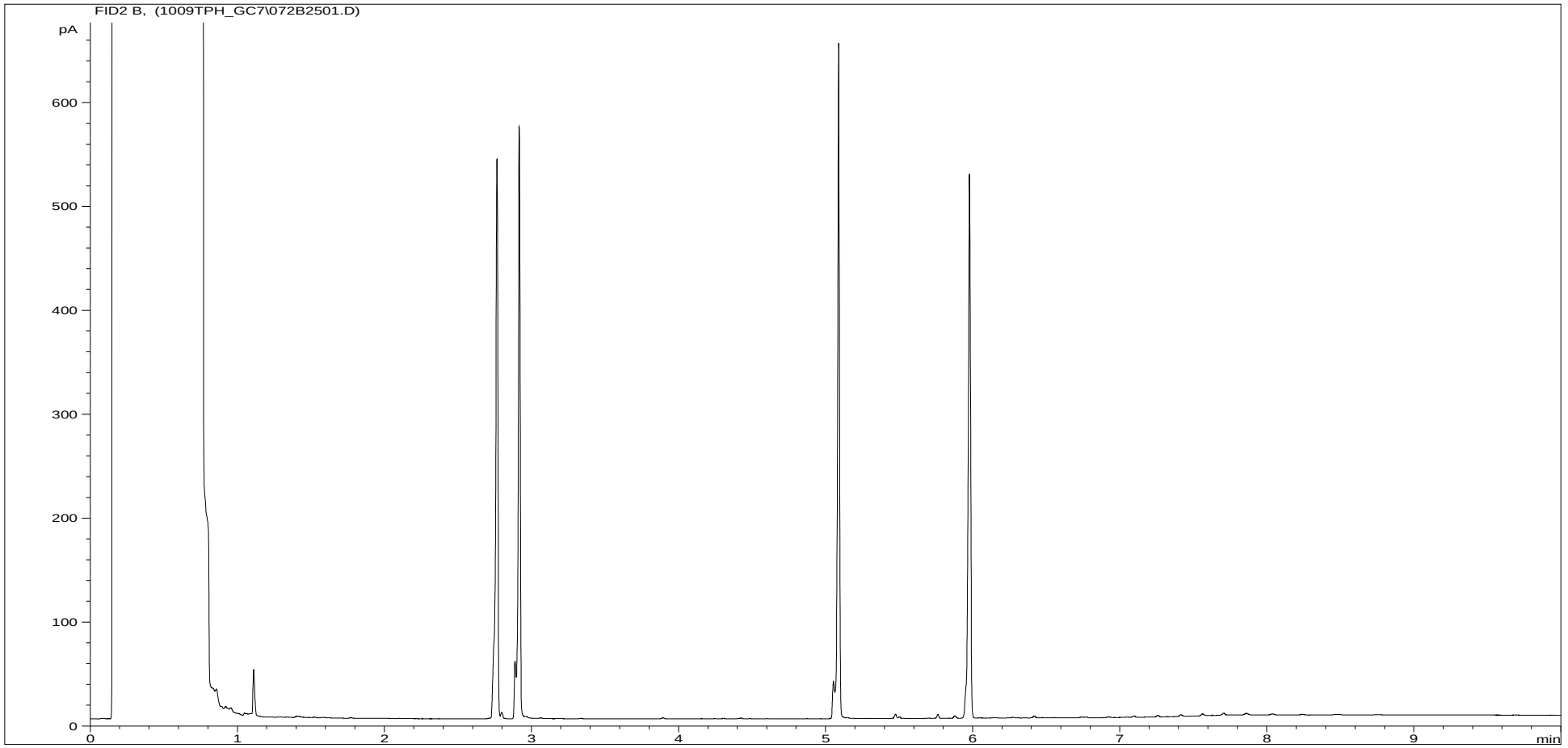


Sample ID:	CL0829262	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH107 ES 2 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\071B2401.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

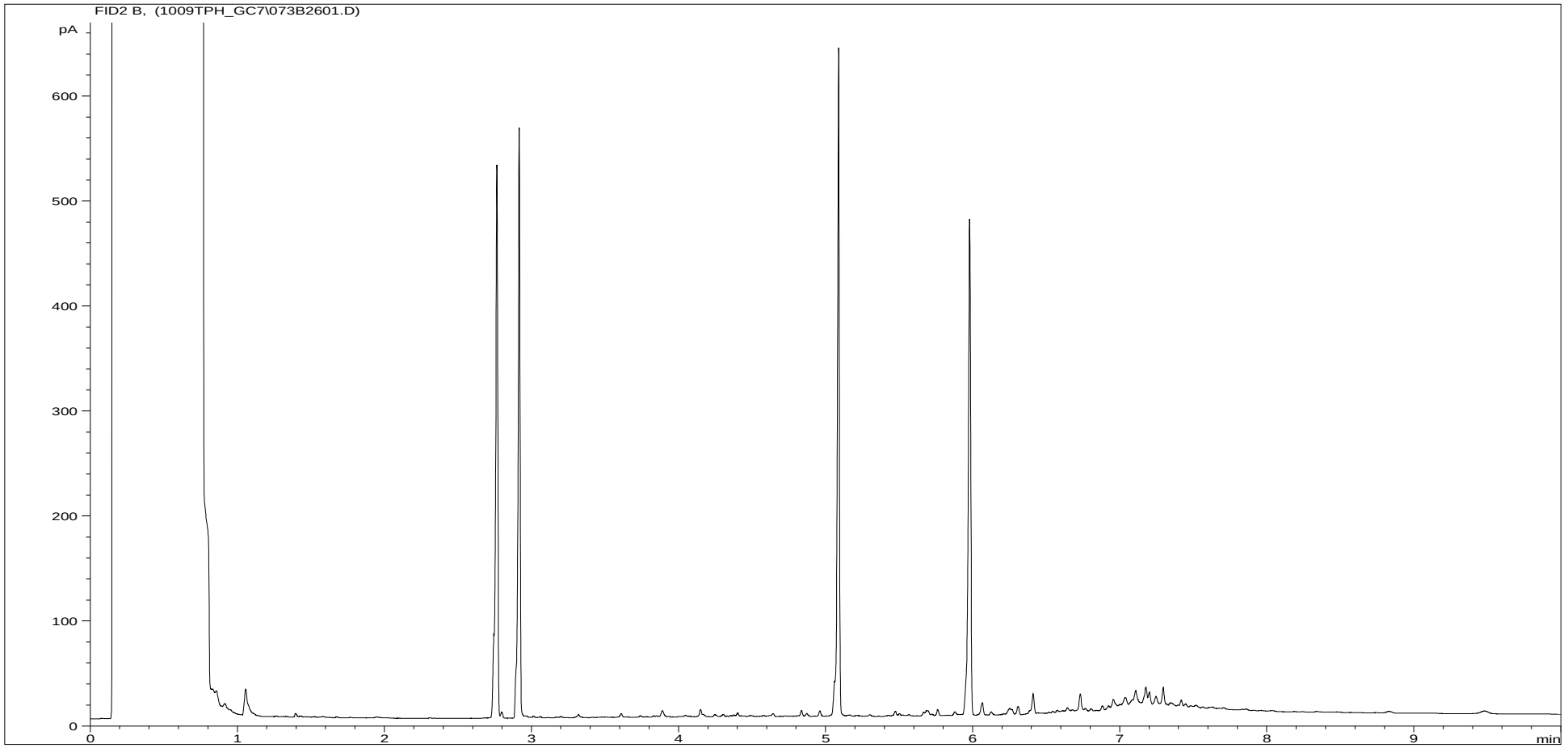


Sample ID:	CL0829263	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH108 ES 2 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\072B2501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

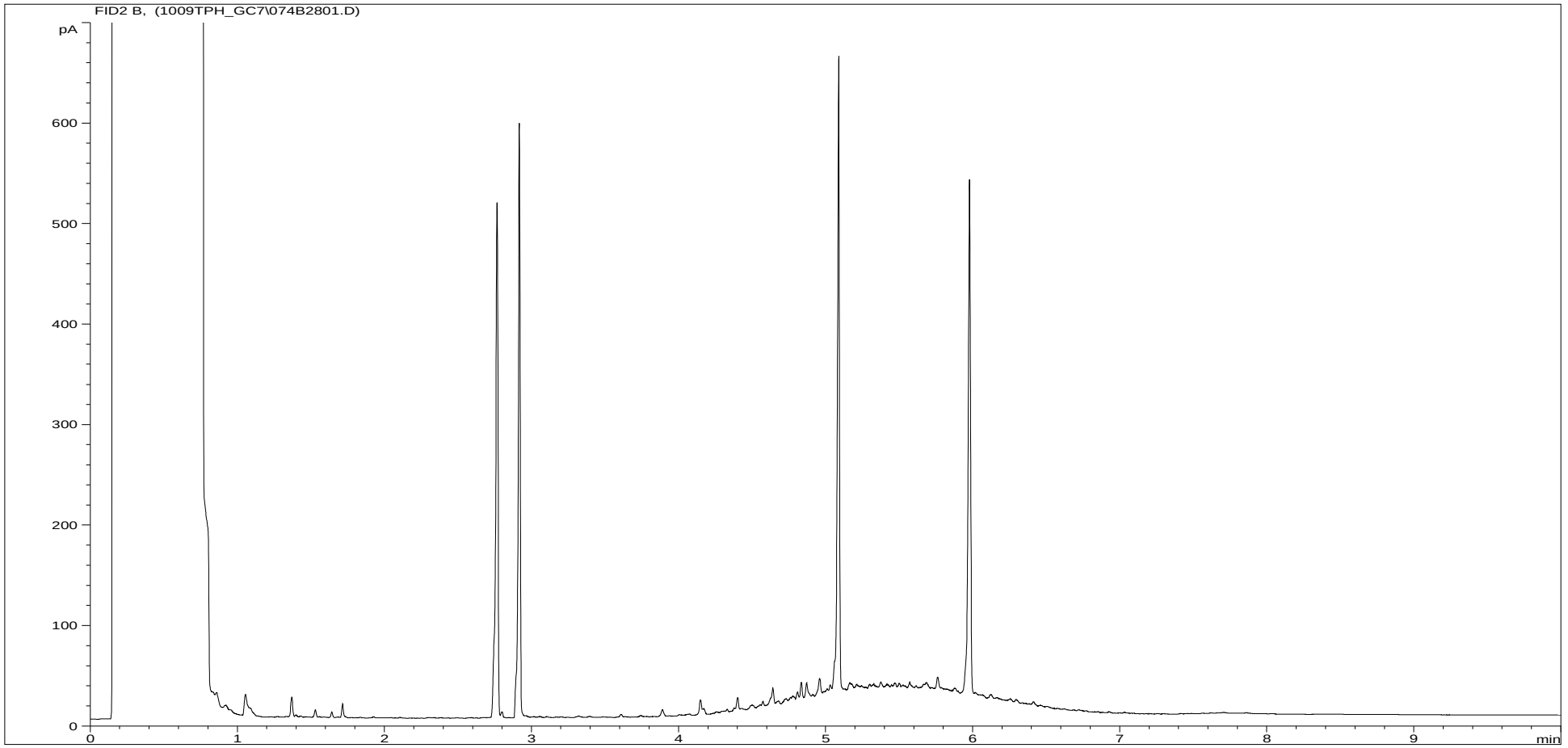


Sample ID:	CL0829264	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH109 ES 1 0.30
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\073B2601.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

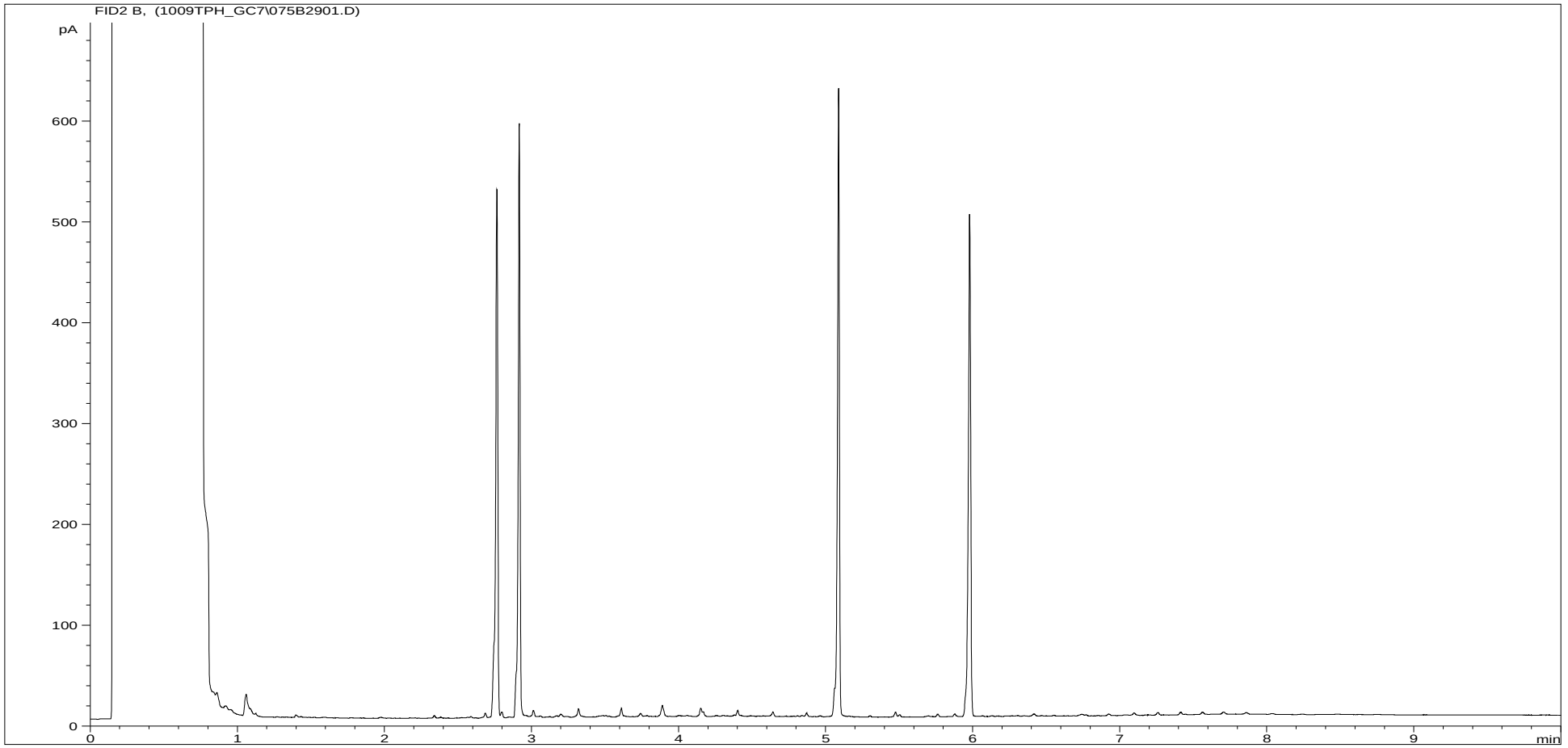


Sample ID:	CL0829265	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH109 ES 6 2.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\074B2801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL0829266	**Job Number:**	S08_6384M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH101 ES 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\075B2901.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Report Notes

Soil/Solid analysis specific:

S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15^{o}C

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
***** denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
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 you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

TES Report No. EFS/086382M (Ver. 1)

Soil Mechanics
Unit 15
Crosby Yard
Bridgend
Mid Glamorgan
CF31 1JZ

Site: Hirwaun Industrial Estate

The 6 samples described in this report were logged for analysis by TES Bretby on 05-Oct-2008.
The analysis was completed by: 21-Oct-2008

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of TPH Texas banding (std) (Page 5)
GC-FID Chromatograms (Pages 6 to 11)
Table of Report Notes (Page 12)

On behalf of
TES Bretby :
J Hannah

J. Hannah
Project Co-ordinator

Date of Issue: 21-Oct-2008

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105^{o}C unless otherwise stated. (except QC samples)
TES Bretby accepts no responsibility for any sampling not carried out by our personnel.

Sample Descriptions

Client : Soil Mechanics

Site : Hirwaun Industrial Estate

Report Number : S08_6382M

Lab ID Number	Client ID	Description
CL/0829232	BH102 ES 0.30	Brown CLAY
CL/0829233	BH102 ES 1.50 (NVM)	Brown Gravel STONE
CL/0829234	BH104 ES 0.70	Brown CLAY
CL/0829235	BH104 ES 1.50	Brown CLAY
CL/0829236	BH105 ES 0.70	Brown CLAY
CL/0829237	BH106 ES 0.30	Brown CLAY

Units :		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg
Method Codes :		ELESULP	ICPACIDS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPSOIL	TMSS	TPHFIDUS	TPHFIDUS
Method Reporting Limits :		20	20	0.5	2	0.1	3	3	3.5	0.10	2.5	0.5	19.5	2	0.2	10.0	10.0
Accreditation Code:		UM	UM	U	UM	U	UM	UM	UM	U	UM	U	UM	U	U	UM	
TES ID Number CL/	**Client Sample Description**	**Elemental Sulphur**	**SO4-- (acid sol)**	**Antimony (MS)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**Molybdenum**	**Tot.Moisture @ 105C**	**TPH by GCFID (AR)**	**TPH Carbon Banding.**
0829232	BH102 ES 0.30	<20	<20	<0.5	5.2	0.21	11.5‡	10.6	22.5	<0.1	16.8	<0.5	49.4	<1	14.7	<11.7	Req
0829233	BH102 ES 1.50 (NVM)	<19‡	<19‡	<0.5	3.7‡	<0.1	13.5‡	4.2‡	7.6‡	<0.1	7.8‡	<0.5	18.7‡	1	13.9	27‡	Req
0829234	BH104 ES 0.70	<20	<20	<0.5	7.3	0.25	17‡	15.1	17.7	<0.1	20.4	<0.5	56.4	1	16.5	<12.0	Req
0829235	BH104 ES 1.50	<21	<21	<0.5	5	0.14	9.4‡	8.2	9.9	<0.1	14	<0.5	33.9	<1	15.2	<11.8	Req
0829236	BH105 ES 0.70	<21	<21	0.5	5.7	0.2	14.3‡	11.5	13.9	<0.1	15.4	<0.5	52.5	1	14.9	<11.8	Req
0829237	BH106 ES 0.30	<21	215	1.2	11.6	0.8	15.3‡	34	35.1	0.12	22.5	0.5	370.6	<1	20.0	54	Req

TES Bretby

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
Report Number	**EFS/086382M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Units :		pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% M/M			
Method Codes :		WSLM3	ICPBOR	ICPMAJ	KONECL	KONECR	PAHSCUV	SEN9	SFAPI	SFAPI	SFAPI	SFAPI	SFAS	WSLM59			
Method Reporting Limits :			0.5	1	5.0	0.1	10		0.5	0.5	0.5	2	0.5	0.02			
Accreditation Code:		U	N	N	N	N	N	N	N	N	N	N	N	N			
TES ID Number CL/	**Client Sample Description**	**pH units**	**Boron (H20 Soluble)**	**Barium**	**Chloride:**	**Chromium vi:**	**PAH (screening)**	**Asbestos (screening)**	**Cyanide(Free) (AR)**	**Cyanide(Total) (AR)**	**Phenol Index.(AR)**	**Thiocyanate(SCN)(AR)**	**Sulphide as S (AR)**	**F.O.C. %**			
0829232	BH102 ES 0.30	8.2	<0.5	77	10	<0.1	<10	NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.51			
0829233	BH102 ES 1.50 (NVM)	8.4	<0.5	16	15	<0.1	<10	NBFO	<0.6	<0.6	<0.6	<2.3	<0.6	0.16			
0829234	BH104 ES 0.70	8.3	<0.5	158	83	<0.1	<10	NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	0.79			
0829235	BH104 ES 1.50	8.3	<0.5	72	13.3	<0.1	<10	NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	0.37			
0829236	BH105 ES 0.70	8.0	<0.5	85	12.6	<0.1	<11	NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	0.38			
0829237	BH106 ES 0.30	8.2	<0.5	247	30	<0.1	31	NBFO	<0.6	<0.6	<0.6	<2.5	<0.6	1.79			

TES Bretby

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Fax +44 (0) 1283 554422

Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
Report Number	**EFS/086382M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Units :		ug/kg	ug/kg	ug/kg	ug/kg												
Method Codes :		BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA												
Method Reporting Limits :		10	10	10	20												
Accreditation Code:		N	N	N	N												
TES ID Number CL/	**Client Sample Description**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**												
0829232	BH102 ES 0.30	<12	<12	<12	<23												
0829233	BH102 ES 1.50 (NVM)	<290	<290	<290	<581												
0829234	BH104 ES 0.70	<12	<12	<12	<24												
0829235	BH104 ES 1.50	<12	<12	<12	<24												
0829236	BH105 ES 0.70	<12	<12	<12	<24												
0829237	BH106 ES 0.30	<13	<13	<13	<25												

TES Bretby

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Burton-on-Trent, Staffordshire, DE15 0XD

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Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	21-Oct-08
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TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Total Petroleum Hydrocarbons (TPH) Carbon Ranges

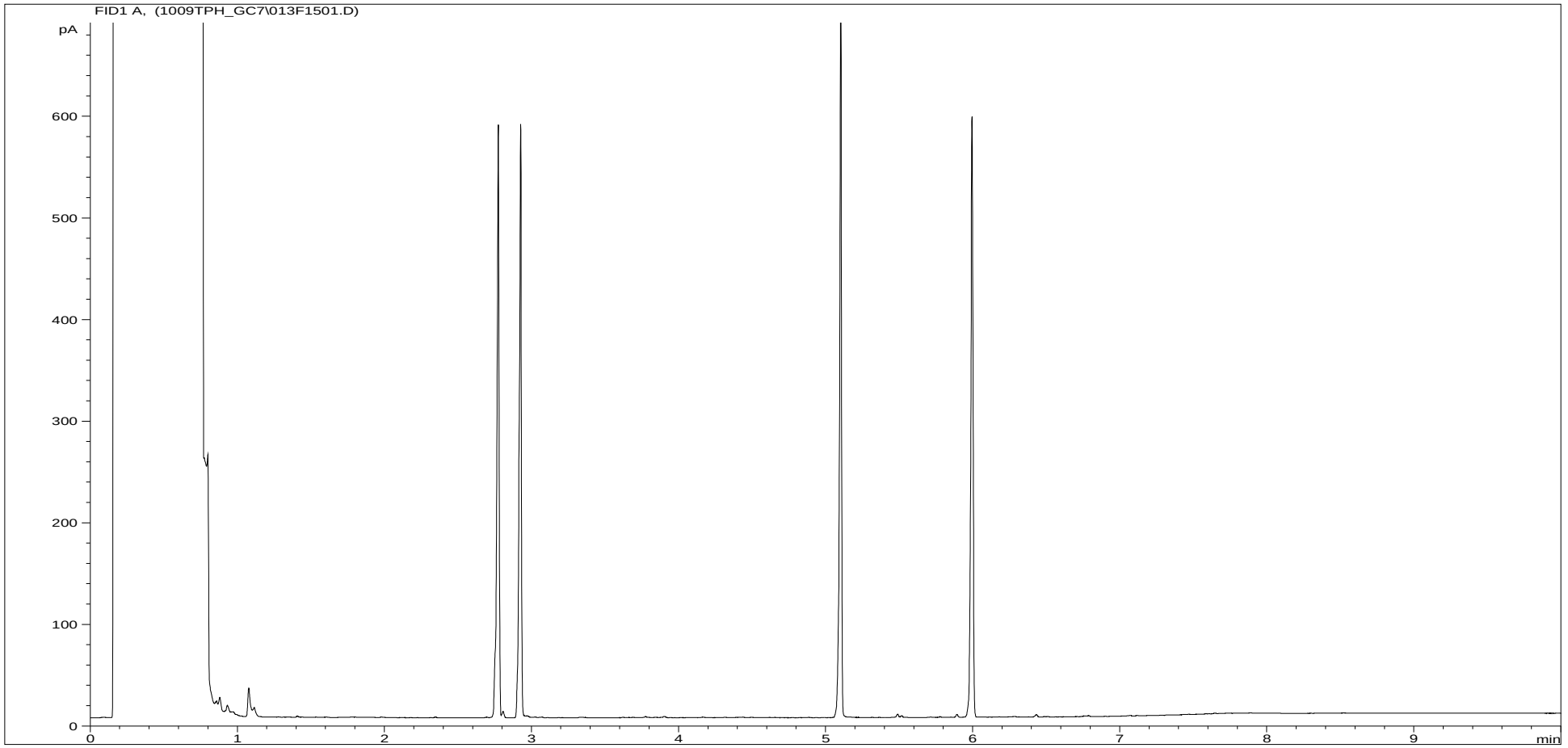
Customer and Site Details: Soil Mechanics : Hirwaun Industrial Estate
Job Number: S08_6382M
QC Batch Number: 83540
Directory: D:\TES\DATA\Y2008\1009TPH_GC7\018F2101.D
Method: Ultra Sonic
Accreditation code: U

Matrix: Soil
Date Booked in: 05-Oct-08
Date Extracted: 08-Oct-08
Date Analysed: 09-Oct-08

		Concentration, (mg/kg) - as dry weight.				
Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
CL0829232	BH102 ES 0.30	<2	<2	<2	<2	<5.13
CL0829233	BH102 ES 1.50 (NVM)	<2	<2	<2	<2	21.4
CL0829234	BH104 ES 0.70	<2	<2	<2	2.42	<5.25
CL0829235	BH104 ES 1.50	<2	<2	<2	<2	<5.17
CL0829236	BH105 ES 0.70	<2	<2	<2	<2	<5.15
CL0829237	BH106 ES 0.30	<3	<3	<3	<3	38

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appropriat e, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

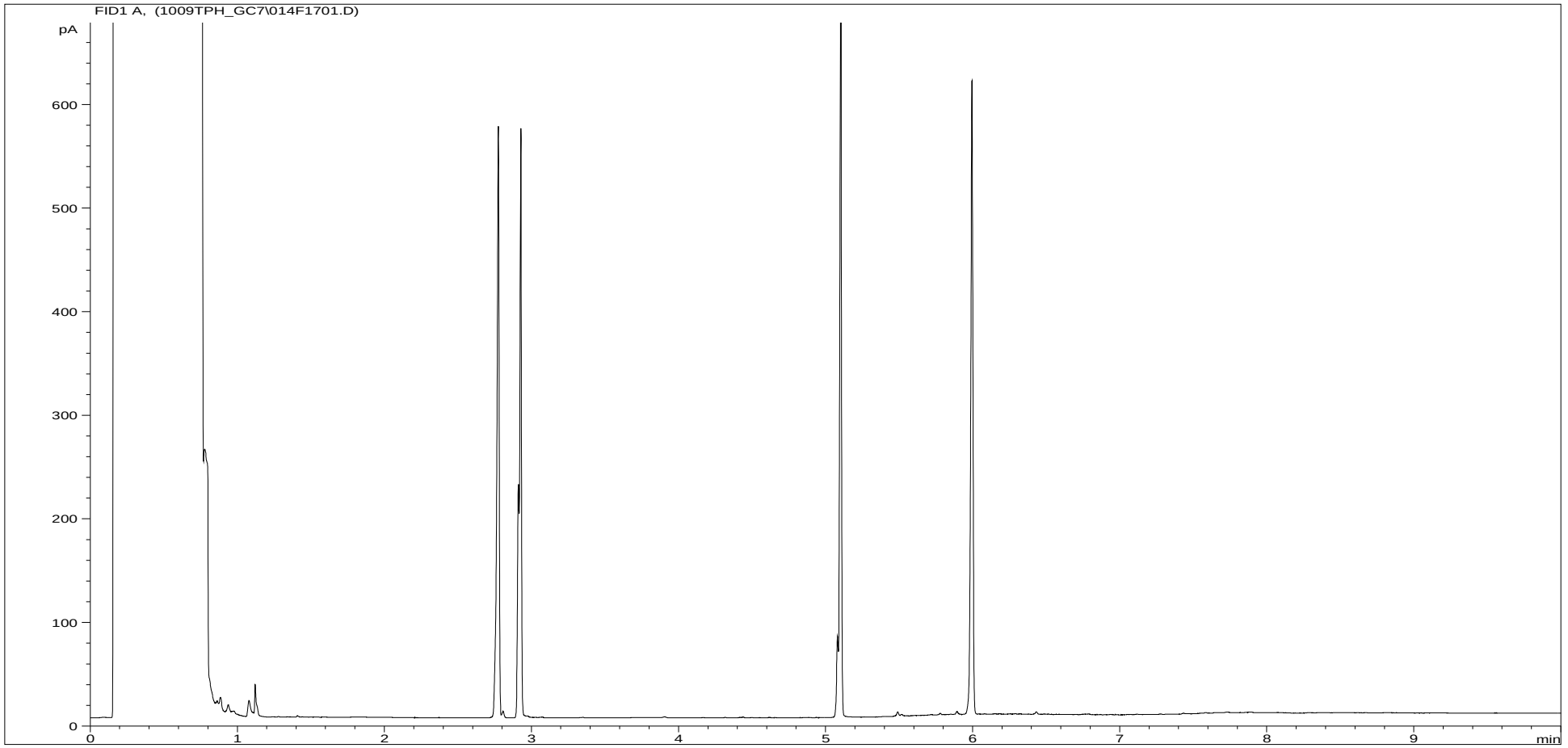


Sample ID:	CL0829232	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH102 ES 0.30
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\013F1501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

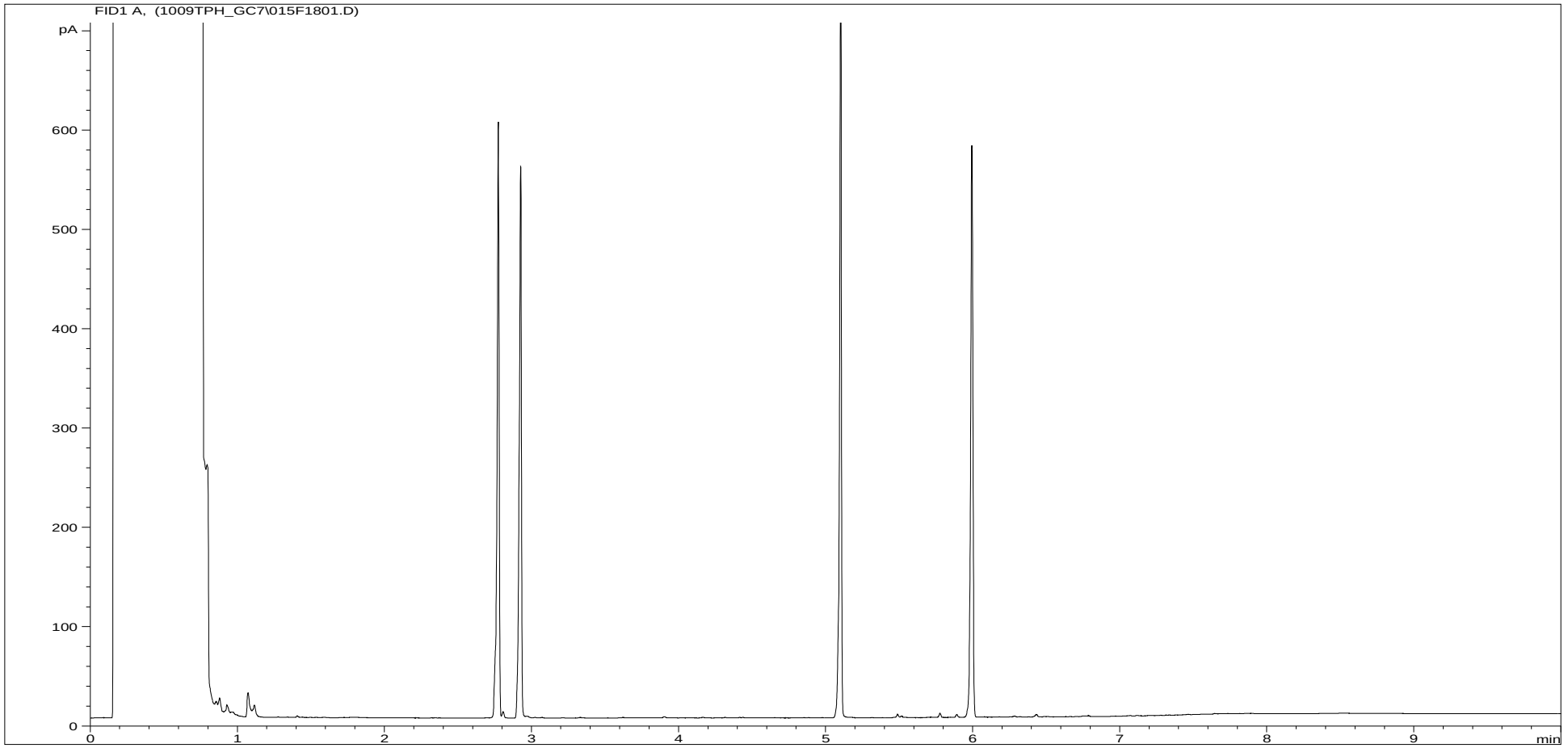


Sample ID:	CL0829233	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH102 ES 1.50 (NVM)
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\014F1701.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

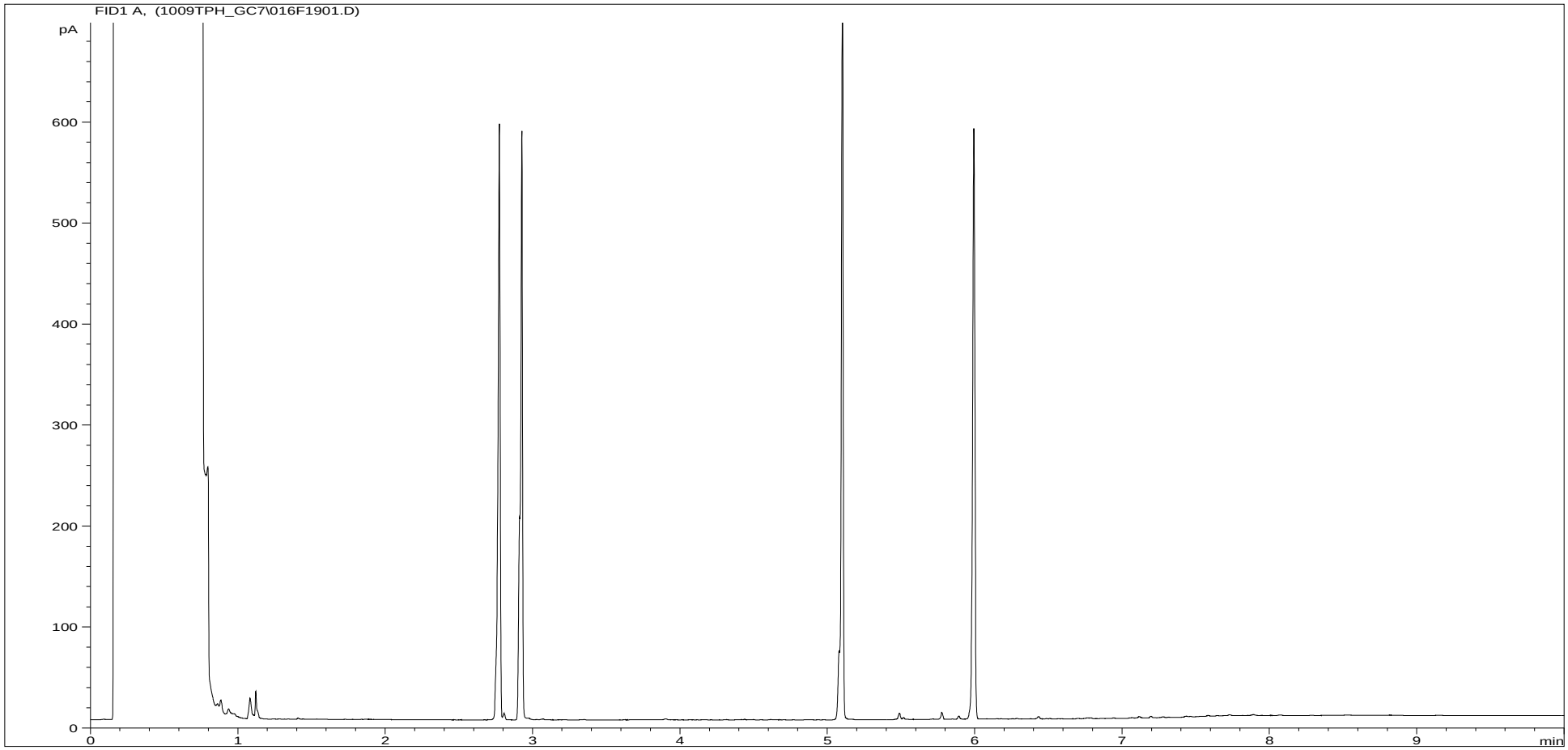


Sample ID:	CL0829234	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH104 ES 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\015F1801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

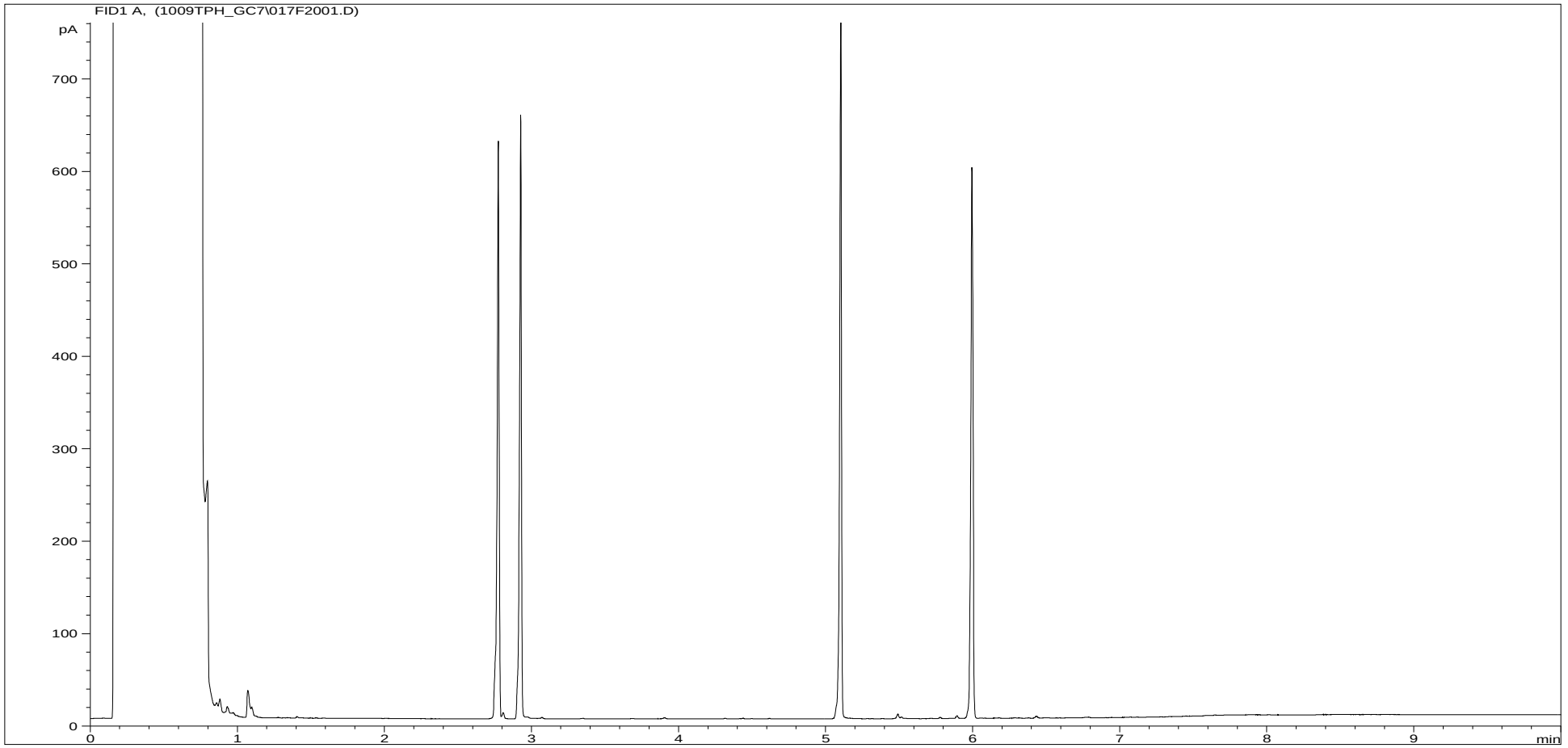


Sample ID:	CL0829235	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH104 ES 1.50
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\016F1901.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

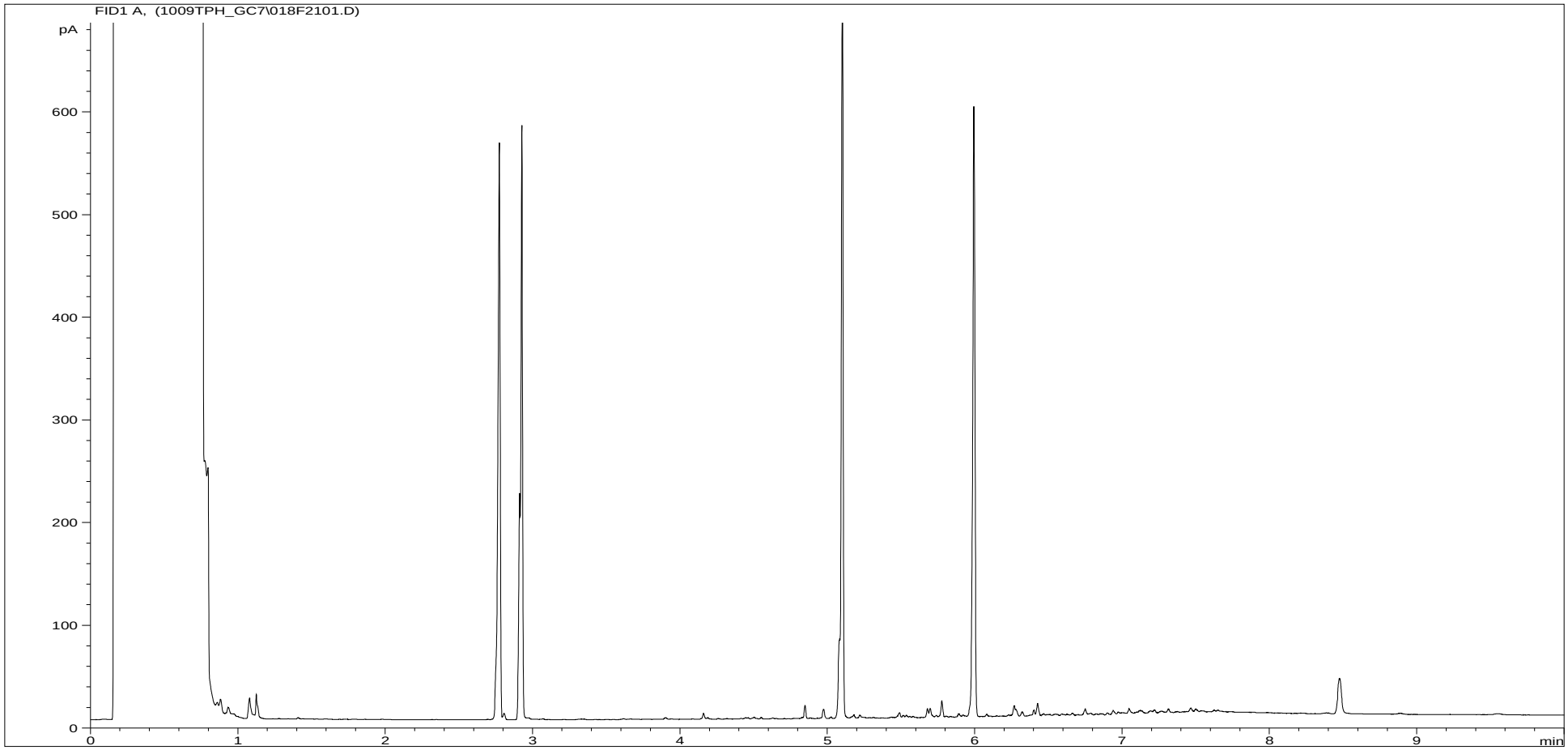


Sample ID:	CL0829236	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH105 ES 0.70
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\017F2001.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL0829237	**Job Number:**	S08_6382M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	BH106 ES 0.30
Acquisition Date/Time:	09-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1009TPH_GC7\018F2101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Report Notes

Soil/Solid analysis specific:

S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15^{o}C

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
***** denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
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 you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

TES Report No. EFS/085713M (Ver. 1)

Soil Mechanics
Unit 15
Crosby Yard
Bridgend
Mid Glamorgan
CF31 1JZ

Site: Hirwaun Industrial Estate

The 11 samples described in this report were logged for analysis by TES Bretby on 05-Sep-2008.
The analysis was completed by: 26-Sep-2008

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of PCB Congener (12) Results (Page 5)
Table of TPH Texas banding (std) (Page 6)
GC-FID Chromatograms (Pages 7 to 17)
Table of Report Notes (Page 18)

On behalf of
TES Bretby :
J Hannah

J. Hannah

Project Co-ordinator

Date of Issue: 26-Sep-2008

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105°C unless otherwise stated. (except QC samples)
TES Bretby accepts no responsibility for any sampling not carried out by our personnel.

Sample Descriptions

Client : Soil Mechanics

Site : Hirwaun Industrial Estate

Report Number : S08_5713M

Lab ID Number	Client ID	Description
CL/0826248	TP11 ES 4 2.30	Brown CLAY
CL/0826249	TP11A ES 2 0.50	Brown Stone SILT
CL/0826250	TP12 ES 1 0.30	Brown Stone SILT
CL/0826251	TP12A ES 1 0.20	Brown MADE GROUND
CL/0826252	TP14 ES 1 0.30	Brown Stone CLAY
CL/0826253	TP15 ES 1 0.30	Brown Stone CLAY
CL/0826254	TP15 ES 2 0.70	Brown Stone CLAY
CL/0826255	TP16 ES 1 0.30 (NVM)	Brown Gravel STONE
CL/0826256	TP16 ES 2 1.00	Brown Stone CLAY
CL/0826257	TP17 ES 1 0.30	Brown Stone CLAY
CL/0826258	TP17 ES 3 1.20	Brown Stone CLAY

Units :		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg
Method Codes :		ELESULP	ICPACIDS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	TMSS	TPHFIDUS	TPHFIDUS
Method Reporting Limits :		20	20	0.1	2	0.1	3	3	3.5	0.10	0.5	2.5	0.5	19.5	0.2	10.0	10.0
Accreditation Code:		UM	UM	U	UM	U	UM	UM	UM	U	U	UM	U	UM	U	UM	
TES ID Number CL/	**Client Sample Description**	**Elemental Sulphur**	**SO4-- (acid sol)**	**Antimony (MS)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Molybdenum (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**Tot.Moisture @ 105C**	**TPH by GCFID (AR)**	**TPH Carbon Banding.**
0826249	TP11A ES 2 0.50	<21	273	<0.5	7.9	0.14	12.0‡	16	21.2	<0.1	<0.5	19	<0.5	57.7	12.7	<11.5	Req
0826248	TP11 ES 4 2.30	<20	348	<0.5	5.3	0.14	16.4‡	12.9	19.7	<0.1	<0.5	22	<0.5	65.4	16.0	<11.9	Req
0826251	TP12A ES 1 0.20	<20	485	0.5	13.9	0.43	12.9‡	26.5	34.3	<0.1	<0.5	21	0.6	212.4	18.0	61	Req
0826250	TP12 ES 1 0.30	<21	82	<0.5	5.4	<0.1	12.1‡	12.7	46.9	<0.1	<0.5	22.1	<0.5	54.1	11.6	<11.3	Req
0826252	TP14 ES 1 0.30	<20	387	<0.5	10.1	0.37	15.1‡	20.8	28.5	<0.1	<0.5	17	<0.5	97.9	20.7	63	Req
0826253	TP15 ES 1 0.30	61	849	<0.5	8.5	0.32	15.3‡	20.4	25.3	<0.1	<0.5	15.6	0.5	92.1	21.5	<12.7	Req
0826254	TP15 ES 2 0.70	<21	1540	1.2	7.6	0.76	15.7‡	20	52	<0.1	0.6	12.8	<0.5	73.9	19.0	114	Req
0826255	TP16 ES 1 0.30 (NVM)	306‡	1740‡	<0.5	9.4‡	0.2	22.5‡	13.3‡	54‡	<0.1	<0.5	11.7‡	1.4	34.6‡	16.6	<12.0‡	Req
0826256	TP16 ES 2 1.00	<21	408	<0.5	8	0.12	15.5‡	19.7	21.2	<0.1	<0.5	28.2	<0.5	58.6	17.9	12.2	Req
0826257	TP17 ES 1 0.30	<21	274	<0.5	11.2	0.2	14‡	19.1	23.6	<0.1	<0.5	19.6	<0.5	57.9	20.9	16.4	Req
0826258	TP17 ES 3 1.20	<21	609	<0.5	11.2	0.2	13.4‡	17.1	27	<0.1	<0.5	17.2	0.8	40.1	21.8	50	Req

TES Bretby

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Burton-on-Trent, Staffordshire, DE15 0XD

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Fax +44 (0) 1283 554422

Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	26-Sep-08
Report Number	**EFS/085713M**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Units :		pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	æg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% M/M		
Method Codes :		WSLM3	ICPBOR	ICPMAJ	KONECL	KONECR	PAHSCUV	PCBUSECD	SEN9	SFAPI	SFAPI	SFAPI	SFAPI	SFAS	WSLM59		
Method Reporting Limits :			0.5	1	5.0	0.1	10			0.5	0.5	0.5	2	0.5	0.02		
Accreditation Code:		U	N	N	N	N	N		N	N	N	N	N	N	N		
TES ID Number CL/	**Client Sample Description**	**pH units**	**Boron (H20 Soluble)**	**Barium**	**Chloride:**	**Chromium vi:**	**PAH (screening)**	**PCB (12 Congeners)**	**Asbestos (screening)**	**Cyanide(Free) (AR)**	**Cyanide(Total) (AR)**	**Phenol Index.(AR)**	**Thiocyanate(SCN)(AR)**	**Sulphide as S (AR)**	**F.O.C. %**		
0826249	TP11A ES 2 0.50	7.7	<0.5	<0.1	14.4	<0.1	<10			<0.6	<0.6	<0.6	<2.3	<0.6	0.32		
0826248	TP11 ES 4 2.30	8.3	0.7	225	101	<0.1	16	Req	NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	0.54		
0826251	TP12A ES 1 0.20	8.0	0.6	141	22	<0.1	16		NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	2.28		
0826250	TP12 ES 1 0.30	7.3	<0.5	<0.1	14.5	<0.1	<10			<0.6	<0.6	<0.6	<2.3	<0.6	0.25		
0826252	TP14 ES 1 0.30	7.7	<0.5	140	15.2	<0.1	20		NBFO	<0.6	<0.6	<0.6	<2.5	<0.6	2.51		
0826253	TP15 ES 1 0.30	9.5	0.6	334	36	<0.1	30	Req	NBFO	<0.6	<0.6	<0.6	<2.5	<0.6	1.77		
0826254	TP15 ES 2 0.70	8.3	0.5	198	20	<0.1	23		NBFO	<0.6	<0.6	<0.6	<2.5	<0.6	3.07		
0826255	TP16 ES 1 0.30 (NVM)	10.1	2.3	420	102	<0.1	123		NBFO	<0.6	<0.6	<0.6	<2.4	<0.6	3.16		
0826256	TP16 ES 2 1.00	7.5	<0.5	169	40	<0.1	12			<0.6	<0.6	<0.6	<2.4	<0.6	0.49		
0826257	TP17 ES 1 0.30	7.8	<0.5	76	22	<0.1	12		NBFO	<0.6	<0.6	<0.6	<2.5	<0.6	1.56		
0826258	TP17 ES 3 1.20	7.6	<0.5	192	27	<0.1	12		NBFO	<0.6	<0.6	<0.6	<2.6	<0.6	2.11		

TES Bretby

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Contact Mr H Woodroffe

Hirwaun Industrial Estate

Soils Sample Analysis

Date Printed	26-Sep-08
Report Number	**EFS/085713M**
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Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Units :		ug/kg	ug/kg	ug/kg	ug/kg												
Method Codes :		BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA												
Method Reporting Limits :		10	10	10	20												
Accreditation Code:		N	N	N	N												
TES ID Number CL/	**Client Sample Description**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**												
0826249	TP11A ES 2 0.50	<11	<11	<11	<23												
0826248	TP11 ES 4 2.30	<12	<12	<12	<24												
0826251	TP12A ES 1 0.20	<12	<12	<12	<24												
0826250	TP12 ES 1 0.30	<11	<11	<11	<23												
0826252	TP14 ES 1 0.30	<32	<32	<32	<63												
0826253	TP15 ES 1 0.30	<13	<13	<13	<25												
0826254	TP15 ES 2 0.70	<12	<12	<12	<25												
0826255	TP16 ES 1 0.30 (NVM)	<12	<12	<12	<24												
0826256	TP16 ES 2 1.00	<12	<12	<12	<24												
0826257	TP17 ES 1 0.30	<32	<32	<32	<63												
0826258	TP17 ES 3 1.20	<13	<13	<13	<26												

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

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Soils Sample Analysis

Date Printed	26-Sep-08
Report Number	**EFS/085713M**
Table Number	**1**

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105ºC where appr opriate, in accordance with the MCERTS standard.

Polychlorinated Biphenyls (congeners)

Customer and Site Details: Soil Mechanics: Hirwaun Industrial Estate
Job Number: S08_5713M
QC Batch Number: 083204
Directory: 0910PCB.GC11
Method: Ultrasonic
Accreditation code: N

Matrix: Soil
Date Booked in: 05-Sep-08
Date Extracted: 09-Sep-08
Date Analysed: 10-Sep-08

		Concentration, (µg/kg)											
Sample ID	**Customer ID**	**PCB 81**	**PCB 77**	**PCB 123**	**PCB 118**	**PCB 114**	**PCB 105**	**PCB 126**	**PCB 167**	**PCB 156**	**PCB 157**	**PCB 169**	**PCB 189**
* CL0826248	TP11 ES 4 2.30	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9
* CL0826253	TP15 ES 1 0.30	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Total Petroleum Hydrocarbons (TPH) Carbon Ranges

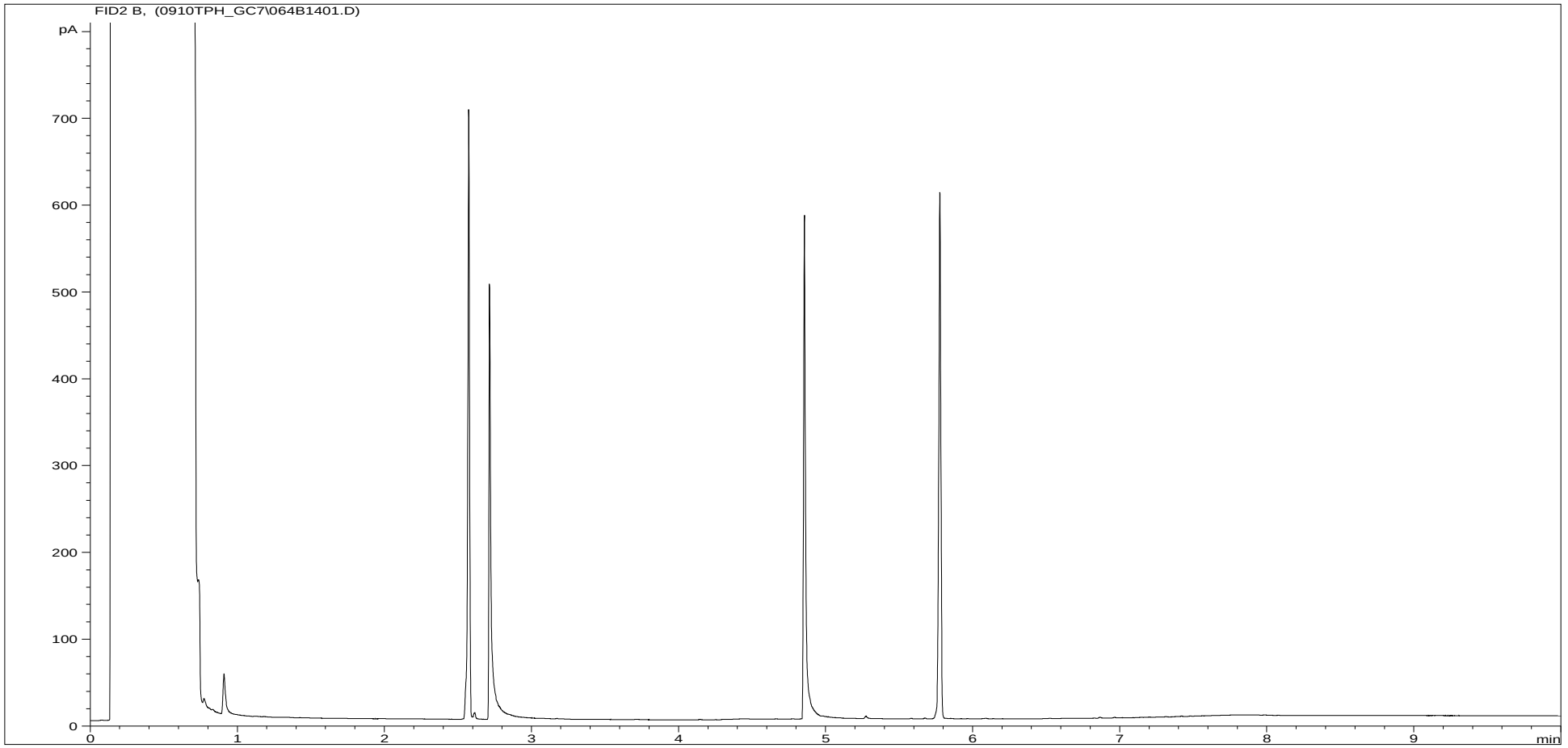
Customer and Site Details: Soil Mechanics : Hirwaun Industrial Estate
Job Number: S08_5713M
QC Batch Number: 83209
Directory: D:\TES\DATA\Y2008\0910TPH_GC7\074B2501.D
Method: Ultra Sonic
Accreditation code: U

Matrix: Soil
Date Booked in: 05-Sep-08
Date Extracted: 09-Sep-08
Date Analysed: 10-Sep-08

		Concentration, (mg/kg) - as dry weight.				
Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
CL0826248	TP11 ES 4 2.30	<2	<2	<2	<2	<5.21
CL0826249	TP11A ES 2 0.50	<2	<2	3.06	<2	<5.02
CL0826250	TP12 ES 1 0.30	<2	<2	2.64	<2	<4.95
CL0826251	TP12A ES 1 0.20	<2	<2	2	<2	37.2
CL0826252	TP14 ES 1 0.30	<3	<3	<3	2.62	37.6
CL0826253	TP15 ES 1 0.30	<3	<3	3.03	<3	<5.58
CL0826254	TP15 ES 2 0.70	<2	<2	4.51	<2	65.8
CL0826255	TP16 ES 1 0.30 (NVM)	<2	<2	2.43	<2	6.87
CL0826256	TP16 ES 2 1.00	<2	<2	3.23	<2	6.59
CL0826257	TP17 ES 1 0.30	<3	<3	3.11	<3	7.37
CL0826258	TP17 ES 3 1.20	<3	<3	<3	<3	26.7

Where individual results are flagged see report notes for for status.
Results corrected to dry weight at 105℃ where appropriat e, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

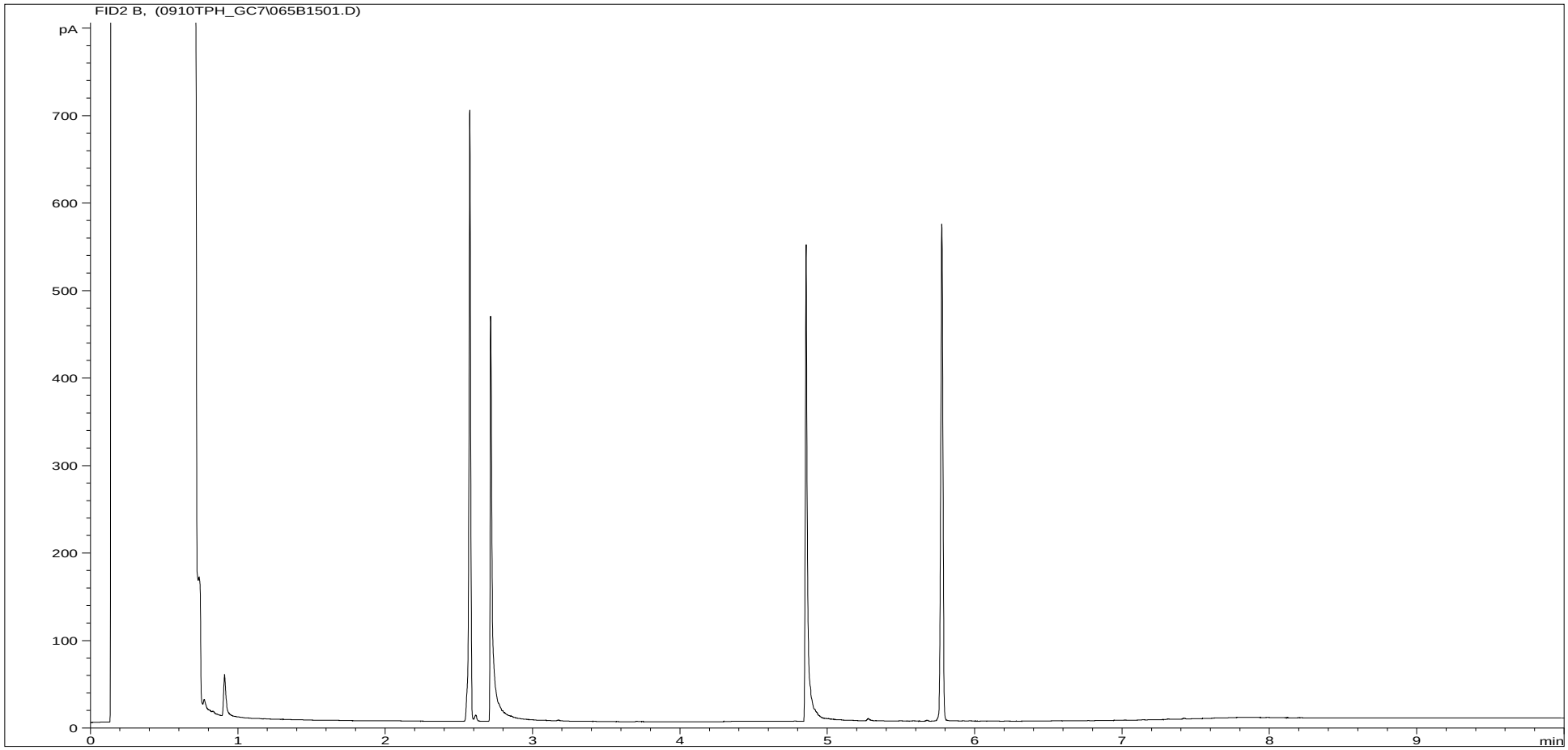


Sample ID:	CL0826248	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP11 ES 4 2.30
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\064B1401.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

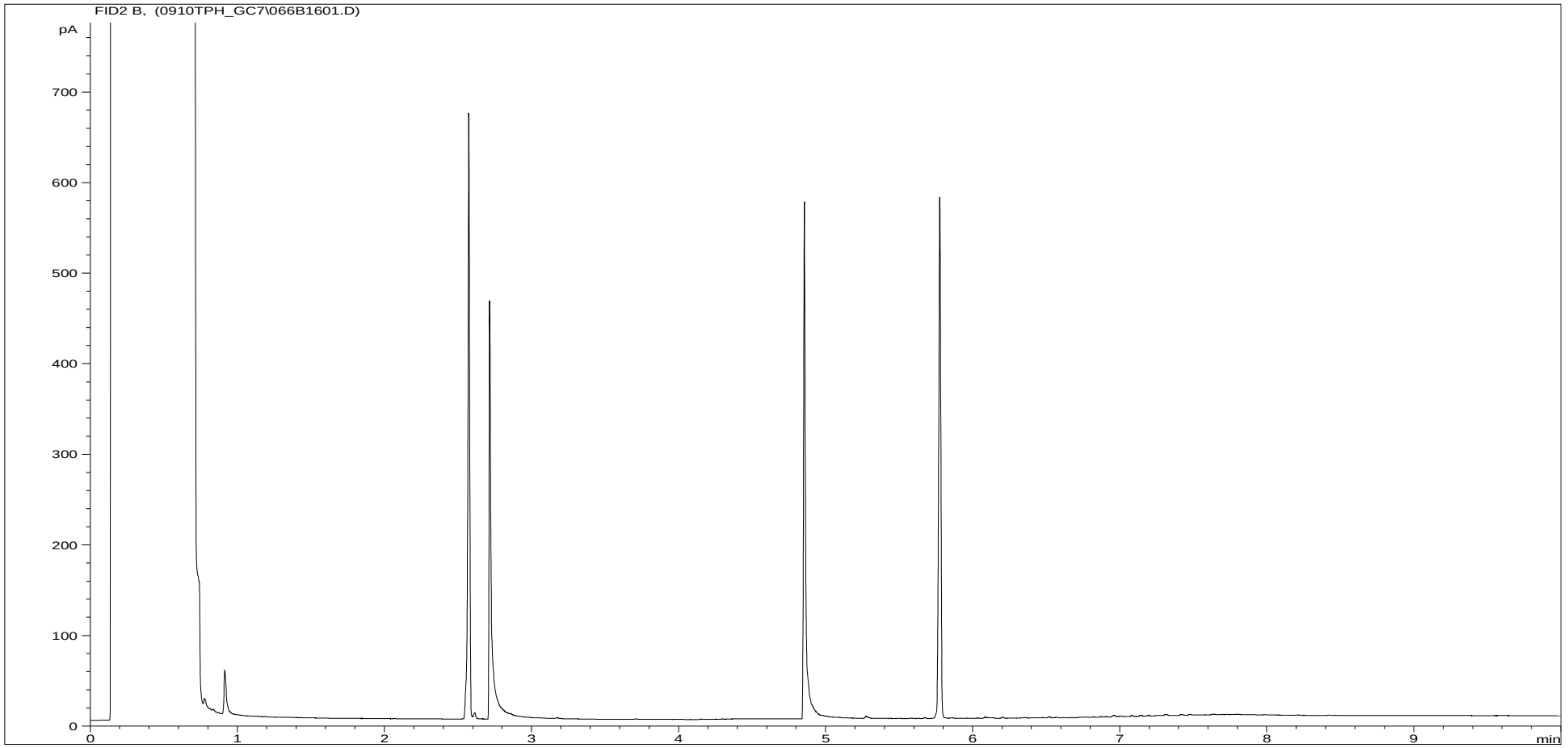


Sample ID:	CL0826249	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP11A ES 2 0.50
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\065B1501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

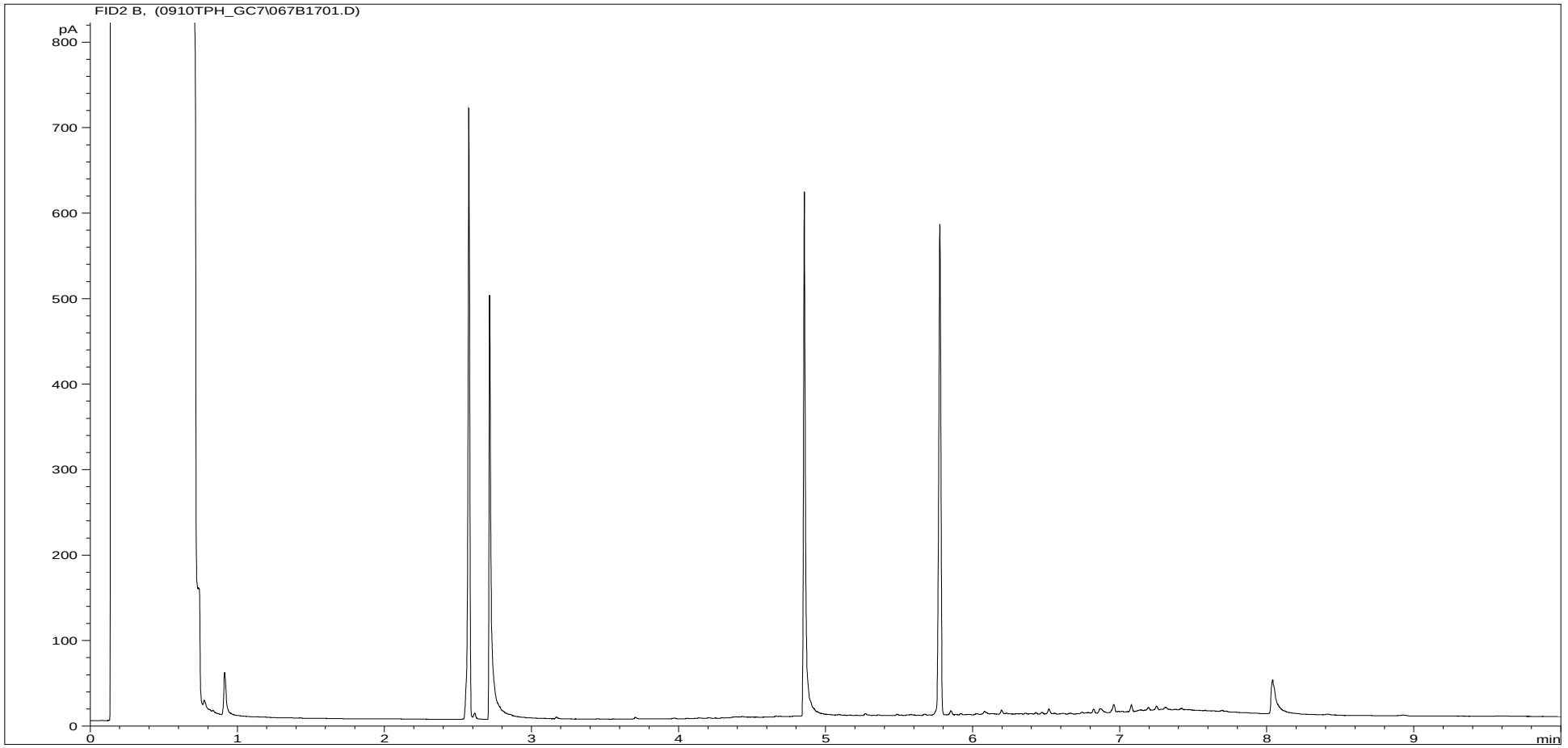


Sample ID:	CL0826250	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP12 ES 1 0.30
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\066B1601.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

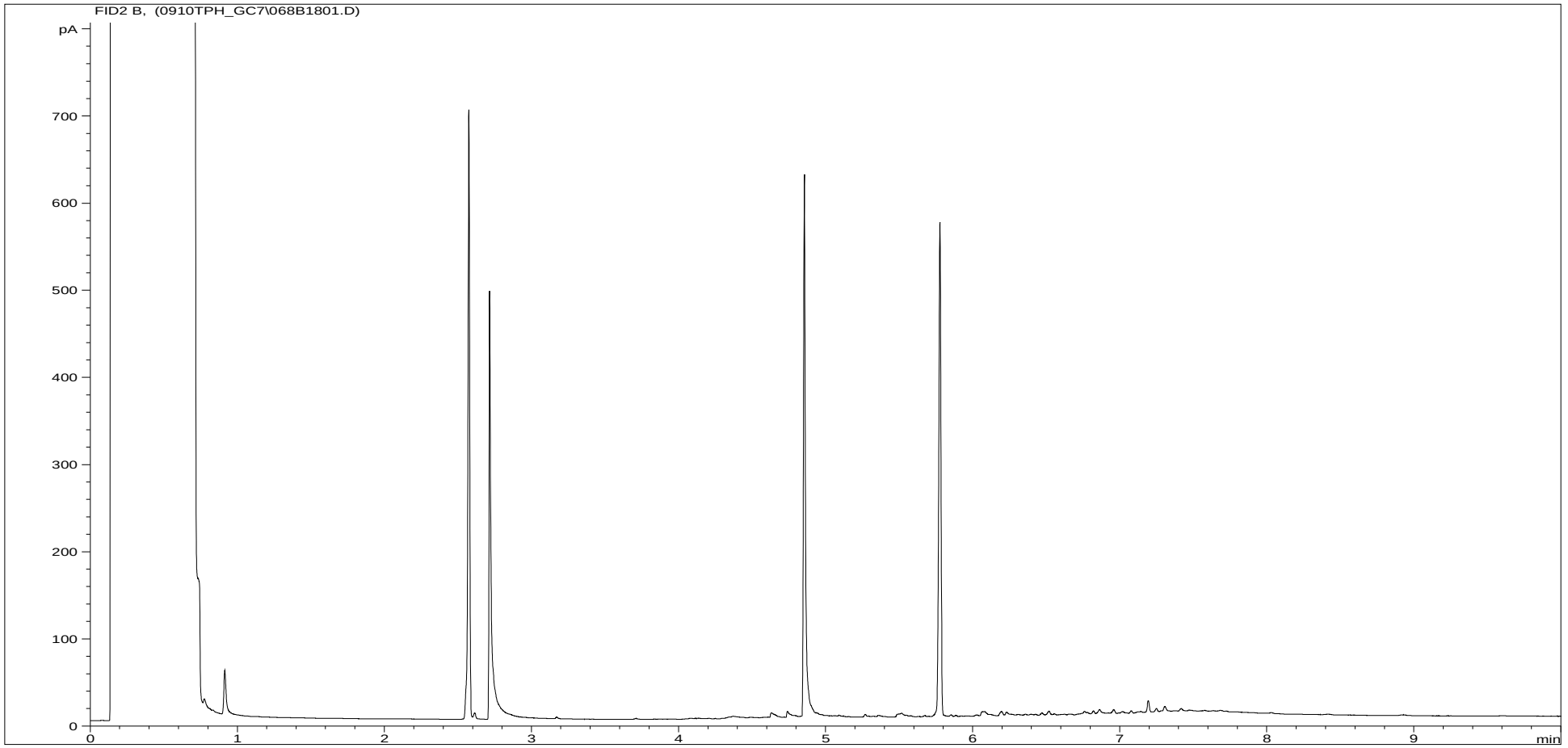


Sample ID:	CL0826251	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP12A ES 1 0.20
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\067B1701.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

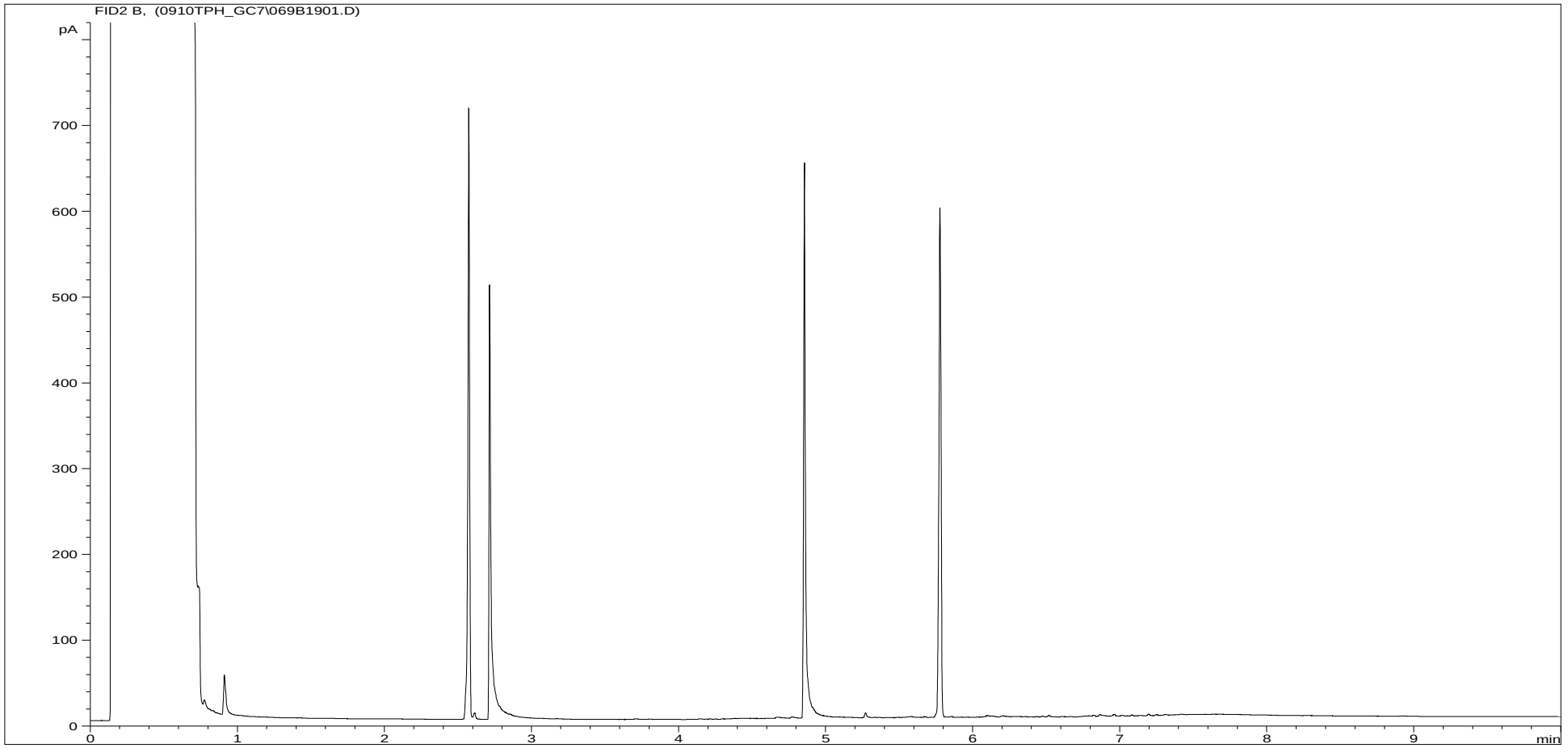


Sample ID:	CL0826252	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP14 ES 1 0.30
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\068B1801.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

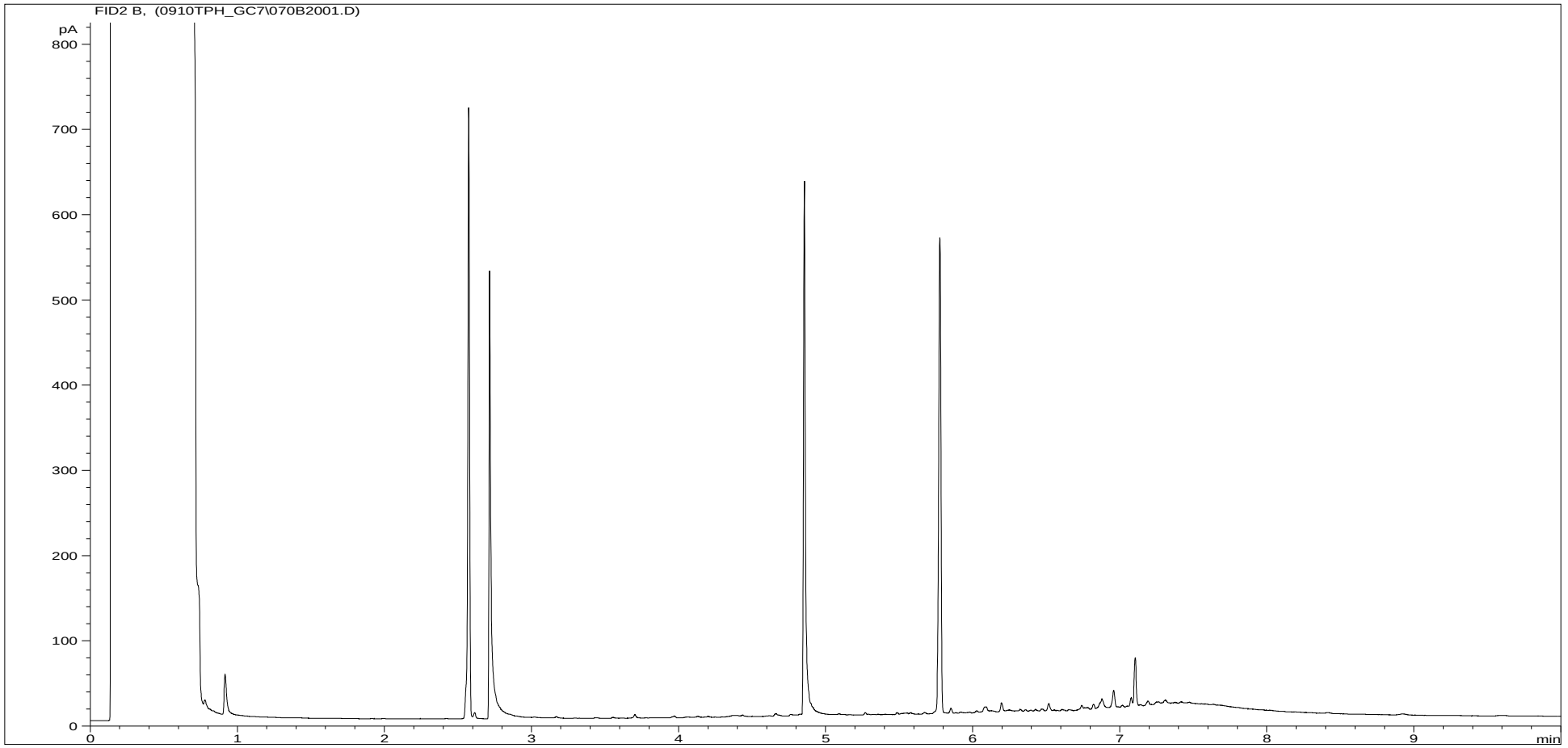


Sample ID:	CL0826253	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP15 ES 1 0.30
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\069B1901.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

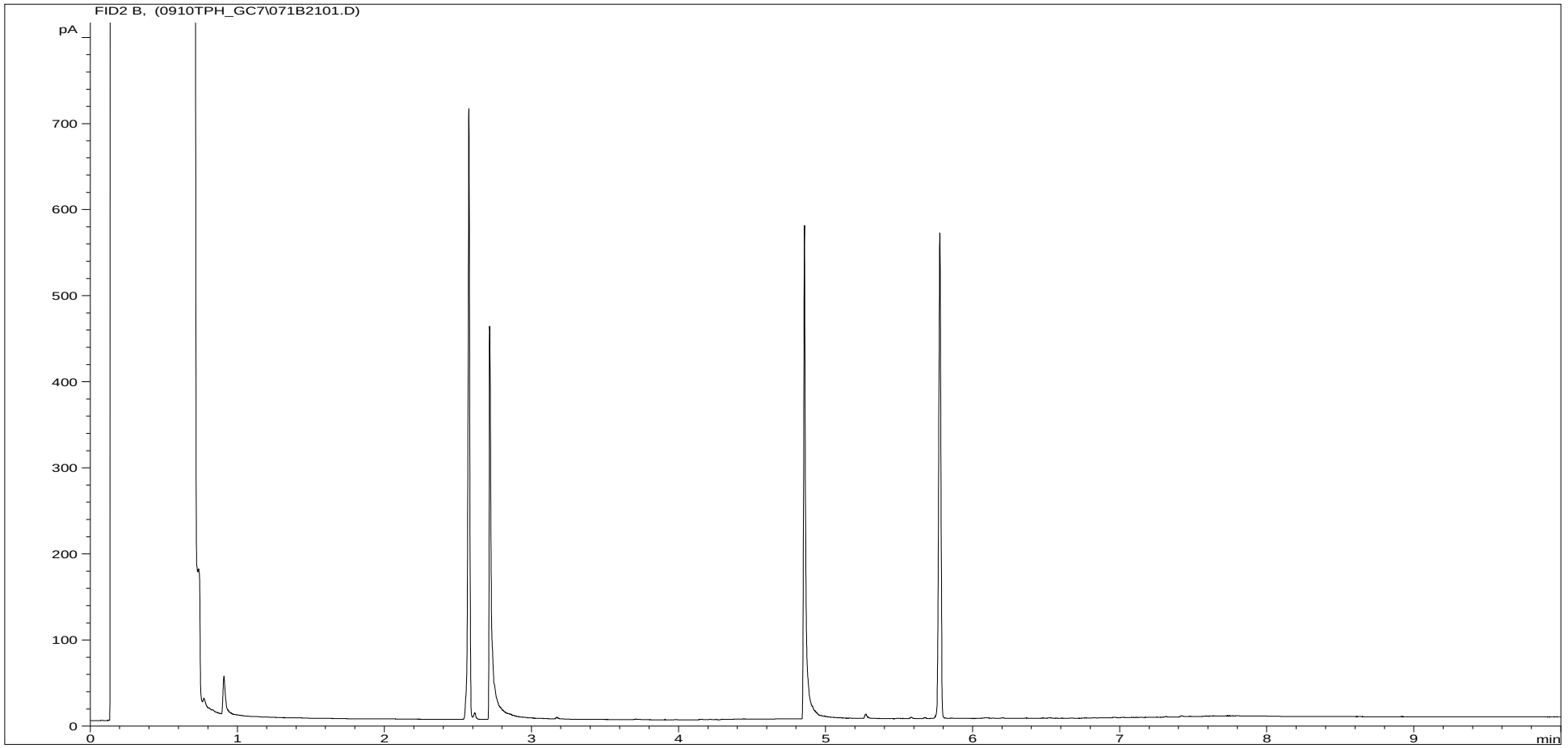


Sample ID:	CL0826254	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP15 ES 2 0.70
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\070B2001.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

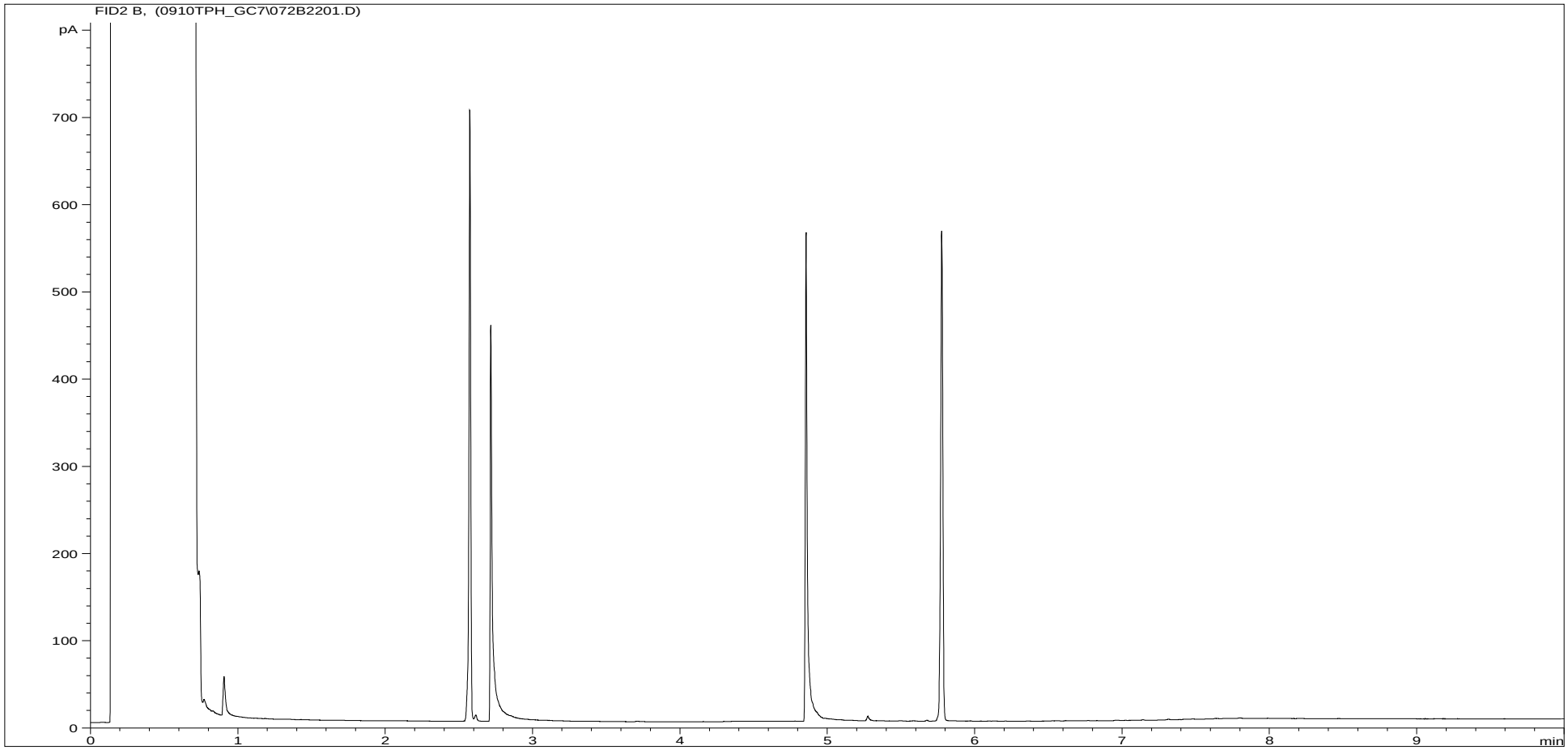


Sample ID:	CL0826255	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP16 ES 1 0.30 (NVM)
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\071B2101.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

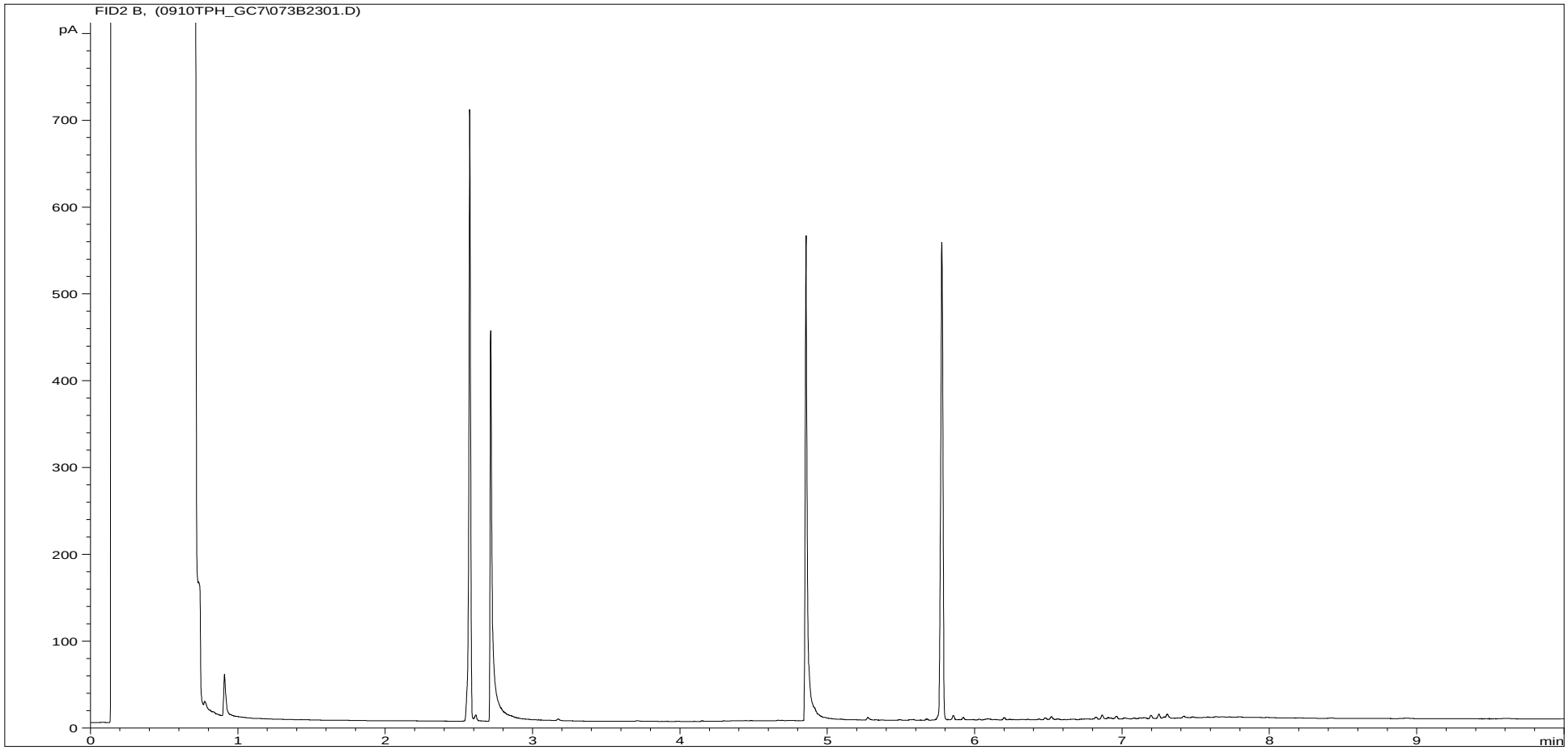


Sample ID:	CL0826256	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP16 ES 2 1.00
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\072B2201.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID

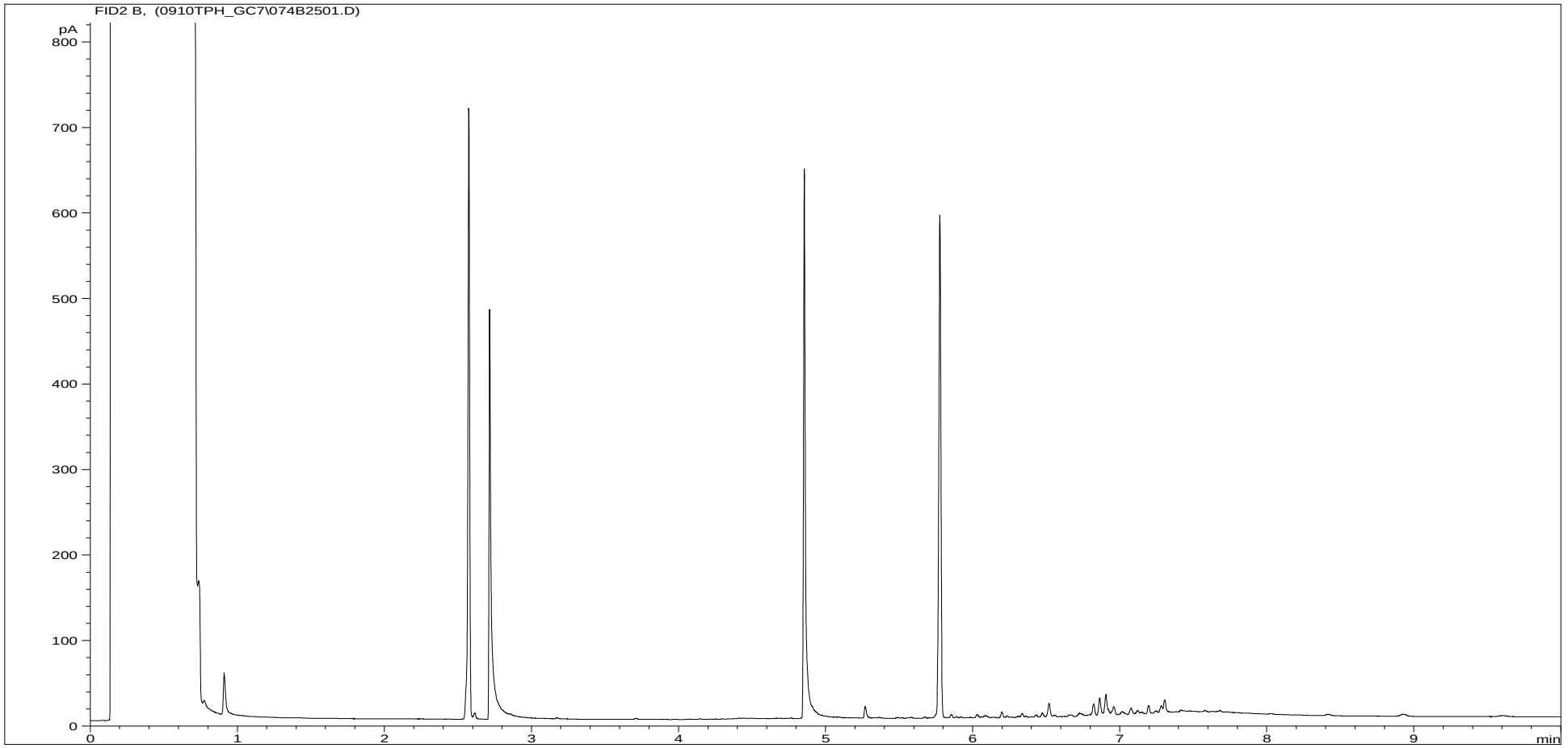


Sample ID:	CL0826257	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP17 ES 1 0.30
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\073B2301.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL0826258	**Job Number:**	S08_5713M
Multiplier:	8	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNFNORACE.M	**Client Sample Ref:**	TP17 ES 3 1.20
Acquisition Date/Time:	10-Sep-08		
Datafile:	D:\TES\DATA\Y2008\0910TPH_GC7\074B2501.D		

Where individual results are flagged see report notes for for status.

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Report Notes

Soil/Solid analysis specific:

S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15^{o}C

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
***** denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
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 you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

TEST REPORT
WATER SAMPLE ANALYSIS

1252

TES Report No. EXR/088900 (Ver. 1)

Soil Mechanics
Unit 15
Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

Site: Hirwaun Industrial Estate

The 5 samples described in this report were logged for analysis by TES Bretby on 14-Oct-2008.
The analysis was completed by: 30-Oct-2008

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of PAH (MS-SIM) (10) Results (Pages 5 to 9)
GC-FID Chromatograms (Pages 10 to 14)
Table of Report Notes (Page 15)

On behalf of
TES Bretby :
John Elstub

Project Co-ordinator

Date of Issue: 30-Oct-2008

Tests marked '^' have been subcontracted to another laboratory.

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

Units :			uS/cm	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	WSLM2	KONENS	ISEF	CPWATVAR	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	CPWATVAR	ICPMSW	ICPMSW	ICPMSW
Method Reporting Limits :			100	1	0.1	3.0	0.001	0.001	0.0001	0.001	0.001	0.002	0.001	0.01	0.0001	0.001	0.001	
UKAS Accredited :		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
TES ID Number EXT	**Client Sample Description**	**pH units**	**Conductivity uS/cm @ 25C**	**Chloride as Cl w**	**Fluoride as F**	**Total Sulphur as SO4 (Total) 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)**	**Arsenic as As (Dissolved)**	**Boron as B (Dissolved) a**	**Mercury as Hg (Dissolved)**	**Selenium as Se (Dissolved)**	**Molybdenum as Mo (Dissolved)**	
0835481	BH101 W	6.6	670	27	0.3	21.0	0.015	0.005	0.0003	0.006	0.002	0.095	0.014	0.08	0.0001	0.004	0.004	
0835482	BH103 W	7.2	362	7	0.2	22.0	0.005	0.004	0.0002	0.004	0.003	0.066	0.002	0.03	<0.0001	0.001	0.001	
0835483	BH105 W	7.2	377	7	0.2	16.0	0.003	0.004	0.0001	0.003	0.003	0.067	0.003	0.04	<0.0001	0.001	0.001	
0835484	BH106 W	6.8	281	9	0.2	11.0	0.004	0.002	0.0002	0.002	0.001	0.037	<0.001	0.03	<0.0001	<0.001	<0.001	
0835485	BH109 W	7.5	651	25	4.2	32.0	0.002	0.003	<0.0001	<0.001	<0.001	0.019	0.003	0.04	<0.0001	<0.001	0.005	

TES Bretby

PO Box 100, Bretby Business Park,

Burton-on-Trent, Staffordshire, DE15 0XD

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Fax +44 (0) 1283 554422

Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Water Sample Analysis

Date Printed	30-Oct-08
Report Number	**EXR/088900**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.

Units :		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		
Method Codes :		ICPMSW	KONENS	KONENS	ISESW24	WSLM11	WSLM13	ICPWATVAR	PAHSWSIM	SFAPI	SFAPI	SFAPI	WSLM20	SFAPI	TPHFID		
Method Reporting Limits :		0.001	0.01	0.01	0.2	5	0.1	0.01	0.01	0.1	0.02	0.02	2	0.05	0.01		
UKAS Accredited :		yes	yes	yes	yes	yes	yes	no	no	no	no	no	no	no	no		
TES ID Number EX/	**Client Sample Description**	**Antimony as Sb (Dissolved)**	**Ammoniacal Nitrogen as N**	**Chromium VI as Cr**	**Sulphide (Free) as S**	**Chemical Oxygen Demand**	**Total Organic Carbon**	**Barium as Ba (Dissolved) a**	**PAH MS-SIM (16)**	**Thiocyanate as SCN**	**Cyanide (Free) as CN**	**Cyanide (Total) as CN**	**Biochemical Oxygen Demand**	**Phenol Index as C6H5OH**	**TPH GC (0.01)**		
0835481	BH101 W	<0.001	11.5	<0.01	0.5	80	24	0.30	Req	<0.20	<0.02	<0.02	13	<0.05	0.04		
0835482	BH103 W	<0.001	1.0	<0.01	<0.2	17	4.2	0.28	Req	<0.20	<0.02	<0.02	<2.0	<0.05	0.02		
0835483	BH105 W	<0.001	0.5	<0.01	<0.2	34	4.7	0.26	Req	<0.20	<0.02	<0.02	<2.0	<0.05	0.03		
0835484	BH106 W	<0.001	0.19	<0.01	<0.2	10	4.0	0.18	Req	<0.20	<0.02	<0.02	2.5	<0.05	<0.01		
0835485	BH109 W	<0.001	0.5	<0.01	1.5	25	8.7	0.18	Req	<0.20	<0.02	<0.02	<2.0	<0.05	0.14		

TES Bretby

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Water Sample Analysis

Date Printed	30-Oct-08
Report Number	**EXR/088900**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.

Units :		ug/l	ug/l	ug/l	ug/l												
Method Codes :		BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA												
Method Reporting Limits :		5	5	5	10												
UKAS Accredited :		no	no	no	no												
TES ID Number EXR	**Client Sample Description**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**												
0835481	BH101 W	<5	<5	<5	<10												
0835482	BH103 W	<5	<5	<5	<10												
0835483	BH105 W	<5	<5	<5	<10												
0835484	BH106 W	<5	<5	<5	<10												
0835485	BH109 W	9	<5	<5	<10												

TES Bretby

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Client Name **Soil Mechanics**

Contact Mr H Woodroffe

Hirwaun Industrial Estate

Water Sample Analysis

Date Printed	30-Oct-08
Report Number	**EXR/088900**
Table Number	**1**

TES Bretby

Where individual results are flagged see report notes for for status.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Soil Mechanics: Hirwaun Industrial Estate		
Sample Details:	BH101 W	**Job Number:**	W08_8900
LIMS ID Number:	EX0835481	**Date Booked in:**	14-Oct-08
QC Batch Number:	923	**Date Extracted:**	23-Oct-08
Quantitation File:	Initial Calibration	**Date Analysed:**	24-Oct-08
Directory:	023PAH_MS14\	**Matrix:**	Water
Dilution:	2.5	**Ext Method:**	Sep. Funnel

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration ug/l	% Fit
Naphthalene	91-20-3	3.48	0.065	82
Acenaphthylene	208-96-8	-	< 0.010	-
Acenaphthene	83-32-9	4.66	0.012	51
Fluorene	86-73-7	-	< 0.010	-
Phenanthrene	85-01-8	5.90	0.035	86
Anthracene	120-12-7	5.95	0.010	84
Fluoranthene	206-44-0	7.27	0.071	99
Pyrene	129-00-0	7.55	0.061	99
Benzo[a]anthracene	56-55-3	9.23	0.032	97
Chrysene	218-01-9	9.29	0.032	97
Benzo[b]fluoranthene	205-99-2	10.78	0.020	M
Benzo[k]fluoranthene	207-08-9	10.80	0.024	M
Benzo[a]pyrene	50-32-8	11.20	0.021	86
Indeno[1,2,3-cd]pyrene	193-39-5	12.59	0.010	98
Dibenzo[a,h]anthracene	53-70-3	-	< 0.010	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.010	-
Total (USEPA16) PAHs	-	-	< 0.433	-

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	76
Acenaphthene-d10	72
Phenanthrene-d10	69
Chrysene-d12	69
Perylene-d12	69

Surrogates	% Rec
Nitrobenzene-d5	N.D
2-Fluorobiphenyl	57
Terphenyl-d14	98

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer an	Soil Mechanics: Hirwaun Industrial Estate		
Sample Deta	BH103 W	**Job Number:**	W08_8900
LIMS ID Num	EX0835482	**Date Booked in:**	14-Oct-08
QC Batch Nu	923	**Date Extracted:**	23-Oct-08
Quantitation	Initial Calibration	**Date Analysed:**	24-Oct-08
Directory:	023PAH_MS14\	**Matrix:**	Water
Dilution:	2.5	**Ext Method:**	Sep. Funnel

UKAS accredited?: No

Target Compou	CAS #	R.T. (min)	Concentration ug/l	% Fit
Naphthalene	91-20-3	3.48	0.010	95
Acenaphthyle	208-96-8	-	< 0.010	-
Acenaphthene	83-32-9	-	< 0.010	-
Fluorene	86-73-7	-	< 0.010	-
Phenanthrene	85-01-8	5.90	0.017	95
Anthracene	120-12-7	-	< 0.010	-
Fluoranthene	206-44-0	7.27	0.021	96
Pyrene	129-00-0	7.55	0.018	97
Benzo[a]anthr	56-55-3	-	< 0.010	-
Chrysene	218-01-9	9.29	0.011	98
Benzo[b]fluora	205-99-2	-	< 0.010	-
Benzo[k]fluora	207-08-9	-	< 0.010	-
Benzo[a]pyren	50-32-8	-	< 0.010	-
Indeno[1,2,3-c	193-39-5	-	< 0.010	-
Dibenzo[a,h]a	53-70-3	-	< 0.010	-
Benzo[g,h,i]pe	191-24-2	-	< 0.010	-
Total (USEPA	-	-	< 0.187	-

"M" denotes that % fit has been manually interpreted

Internal Stan	% Area
1,4-Dichlorobe	NA
Naphthalene-d	70
Acenaphthene	65
Phenanthrene	62
Chrysene-d12	62
Perylene-d12	61

Surrogates	% Rec
Nitrobenzene-d5	N.D
2-Fluorobiphenyl	68
Terphenyl-d14	109

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Where individual results are flagged see report notes for for status.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Soil Mechanics: Hirwaun Industrial Estate		
Sample Details:	BH105 W	**Job Number:**	W08_8900
LIMS ID Number:	EX0835483	**Date Booked in:**	14-Oct-08
QC Batch Number:	923	**Date Extracted:**	23-Oct-08
Quantitation File:	Initial Calibration	**Date Analysed:**	24-Oct-08
Directory:	023PAH_MS14\	**Matrix:**	Water
Dilution:	2.5	**Ext Method:**	Sep. Funnel

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration ug/l	% Fit
Naphthalene	91-20-3	3.48	0.012	96
Acenaphthylene	208-96-8	-	< 0.010	-
Acenaphthene	83-32-9	-	< 0.010	-
Fluorene	86-73-7	-	< 0.010	-
Phenanthrene	85-01-8	5.91	0.011	97
Anthracene	120-12-7	-	< 0.010	-
Fluoranthene	206-44-0	-	< 0.010	-
Pyrene	129-00-0	-	< 0.010	-
Benzo[a]anthracene	56-55-3	-	< 0.010	-
Chrysene	218-01-9	-	< 0.010	-
Benzo[b]fluoranthene	205-99-2	-	< 0.010	-
Benzo[k]fluoranthene	207-08-9	-	< 0.010	-
Benzo[a]pyrene	50-32-8	-	< 0.010	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.010	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.010	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.010	-
Total (USEPA16) PAHs	-	-	< 0.163	-

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	82
Acenaphthene-d10	79
Phenanthrene-d10	76
Chrysene-d12	75
Perylene-d12	72

Surrogates	% Rec
Nitrobenzene-d5	N.D
2-Fluorobiphenyl	63
Terphenyl-d14	104

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Soil Mechanics: Hirwaun Industrial Estate		
Sample Details:	BH106 W	**Job Number:**	W08_8900
LIMS ID Number:	EX0835484	**Date Booked in:**	14-Oct-08
QC Batch Number:	923	**Date Extracted:**	23-Oct-08
Quantitation File:	Initial Calibration	**Date Analysed:**	24-Oct-08
Directory:	023PAH_MS14\	**Matrix:**	Water
Dilution:	2.5	**Ext Method:**	Sep. Funnel

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration ug/l	% Fit
Naphthalene	91-20-3	-	< 0.010	-
Acenaphthylene	208-96-8	-	< 0.010	-
Acenaphthene	83-32-9	-	< 0.010	-
Fluorene	86-73-7	-	< 0.010	-
Phenanthrene	85-01-8	-	< 0.010	-
Anthracene	120-12-7	-	< 0.010	-
Fluoranthene	206-44-0	-	< 0.010	-
Pyrene	129-00-0	-	< 0.010	-
Benzo[a]anthracene	56-55-3	-	< 0.010	-
Chrysene	218-01-9	-	< 0.010	-
Benzo[b]fluoranthene	205-99-2	-	< 0.010	-
Benzo[k]fluoranthene	207-08-9	-	< 0.010	-
Benzo[a]pyrene	50-32-8	-	< 0.010	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.010	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.010	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.010	-
Total (USEPA16) PAHs	-	-	< 0.160	-

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	84
Acenaphthene-d10	84
Phenanthrene-d10	83
Chrysene-d12	83
Perylene-d12	79

Surrogates	% Rec
Nitrobenzene-d5	N.D
2-Fluorobiphenyl	48
Terphenyl-d14	86

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Soil Mechanics: Hirwaun Industrial Estate		
Sample Details:	BH109 W	**Job Number:**	W08_8900
LIMS ID Number:	EX0835485	**Date Booked in:**	14-Oct-08
QC Batch Number:	923	**Date Extracted:**	23-Oct-08
Quantitation File:	Initial Calibration	**Date Analysed:**	24-Oct-08
Directory:	023PAH_MS14\	**Matrix:**	Water
Dilution:	2.5	**Ext Method:**	Sep. Funnel

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration ug/l	% Fit
Naphthalene	91-20-3	3.48	1.219	98
Acenaphthylene	208-96-8	4.54	0.021	74
Acenaphthene	83-32-9	4.66	0.755	98
Fluorene	86-73-7	5.05	0.478	95
Phenanthrene	85-01-8	5.90	0.104	82
Anthracene	120-12-7	5.95	0.365	M
Fluoranthene	206-44-0	7.26	0.327	100
Pyrene	129-00-0	7.55	0.204	95
Benzo[a]anthracene	56-55-3	9.23	0.026	85
Chrysene	218-01-9	9.29	0.027	90
Benzo[b]fluoranthene	205-99-2	-	< 0.010	-
Benzo[k]fluoranthene	207-08-9	-	< 0.010	-
Benzo[a]pyrene	50-32-8	-	< 0.010	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.010	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.010	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.010	-
Total (USEPA16) PAHs	-	-	< 3.586	-

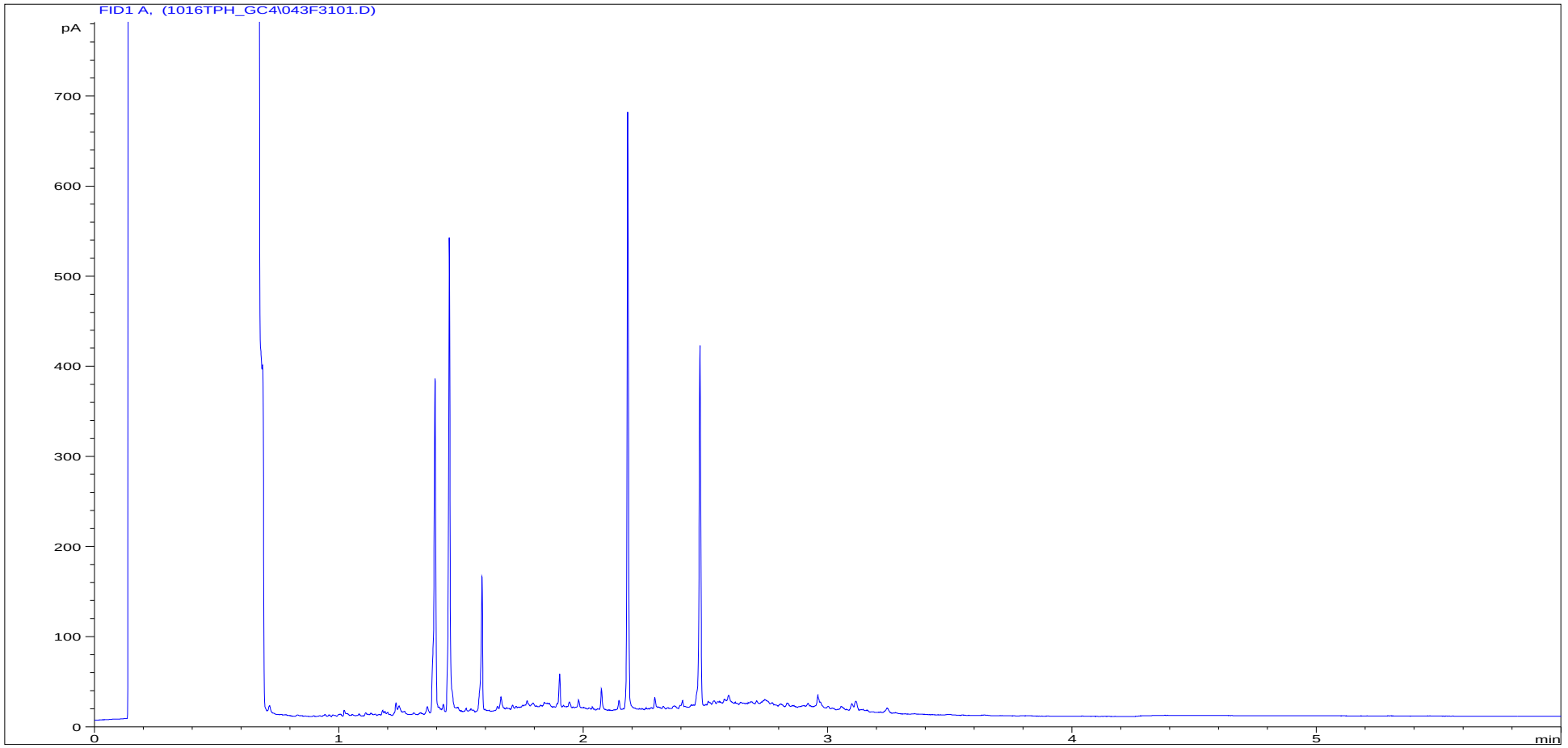
"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	74
Acenaphthene-d10	70
Phenanthrene-d10	68
Chrysene-d12	66
Perylene-d12	62

Surrogates	% Rec
Nitrobenzene-d5	N.D
2-Fluorobiphenyl	77
Terphenyl-d14	104

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

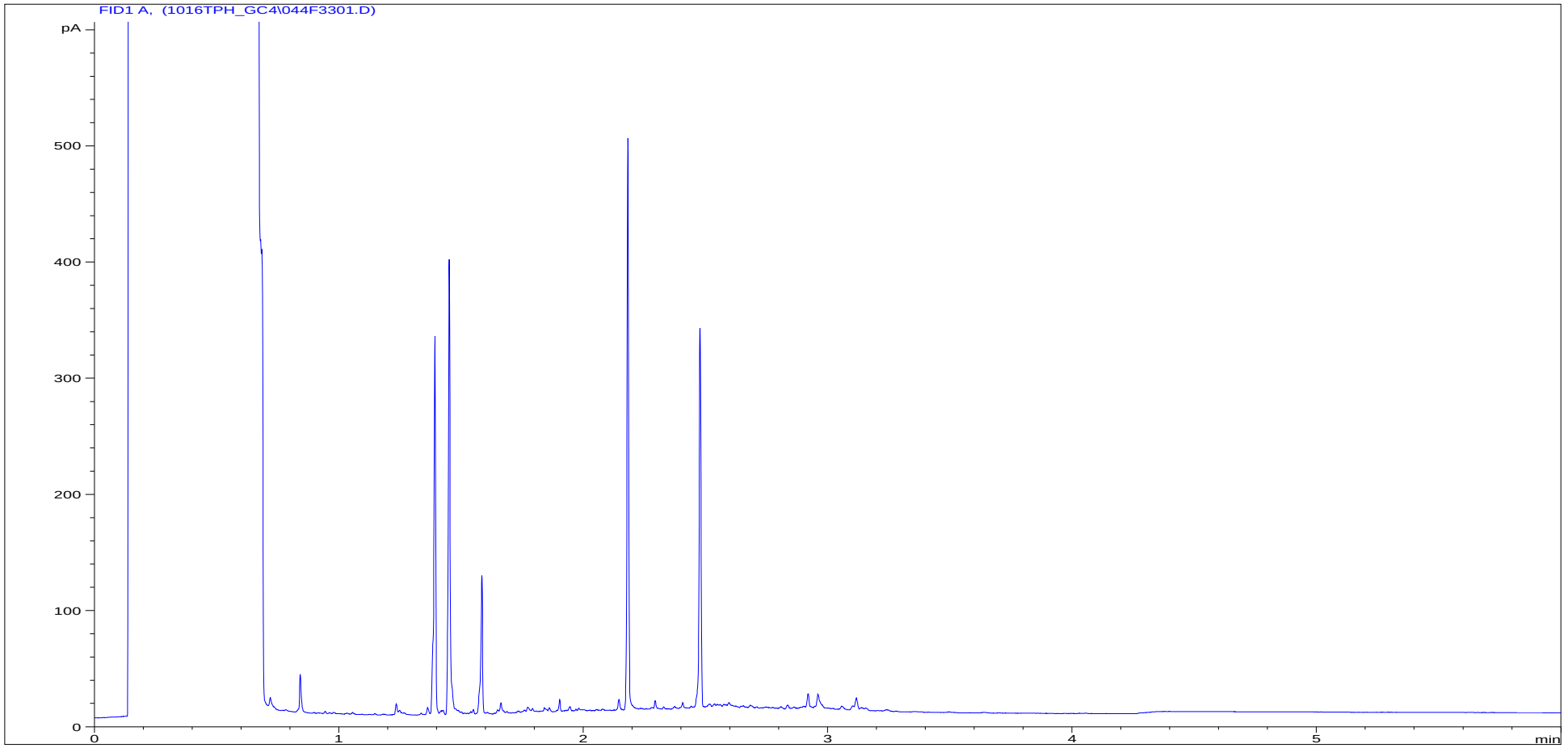
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX0835481	**Job Number:**	W08_8900
Multiplier:	0.005	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH101 W
Acquisition Date/Time:	16-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1016TPH_GC4\043F3101.D		

Where individual results are flagged see report notes for for status.

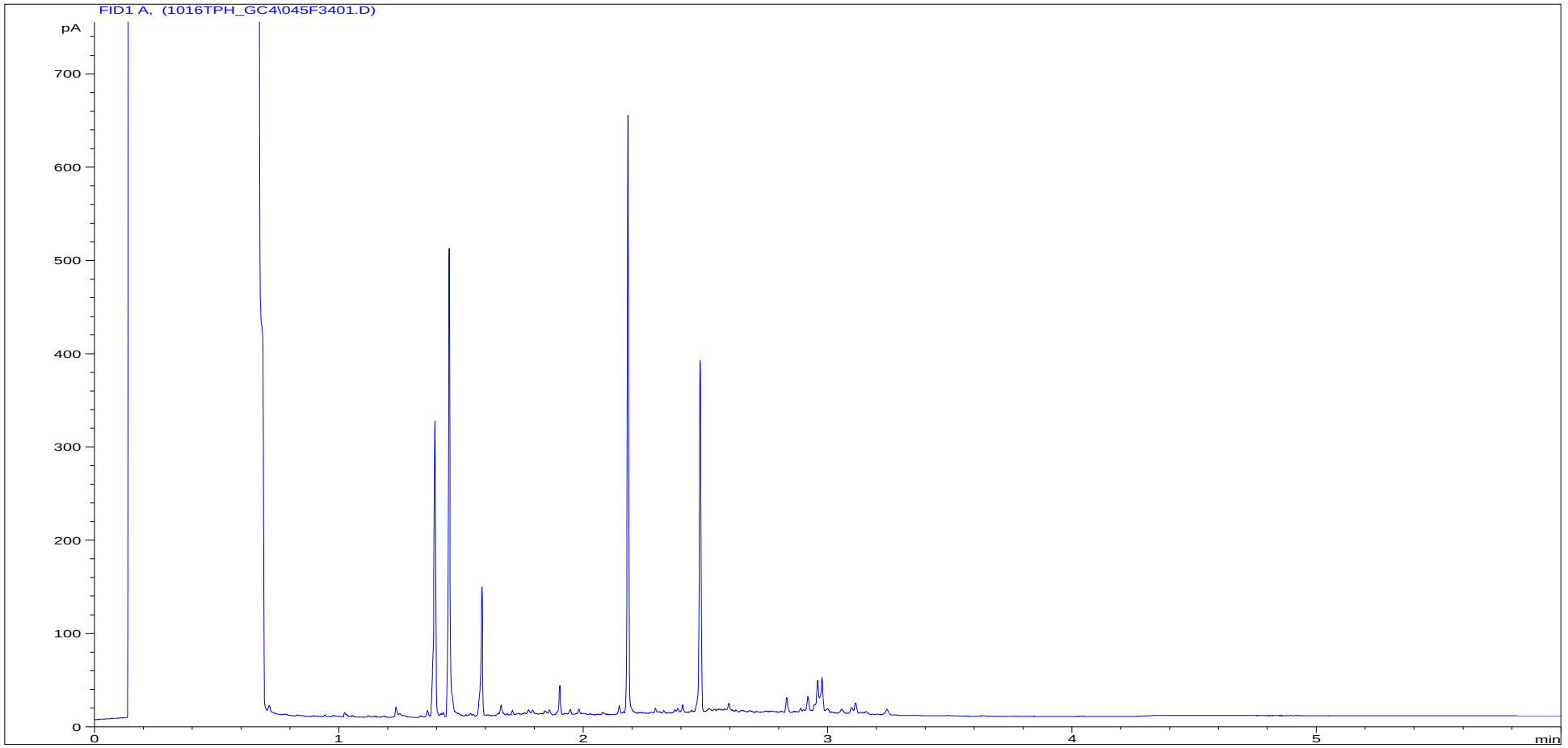
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX0835482	**Job Number:**	W08_8900
Multiplier:	0.005	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH103 W
Acquisition Date/Time:	16-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1016TPH_GC4\044F3301.D		

Where individual results are flagged see report notes for for status.

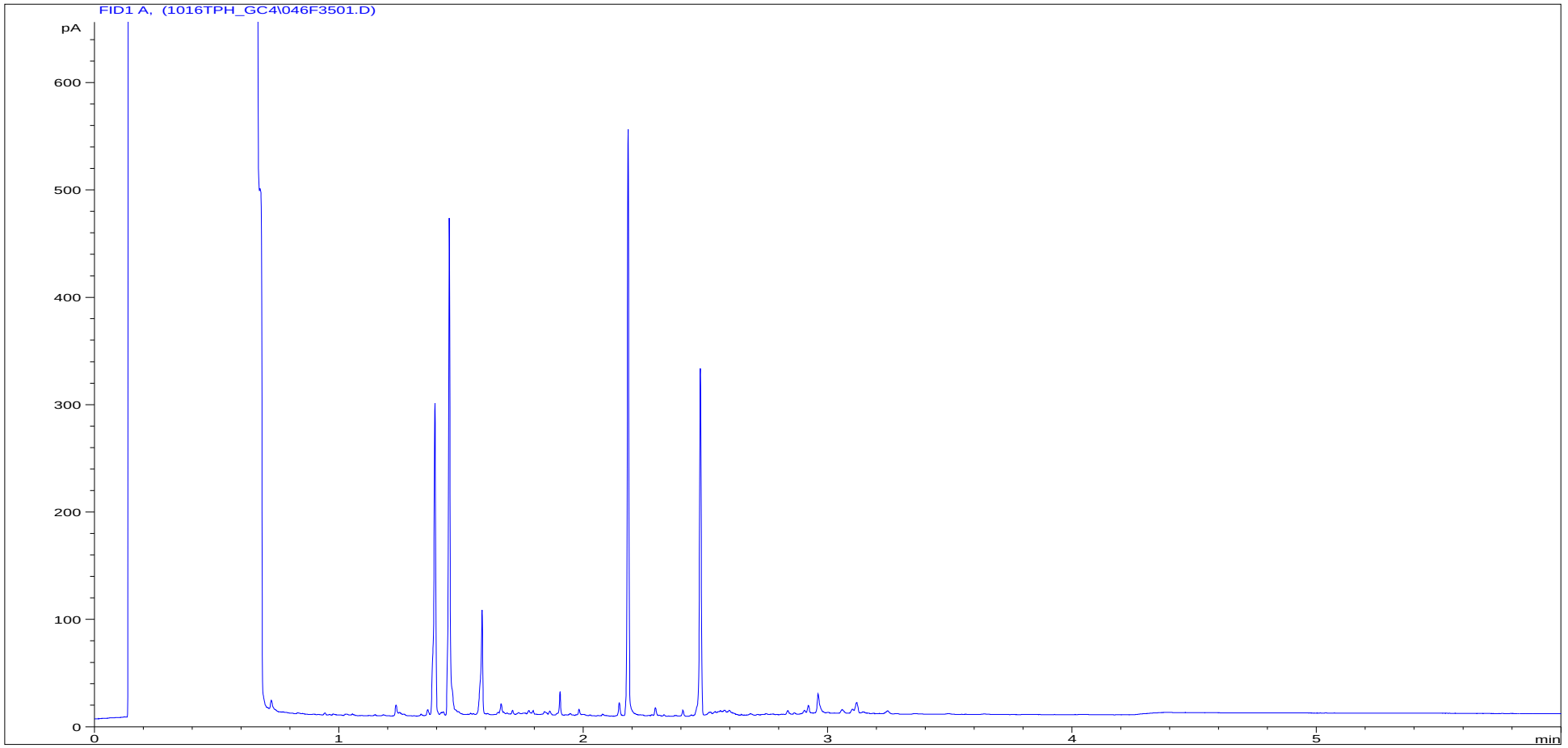
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX0835483	**Job Number:**	W08_8900
Multiplier:	0.005	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH105 W
Acquisition Date/Time:	16-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1016TPH_GC4\045F3401.D		

Where individual results are flagged see report notes for for status.

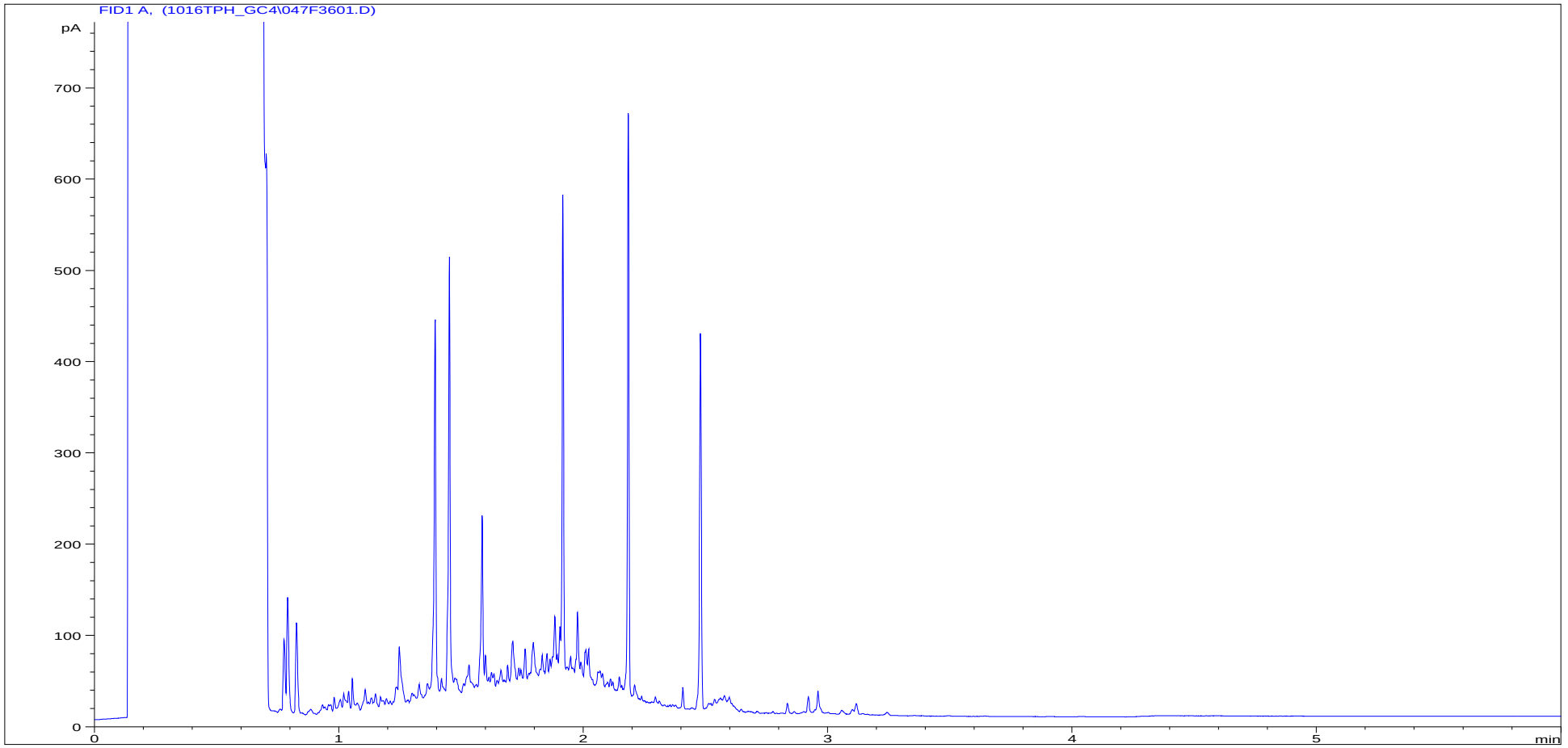
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX0835484	**Job Number:**	W08_8900
Multiplier:	0.005	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH106 W
Acquisition Date/Time:	16-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1016TPH_GC4\046F3501.D		

Where individual results are flagged see report notes for for status.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	EX0835485	**Job Number:**	W08_8900
Multiplier:	0.005	**Client:**	Soil Mechanics
Dilution:	1	**Site:**	Hirwaun Industrial Estate
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH109 W
Acquisition Date/Time:	16-Oct-08		
Datafile:	D:\TES\DATA\Y2008\1016TPH_GC4\047F3601.D		

Where individual results are flagged see report notes for for status.

Report Notes

Soil/Solid analysis specific:
Results expressed as mg/kg on an air dried basis unless stated otherwise
S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15^oC

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
***** denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
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 you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

ENCLOSURE E
PHOTOGRAPHS

Rotary Cores	Plate E1 to E5
Trial Pits	Plate E6 to E23

Borehole Core Photographs

Soil Mechanics





Notes	Project	Hirwaun Industrial Estate	Plate
	Project No	H8076	E1
	Carried out for	Enviroparks Ltd	

Borehole Core Photographs

Soil Mechanics



Notes	Project	Hirwaun Industrial Estate	Plate
	Project No	H8076	E2
	Carried out for	Enviroparks Ltd	

Borehole Core Photographs

Soil Mechanics





Notes	Project	Hirwaun Industrial Estate	Plate
	Project No	H8076	E3
	Carried out for	Enviroparks Ltd	

Borehole Core Photographs

Soil Mechanics





Notes	Project	Hirwaun Industrial Estate	Plate
	Project No	H8076	E4
	Carried out for	Enviroparks Ltd	

Borehole Core Photographs

Soil Mechanics



Notes	Project	Hirwaun Industrial Estate	Plate
	Project No	H8076	E5
	Carried out for	Enviroparks Ltd	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Industrial Estate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E6

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E7**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E8**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E9**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E10

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E11

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E12**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics



Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E13**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:

Project	Hirwaun Indusrial Eastate
Project No.	H8076
Carried out for	Pell Frischmann

Figure
E14

Trial Pit Photographs

Soil Mechanics





Notes:

Project	Hirwaun Indusrial Eastate
Project No.	H8076
Carried out for	Pell Frischmann

Figure
E15

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E16**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E17**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E18**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E19**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E20

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E21

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E22**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E23**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Industrial Estate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E6

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E7**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E8**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E9**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E10

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E11

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E12**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics



Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E13**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:

Project	Hirwaun Indusrial Eastate
Project No.	H8076
Carried out for	Pell Frischmann

Figure
E14

Trial Pit Photographs

Soil Mechanics





Notes:

Project	Hirwaun Indusrial Eastate
Project No.	H8076
Carried out for	Pell Frischmann

Figure
E15

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E16**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E18

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E19**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E20

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project	Hirwaun Indusrial Eastate
	Project No.	H8076
	Carried out for	Pell Frischmann

Figure
E21

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E22**
	Carried out for Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:			Figure
	Project	Hirwaun Indusrial Eastate	**E17**
	Project No.	H8076	
	Carried out for	Pell Frischmann	

Trial Pit Photographs

Soil Mechanics





Notes:		
	Project Hirwaun Indusrial Eastate	**Figure**
	Project No. H8076	**E23**
	Carried out for Pell Frischmann	

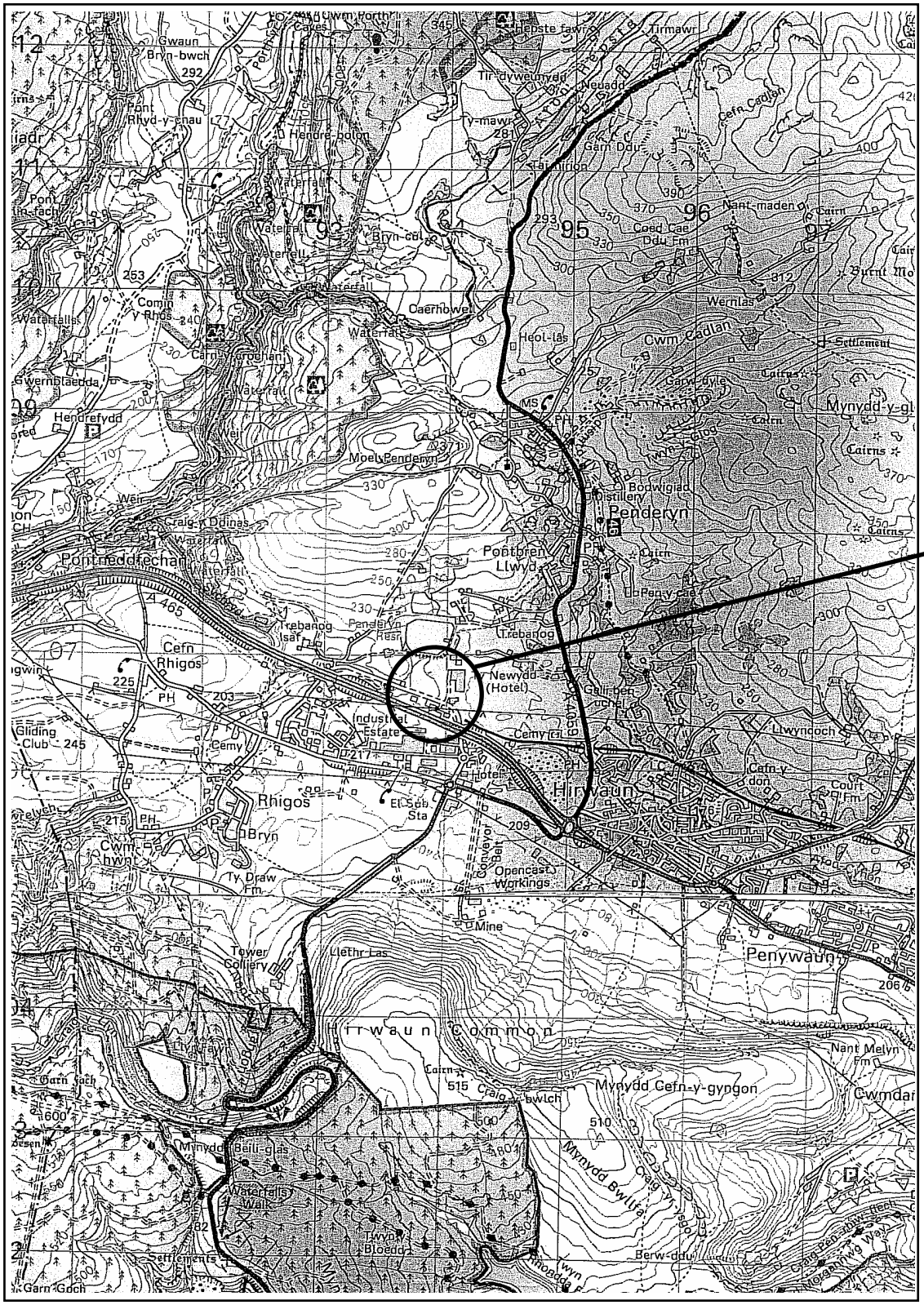
ENCLOSURE F

DRAWINGS

Site Location Plan	1
Exploratory Hole Location Plan	2
Made Ground Depths & Basal Reduced Levels	3
Rock Head Depths and Reduced Levels	4
Groundwater Depths and Reduced Levels	5
Plot of SPT 'N' Value Against Depth	6
Plot of SPT 'N' Value Against Reduced Level	7
Plot of SPT 'N' Value Against Reduced Level – Glacial Deposits	8
Plot of Index Properties Against Depth	9
Plasticity Chart	10

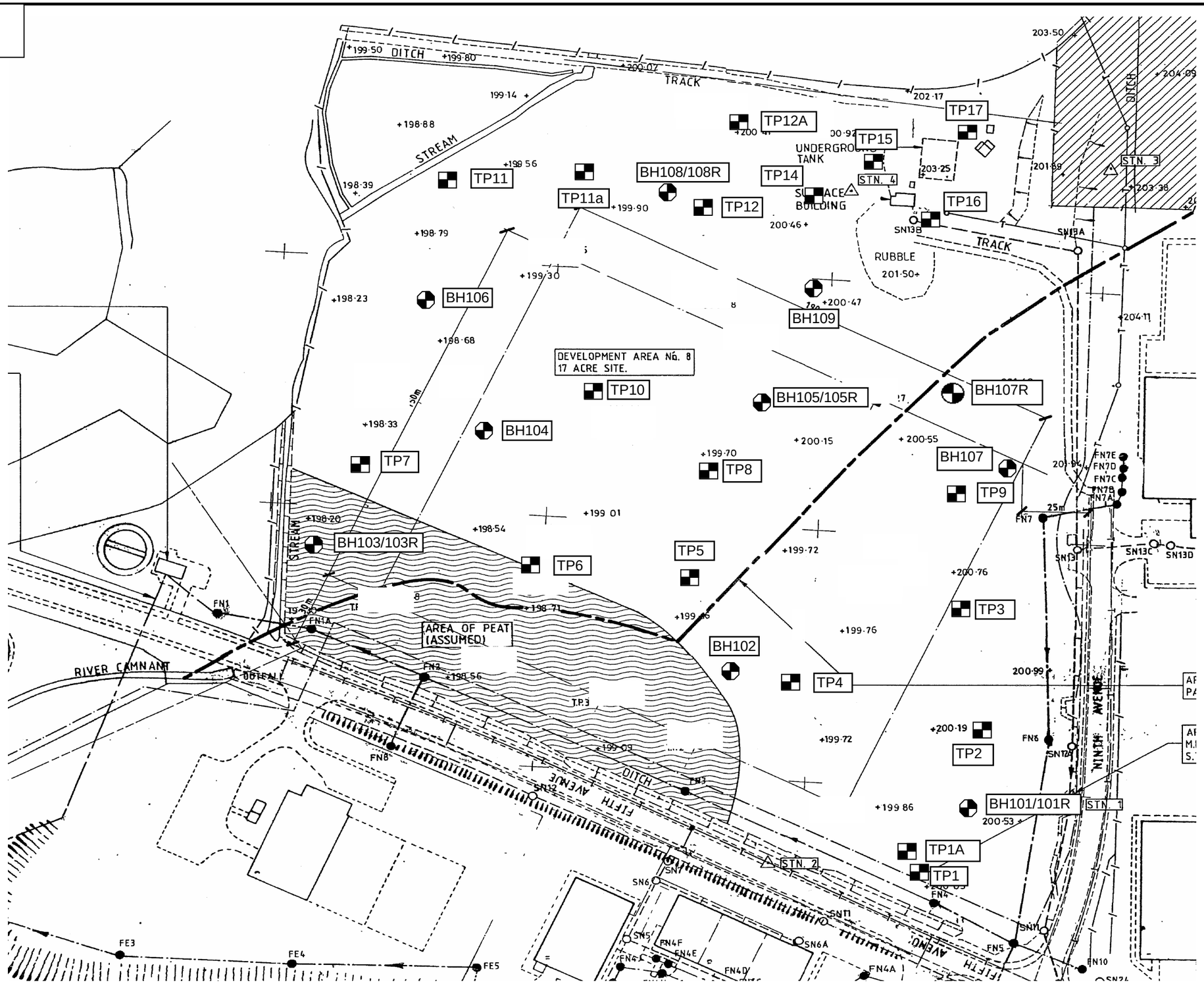
Site Location Plan

Soil Mechanics



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Notes: Scale 1:50 000	**Project** Hirwaun Industrial Estate **Project No.** H8076 **Carried out for** Enviroparks Ltd	**Figure** **F1** Sheet 1 of 1



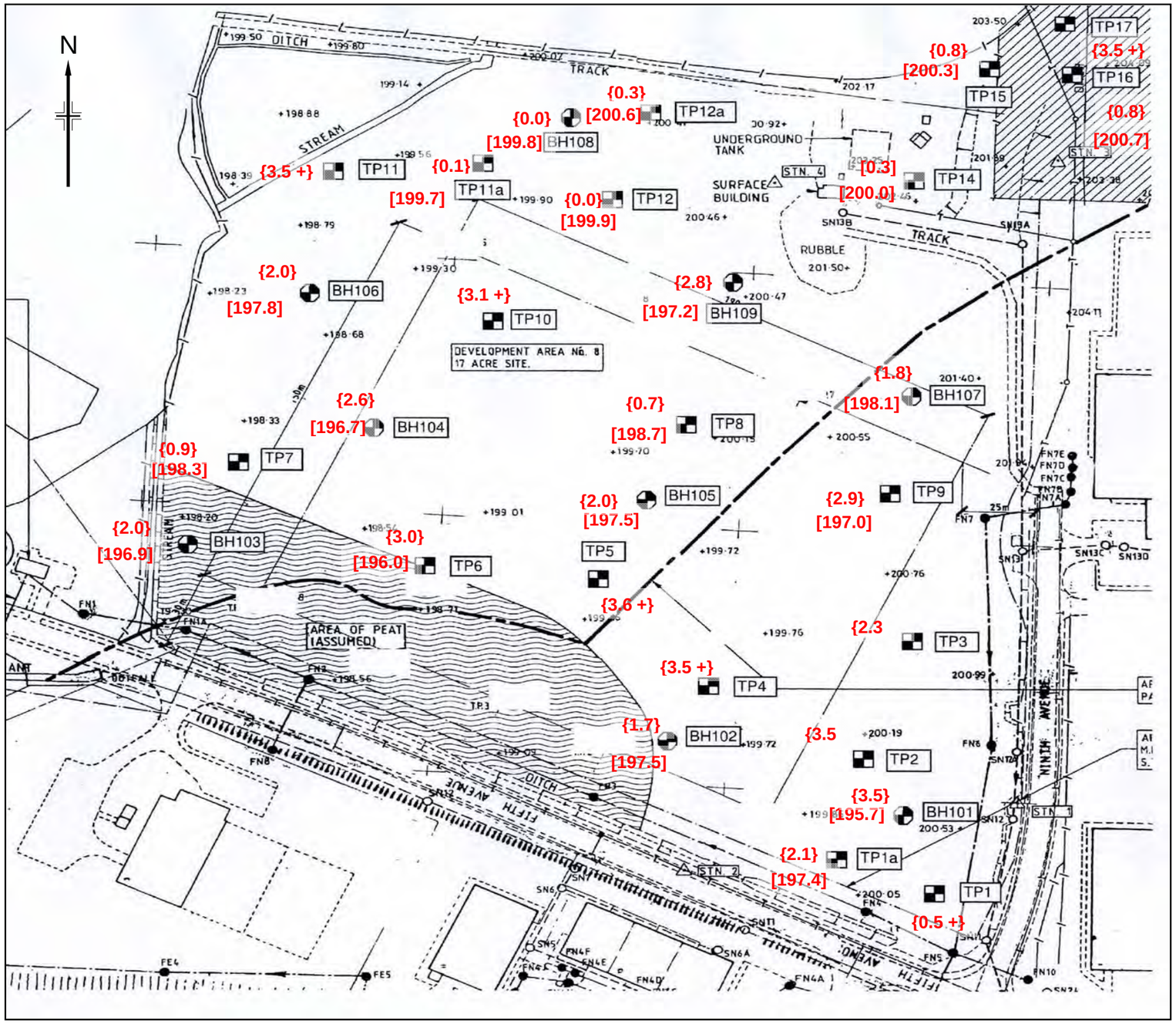
F 2 - EXPLORATORY HOLE LOCATION PLAN Not To Scale

Hirwaun Industrial Estate **H8076**

Soil Mechanics

Made Ground Depths & Basal Reduced levels

Soil Mechanics



Key:

{3.5}	Made Ground Thickness (m)
[195.7]	Made Ground base (m OD)

Notes:

Basal reduced level of Made Ground only shown where base proved.

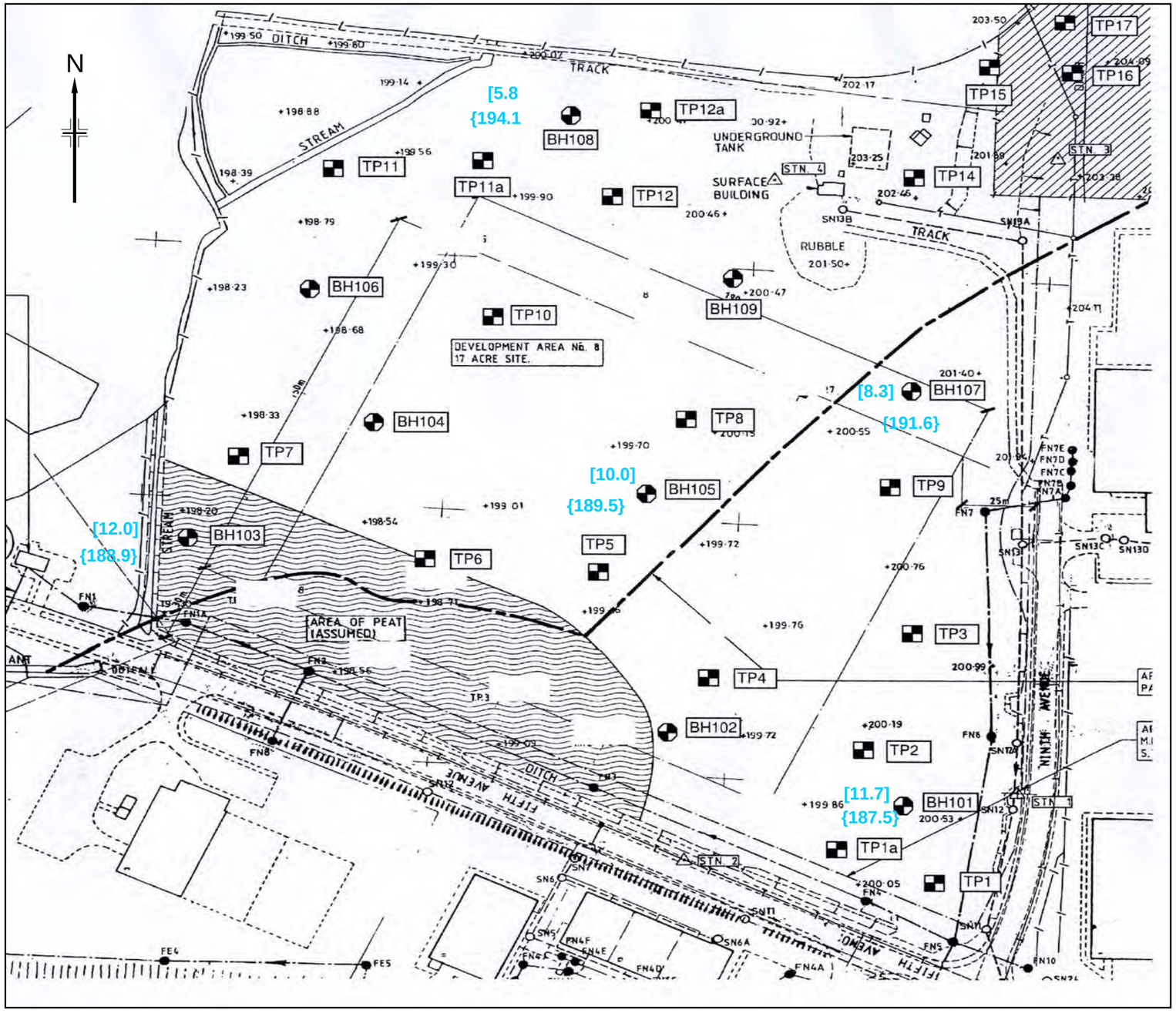
A '+' sign indicates basal depth of Made Ground not proved

Not to scale

Notes Not to scale	**Project** Project No Carried out for	Hirwaun Industrial Estate H8076 Enviroparks Limited	**Drawing** 3 Sheet 1 of 1

Rock Head Depths and Reduced Levels

Soil Mechanics



Key:

[10.0]	Rock head depth (m)
{186.9}	Rock head level (m OD)

Notes:

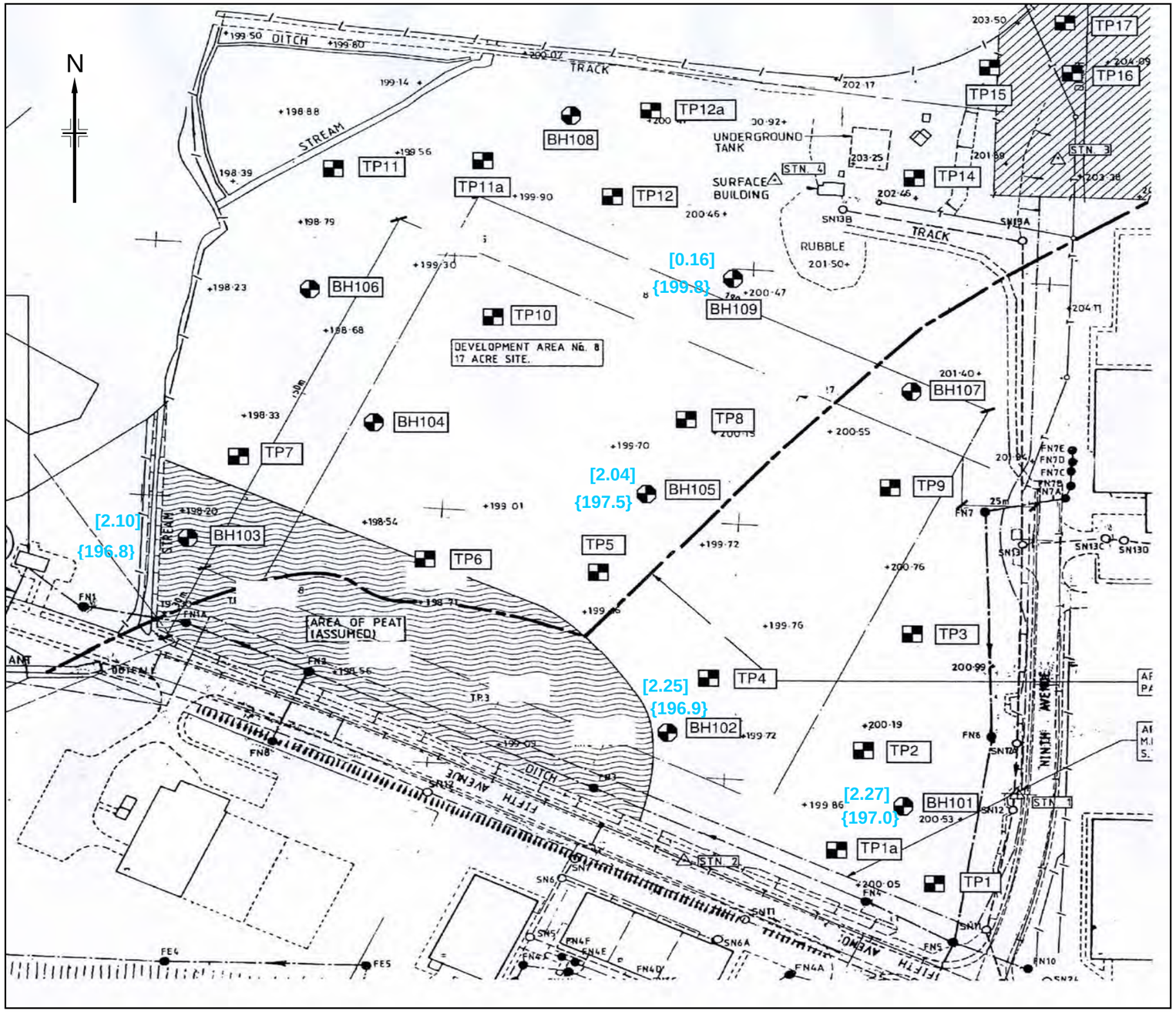
Only holes included above where rock was proved by coring

Not to scale

Notes Not to scale	**Project**	Hirwaun Industrial Estate	**Drawing** **4**
	Project No	H8076	
	Carried out for	Enviroparks Limited	Sheet 1 of 1

Groundwater Depths and Reduced Levels

Soil Mechanics



Key:

[2.01]	Depth to Groundwater (m)
{186.9}	Top of groundwater table reduced levels (m OD)

Notes:

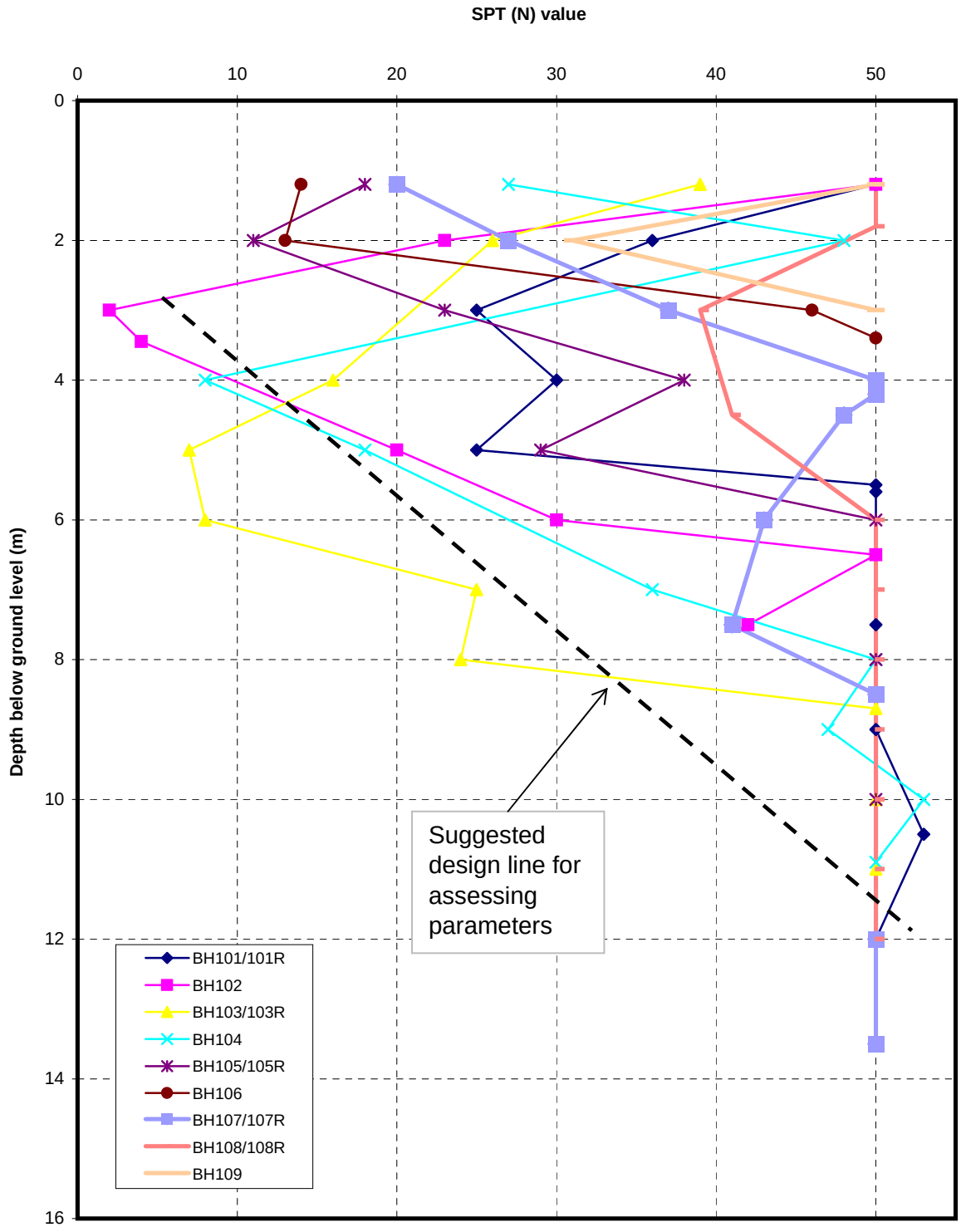
Only holes included where standpipe readings were taken

Not to scale

Notes Not to scale	**Project**	Hirwaun Industrial Estate	**Drawing** **5**
	Project No	H8076	
	Carried out for	Enviroparks Limited	Sheet 1 of 1

Plot of SPT 'N' Value Against Depth

Soil Mechanics



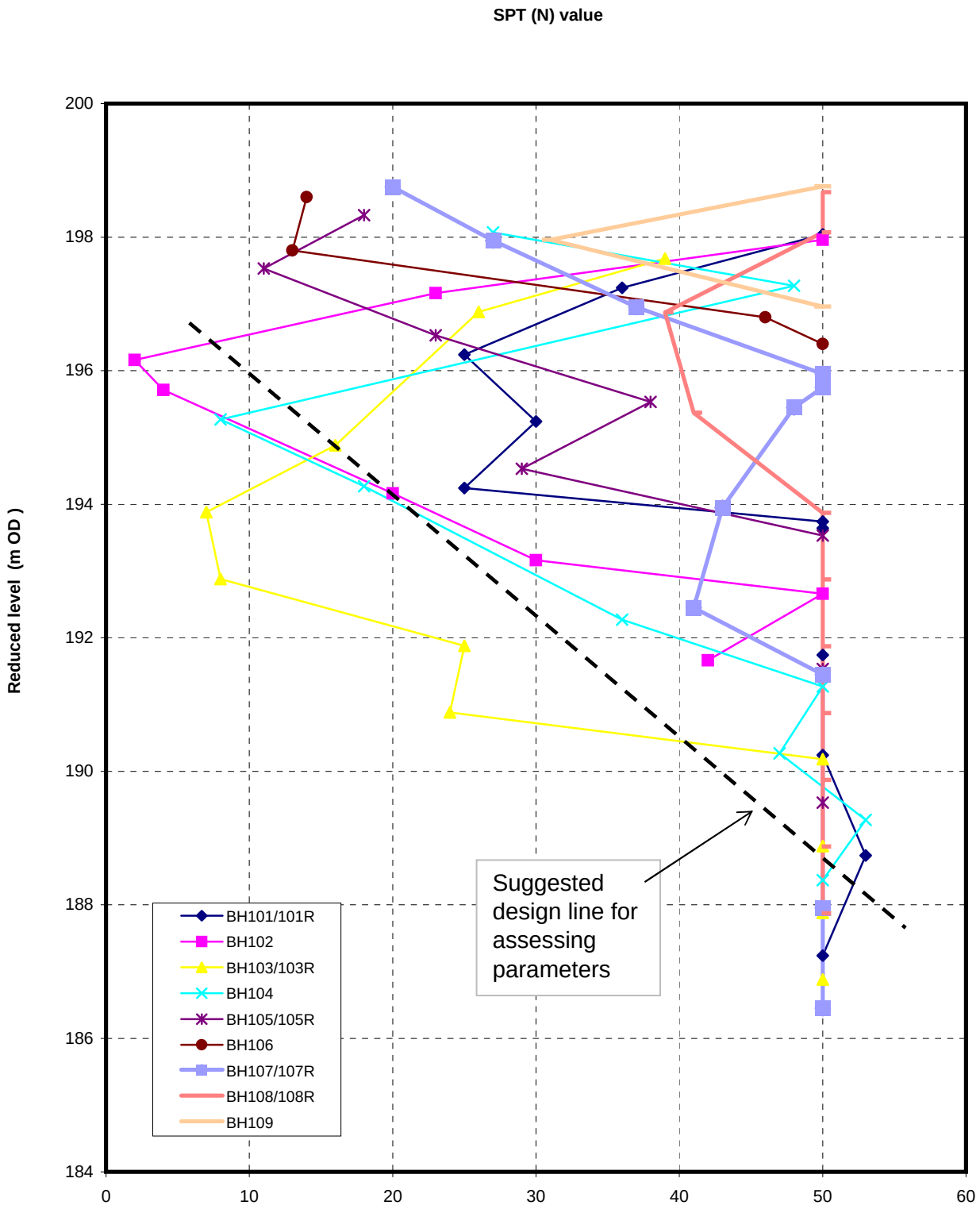
Notes:
In general 'N' values shown as 50 are maximum blow counts not 'N' values. True 'N' value greater than that shown but the high values are almost certainly a consequence of encountering cobbles/ boulders or bedrock and may not representative of the true relative density

Not to scale

Notes Not to scale	**Project** Hirwaun Industrial Estate Project No H8076 Carried out for Enviroparks Limited	**Drawing** 6 Sheet 1 of 1

Plot of SPT 'N' Value Against Reduced Level

Soil Mechanics



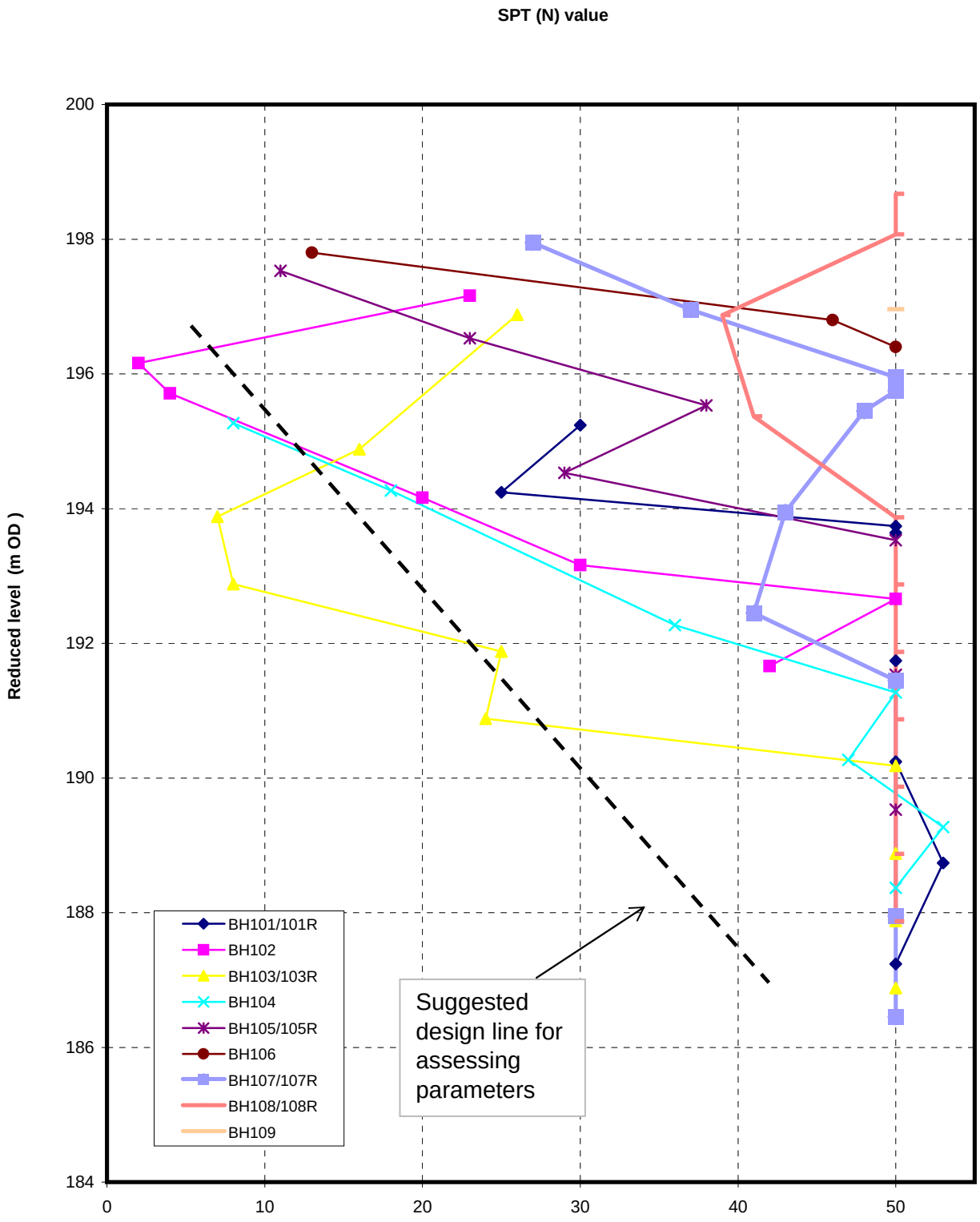
Notes:
In general 'N' values shown as 50 are maximum blow counts not 'N' values. True 'N' value greater than that shown but the high values are almost certainly a consequence of encountering cobbles/ boulders or bedrock and may not representative of the true relative density

Not to scale

Notes Not to scale	**Project** Project No Carried out for	Hirwaun Industrial Estate H8076 Enviroparks Limited	**Drawing** 7 Sheet 1 of 1

Plot of SPT 'N' Value Against Reduced Level - Glacial Deposits

Soil Mechanics



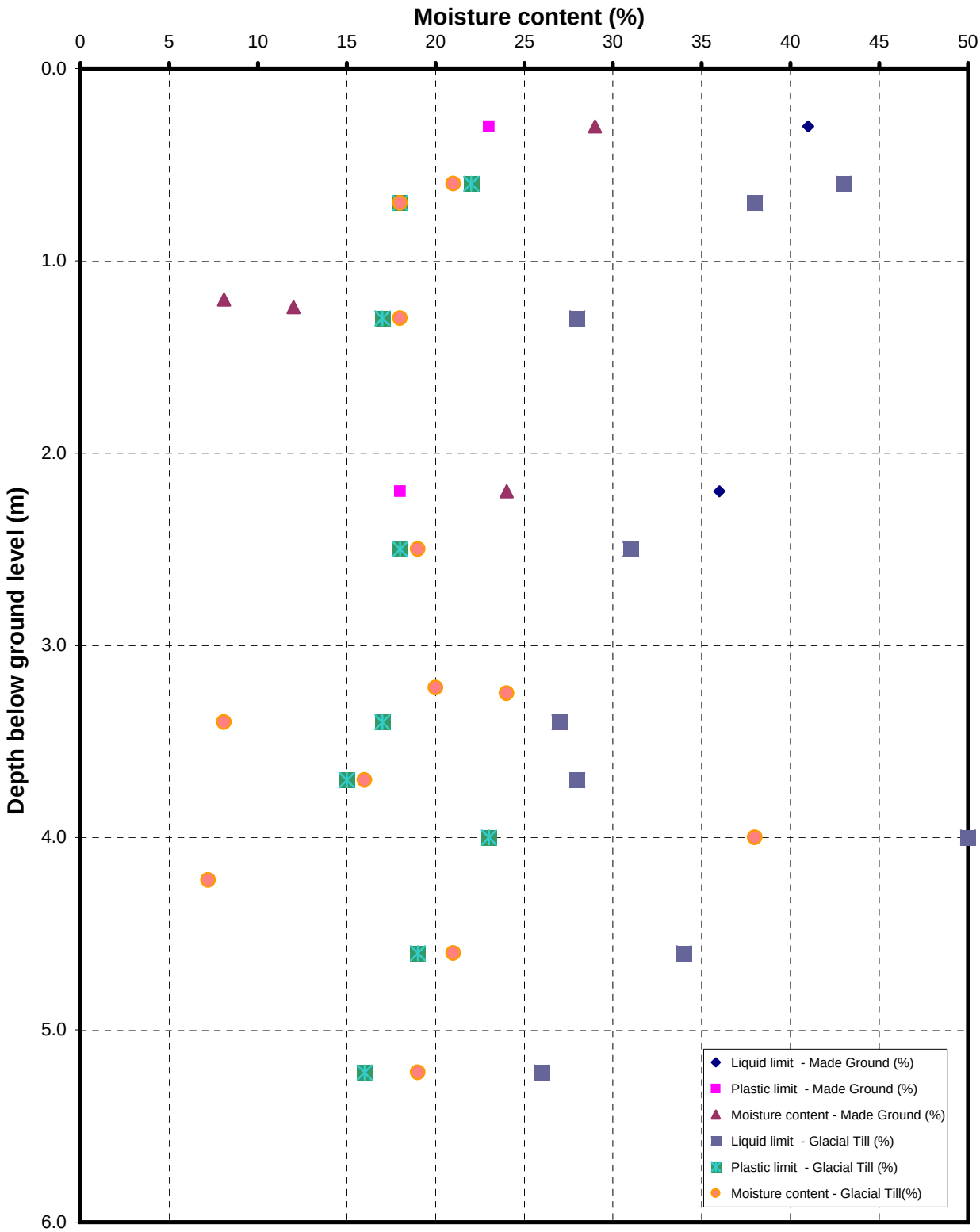
Notes:
In general 'N' values shown as 50 are maximum blow counts not 'N' values. True 'N' value greater than that shown but the high values are almost certainly a consequence of encountering cobbles/ boulders or bedrock and may not representative of the true relative density

Not to scale

Notes Not to scale	**Project** Hirwaun Industrial Estate Project No H8076 Carried out for Enviroparks Limited	**Drawing** 8 Sheet 1 of 1

Plot of Index Properties against Depth

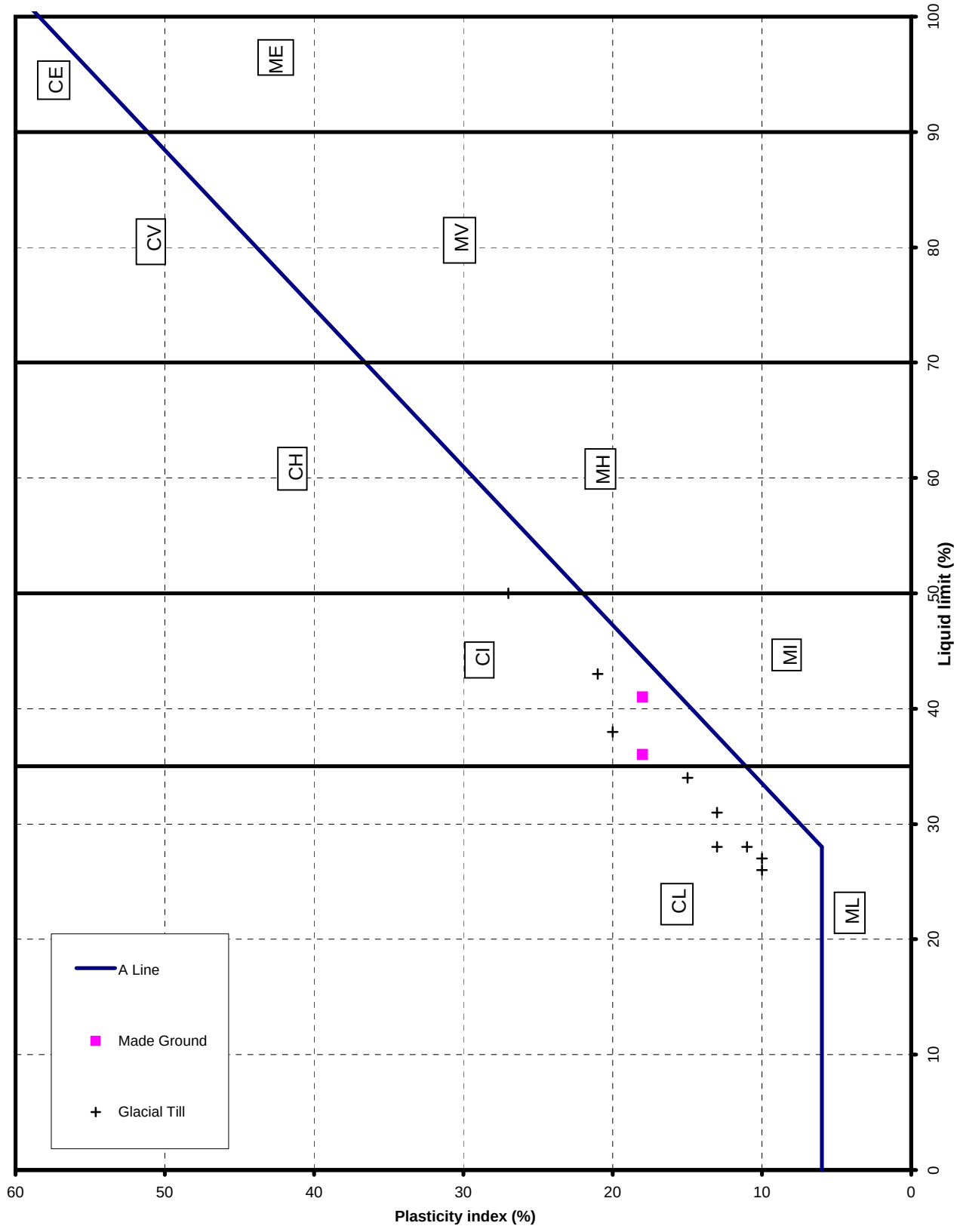
Soil Mechanics



Notes Not to scale	**Project** Hirwaun Industrial Estate Project No H8076 Carried out for Enviroparks Limited	**Drawing** **9** Sheet 1 of 1

Plasticity Chart

Soil Mechanics



Notes Not to scale	**Project** Hirwaun Industrial Estate Project No H8076 Carried out for Enviroparks Limited	**Drawing** **10** Sheet 1 of 1

APPENDIX D

QUANTUM SUPPLEMENTARY GEO-ENVIRONMENTAL REPORT

APPENDIX IV – QUANTUM GEOTECHNICAL REPORT

(REF: G345 ENVIROPARK_LR01, OCTOBER 2013)

Document:	**Supplementary Geotechnical & Geo-Environmental Report**		
Project Title:	**Enviropark, Hirwaun**	Date:	4th October, 2013
Client:	Dawnus Construction Ltd	Our Ref:	G345 Enviropark_LR01

Introduction:

Upon the instruction of the Client, Dawnus Construction Ltd, in conjunction with the Project Consultant Engineers, Waterman, Quantum Geotechnical have been requested to undertake a review of the geotechnical and geo-environmental studies undertaken on Phase 1 of the development site for Enviropark, Hirwaun.

The purpose of this document is to provide added guidance and recommendations on geotechnical and environmental issues in relation to specific issues highlighted as part of the tendering and design process.

The specific issues Quantum were asked to address in this Report relate to:

- Main Foundations
- Ground Bearing Floor Slab
- Extent of Possible Alluvium
- Contamination Hotspot

The Client has provided a site investigation report prepared by Soil Mechanics (reference H8076, January 2009) which provides extensive data over the whole development site. In addition to this, a *Ground Conditions Review* letter report prepared by consultants Pell Frischmann on behalf of Enviropark. The Pell Frischmann letter report reviewed the Soil Mechanics report conclusions and highlighted specific aspects where the ground conditions indicated alternative foundation and infrastructure solutions, or where additional information may be required to allow detailed design to be completed.

In the interests of brevity, data from the earlier Soil Mechanics Report is not included. This report must be read in conjunction with these earlier reports to derive specific data in support of the conclusions drawn by Quantum Geotechnical.

The Notes & Limitations pertinent to Ground Investigation work should be read in conjunction with this Report, which are presented at the end of the Report.

Background

Early discussions in the design process with Waterman highlighted potential areas of concern. Namely; Main foundations; risk of differential settlement; feasibility of a ground bearing slab; any contamination hotspots; and groundwater levels.

The consultants for the Client (Pell Frischmann) pointed out in their letter of July 2011 that the Made Ground, although predominantly granular, contains many inclusions of brick/concrete etc at cobble and boulder size and clayey horizons (in Soil Mechanics TP logs, not BH logs), that could lead to differential settlements. We would agree with this statement.

From our own assessment of the site prior to the additional investigation, it was considered extremely optimistic to expect an allowable bearing capacity of 150kPa as suggested in the Soil Mechanics GI Report in the made ground.

At a load of 65kPa, as indicated in the GI for floor slab load, it was considered that total settlements may reach 40mm with differentials of 20mm to 30mm, without some sort of pre-treatment.

The question of hotspots appeared to be only relevant as regards the risk to controlled waters and appears to be concentrated around TP2 (within current development area). Human health is not considered at risk.

Groundwater depths were indicated to vary over the site from the GI information. It appears to be sitting within the made ground, so is likely to be encountered in any excavations up to 2.5m deep.

In order to try and bring some clarity to these matters, some additional sampling and testing was recommended.

This was suggested to comprise of trial pits to sample around the location of TP2 to sample for contamination testing; and the southern fringe for the possible presence of alluvium. In addition some dynamic probing over the main building footprint would give additional comfort to the possibility of a ground bearing slab and any need for excavate and re-compact or replace.

Ground Conditions Revealed by Quantum Investigation

The findings of the additional trial pits and dynamic probes are presented in Appendix II.

In summary; the Dynamic Probes over the footprint of the main building have proved a very dense mantle of the fill to approximately 2-3m depth. The trial pits (TP201 – 204) excavated around original TP2 for additional sampling, confirmed the very dense nature of the top 2 – 3m of the made ground.

This appears to be a re-worked glacial soil, being essentially a sandy Gravel with variable cobble content. Although it is very dense it is not considered to be an engineered fill, put down in layers and compacted say.

The additional trial pits excavated to assess whether any Peat/Alluvium was present along southern fringe of the site (TPs 101 – 106), found no evidence found of Peat or soft alluvium.

The 'boggy' nature of the ground surface along the front of the site is considered to be due to drainage issues and the surface layer holding the run-off.

No groundwater was encountered in any of the trial pits excavated. The only water encountered was from surface run-off.

Foundations

Although the made ground as proved in the additional investigation has been found to be dense we would not recommend structural foundations to be placed within it. It is not an engineered fill and therefore could be subject to differential settlements at higher loads. Creep consolidation and consolidation due to the new load will affect it, irrespective of how long the fill has been in place.

We would recommend a safe bearing capacity of 75kPa for the made ground.

All structural loads should be supported by piles. Pell Frischmann recommended piling for foundation loads, even for lighter structures.

Floor Slab

The actual loading of any floor slabs is unclear based on information passed to Quantum to date; a loading of 65kPa having been indicated in the Soil Mechanics Report.

Pell Frischmann suggested suspended floor slabs. This would appear to be impractical for this type of development.

Depending on the actual finished floor level; if build up is required we would recommend that a simple topsoil strip be followed by proof rolling and placing of sub-base for the ground bearing slab. If the level is to be lowered, the same protocol should be followed after excavation to the required level.

Extent of Alluvium

The plan included with Soil Mechanics Report indicated an *'Area of Peat (assumed)'* along the southern frontage of the site.

In order to better assess this, a series of additional trial pits (TP 101 – 106) were excavated to try and identify any peat or alluvium. British Geological Survey mapping of the area indicates 'Alluvium' as clay, sand and gravel from the Quaternary Period being present on the site.

The additional trial holes proved up to 1.8m of made ground (TP104) overlying a compact brown and grey sandy very silty Gravel with some cobbles. This stratum could be of alluvial origin, although sub-angular gravels were present which isn't typical of true alluvial soils; but was not proved as a typical compressible alluvium. There was no evidence of any Peat being present in the additional trial pits.

The ground surface in this area does give the appearance of being waterlogged, as can be found with peaty ground, but this appeared to be due to the poor drainage of this area, with water standing at surface, rather than organic soils.

Geo-Environmental Assessment

The purpose of the additional sampling for contamination purposes was to provide information as to whether the contamination found in TP2 of the original Soil Mechanics investigation was of wider extent.

A slight exceedance of TPH (Total Petroleum Hydrocarbon) was recorded that could be considered a risk to site users. However banded analysis of component hydrocarbons suggested that hydrocarbon contamination may not be an issue for the proposed end use. Additional testing was performed as part of this Report to confirm this to be the case.

A summary of the most recent test results is tabulated below, compared to accepted thresholds.

Analyte	**Results**					**SGV/GAC Human Health (Residential)[1]**	**SGV/GAC Leachate/Controlled Waters**
Location	*TP201 1m*	*TP201 2m*	*TP202 1m*	*TP203 2m*	*TP204 1.8m*		
SOILS (mg/kg)							
PAH (total)	< 1.6	8	24	28	36	> 30,232	
BTEX	< 1	< 1	< 1	< 1	< 1	> 948	
TPH Aliphatic	< 10	40	21	18	53	50	
TPH Aromatic	< 10	59	30	42	66	50	
LEACHATE (µg/l)							
PAH (total)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		0.1[2]
BTEX	< 10	< 10	< 10	< 10	< 10		15[2]
TPH Aliphatic	< 10	< 10	< 10	< 10	< 10		10[2]
TPH Aromatic	< 10	< 10	< 10	< 10	< 10		10[2]

Notes: 1. Sum of individual compounds for Residential End Use without Plant Uptake
2. UK Drinking Water Standards (No Environmental Quality Standard (EQS) exists in UK)

Human Health Risk Conclusions

The Residential End Use without Plant Uptake Thresholds set By DEFRA/CLEA have been adopted to assess the risk to human health, from coming into contact with the soils on site.

Based on these additional test results; overall there is no perceived risk from manual handling of the soils. One compound in one sample within the Polyaromatic Hydrocarbons exceeds the minimum threshold for Benz(a)pyrene (Result 1.3mg/kg: Threshold 1.0mg/kg).

This one value exceeding the quoted threshold does not in itself constitute a risk. The corresponding threshold for the site's end use as commercial/industrial of 14mk/kg demonstrates that the soil does not present an undue risk. It simply gives an indication that some intervention may be appropriate or that site management should be introduced to mitigate against the risk.

This should take the form of Operatives working with or likely to come into contact with Made Ground observing good practice as regards hygiene on site. Appropriate personal protective equipment should be issued and personnel should be instructed in safe working methods. Operatives should be warned to avoid contact between hands and mouth before washing. The consumption of food must be confined to designated clean areas. Suitable welfare including washing facilities should be provided.

Assessment of Risk to Controlled Waters

The risk to controlled waters, i.e. nearby watercourses or groundwater bodies, is defined by the potential for any contaminants present on site to leach from the soils or by held contaminated water migration beneath the site.

The previous investigation and test results from the site indicated that "the majority of contaminants in the ground do not pose a risk to groundwater outside the site or to controlled surface waters". The additional testing undertaken on samples around the identified potential hotspot confirm that no risk exists from contaminated groundwater.

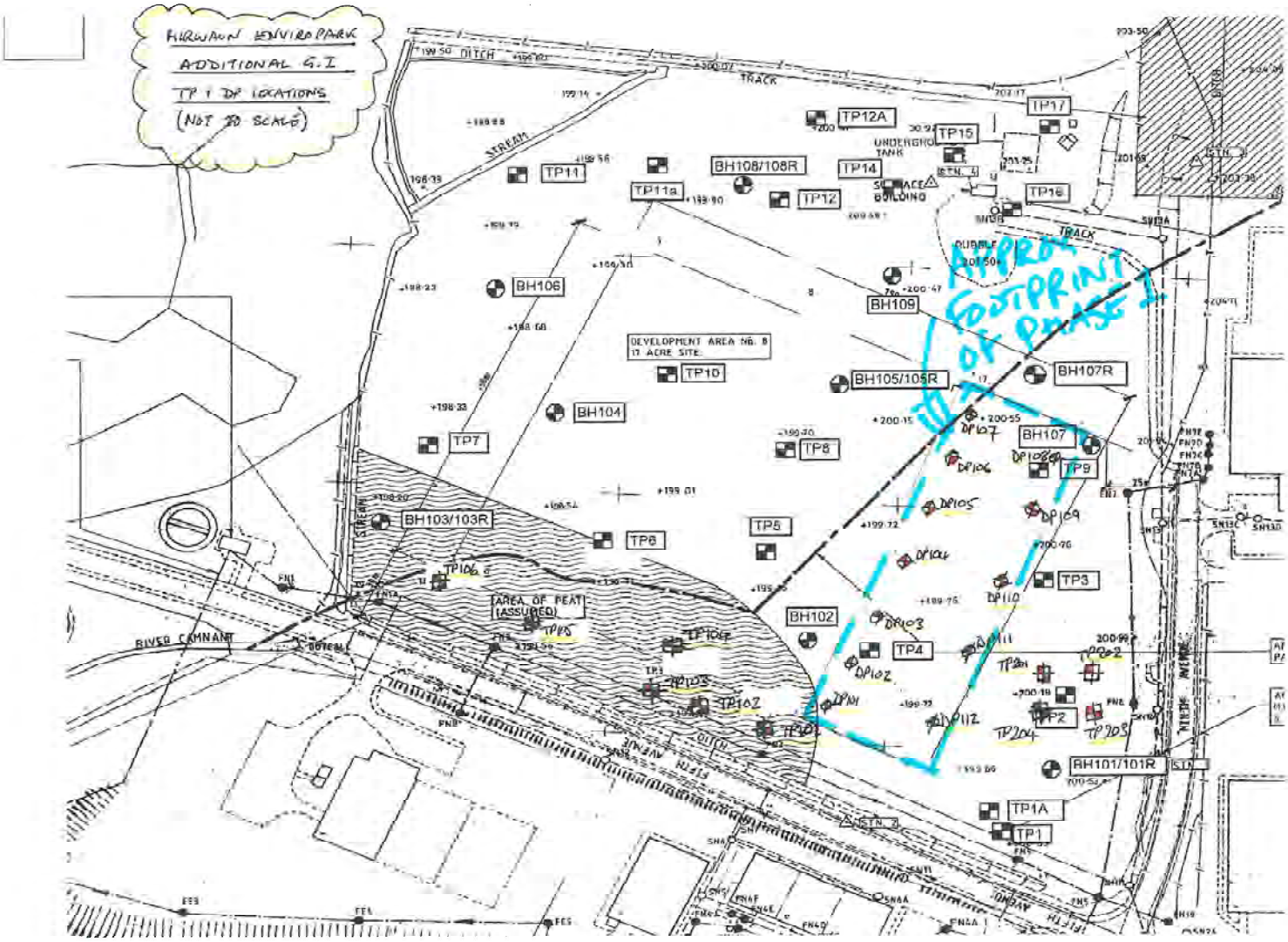
We trust that the above is of assistance; however, if you need any further clarification or have any queries please do not hesitate to contact us.

For and on behalf of **QUANTUM GEOTECHNICAL LTD**

J.E. STARK, B.Sc. (Hons), C.Geol., F.G.S.
Technical Director

Date

APPENDIX I – Site Plan


HIRWAUN ENVIRO PARK
ADDITIONAL G.I
TP & DP LOCATIONS
(NOT TO SCALE)
TP12A
TP15
TP17
TP11
BH108/108R
TP14
TP11a
TP12
TP16
BH106
BH109
APPROX FOOTPRINT OF PHASE 1
DEVELOPMENT AREA NO. 8
17 ACRE SITE.
TP10
BH105/105R
BH107R
BH104
BH107
TP7
TP8
TP9
BH103/103R
TP6
TP5
TP3
AREA OF PEAT (ASSUMED)
BH102
TP4
RIVER CYNNANT
TP2
BH101/101R
TP1A
TP1
DITCH
TRACK
STREAM

APPENDIX II – Trial Pit & Dynamic Probe Records

Contract : Enviroparks, Hirwaun

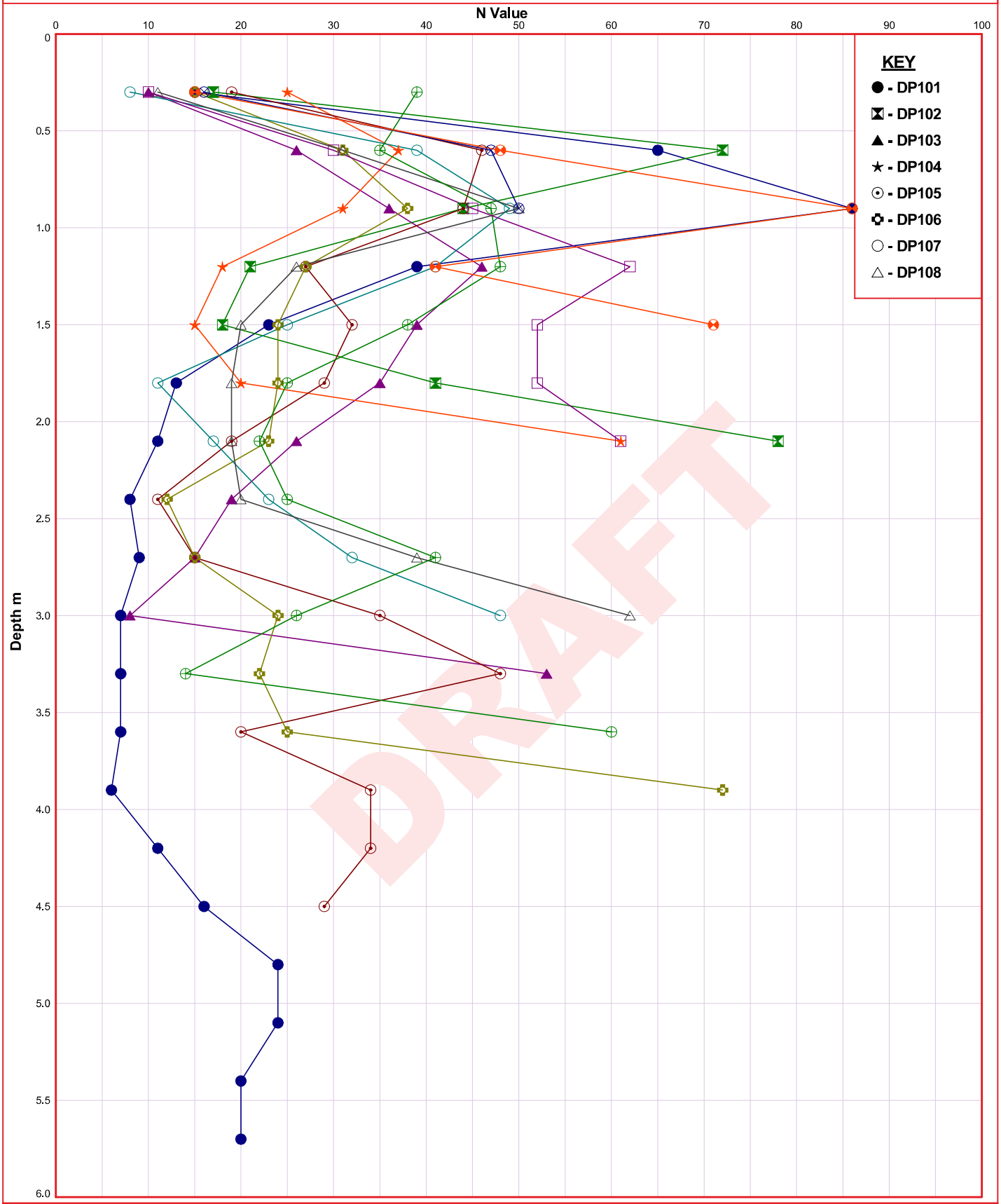
Client : Dawnus Construction Ltd

Point Plotted
DP101, DP102, DP103, DP104, DP105, DP106, DP107, DP108, DP109, DP110

Job Number : G345

Engineer : Waterman

SPT N VALUE Vs. DEPTH



Remarks:

Quantum Geotechnical

Ty Berwig, Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Tel: 01554 776150
email: enquiries@quantum-geotech.co.uk

Library File: F:\GINT\QUANTUM\LIBRARY\QUANTUM.GLB. Form Name: SPT DEPTH. Version 1.00.001, 20/10/04

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP101

Dates : 11/09/13 - 11/09/13
Location :

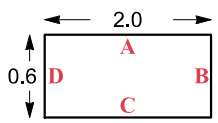
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.10)	
1					1.10	Possible MADE GROUND: Loose pale brown & grey silty fine SAND, with clayey inclusions; becoming grey and brown mottled with coarse gravels and occasional rounded cobbles		1.10 (0.70)	
2					1.80	Loose to compact , with some laminations, slightly gravelly fine sandy clayey SILT with some sub-ang cobbles		1.80 (0.90)	
					2.70	Compact brown-grey silty gravelly (fine to coarse, sub-ang to sub-rounded) fine SAND		2.70 (0.30)	
3					3.00	EOTP		3.00	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Llanelli, Carmarthenshire SA14 9ST
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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
	JS	1 Of 2	4		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd			Trial Pit No. TP101
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:	



Above:- TP101 spoil



Right:- TP101 pit

DRAFT

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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP102

Dates : 11/09/13 - 11/09/13
Location :

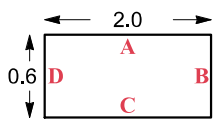
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(0.30)	
1					0.30	Compact brown and grey mottled sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL with some sub-rounded Cobbles (Sandstone)		0.30 (1.20)	
					1.50	EOTP		1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

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Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd			Trial Pit No. TP102
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:	



Above:- TP102 spoil



Right:- TP102 pit

DRAFT

Quantum Geotechnical
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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP103

Dates : 11/09/13 - 11/09/13
Location :

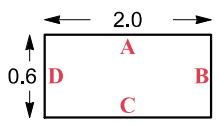
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(0.30)	
1					0.30	Compact brown and grey mottled sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL withsome sub-rounded Cobbles (Sandstone)		0.30 (1.20)	
					1.50	EOTP		1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd			Trial Pit No. TP103
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:	



Above:- TP103 spoil



Right:- TP103 pit

DRAFT

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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No. TP104

Dates : 11/09/13 - 11/09/13

Location :

Job Number : G345

Engineer : Waterman

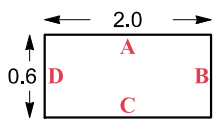
Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.10)	
1					1.10	MADE GROUND: Compact grey and dark grey slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang) with some to many cobbles		1.10 (0.70)	
					1.80	Compact brown and grey mottled sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL withsome sub-rounded Cobbles (Sandstone)		1.80 (0.20)	
2					2.00	EOTP		2.00	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
	JS	1 Of 2	4		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd		Trial Pit No. TP104
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:



Above:- TP104 spoil



Right:- TP104 pit

DRAFT

Quantum Geotechnical
Ty Berwig, Bynea
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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No. TP105

Dates : 11/09/13 - 11/09/13

Location :

Job Number : G345

Engineer : Waterman

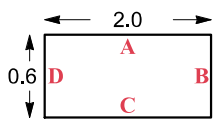
Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(0.40)	
					0.40	MADE GROUND: Compact grey and dark grey slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang) with some to many cobbles		0.40 (0.10)	
					0.50	Compact brown and grey mottled sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL withsome sub-rounded Cobbles (Sandstone)		0.50	
1								(1.00)	
					1.50	EOTP		1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Llanelli, Carmarthenshire SA14 9ST
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Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd		Trial Pit No. TP105
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:



Above:- TP105 spoil



Right:- TP105 pit

DRAFT

Quantum Geotechnical
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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No. TP106

Dates : 11/09/13 - 11/09/13

Location :

Job Number : G345

Engineer : Waterman

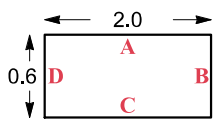
Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thickness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thickness)	Water
						MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(0.60)	
1					0.60	MADE GROUND: Compact yellow brown slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang) with some cobbles		0.60 (0.60)	
					1.20	Compact brown and grey mottled sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL withsome sub-rounded Cobbles (Sandstone)		1.20 (0.30)	
					1.50	EOTP		1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea
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Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd			Trial Pit No. TP106
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:	



Above:- TP106 spoil



Right:- TP106 pit

DRAFT

Quantum Geotechnical
Ty Berwig, Bynea
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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No. TP201

Dates : 11/09/13 - 11/09/13

Location :

Job Number : G345

Engineer : Waterman

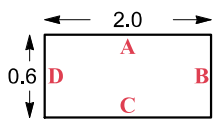
Ground Level :

Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thickness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thickness)	Water
1	1.00 -	D1				MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.80)	
					1.80	MADE GROUND: Compact grey and dark grey slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural with some brick) with some to many cobbles		1.80 (1.20)	
2	2.00 -	ES1 ES2							
3					3.00	EOTP		3.00	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
	JS	1 Of 2	4		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd		Trial Pit No. TP201
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:



Above:- TP201 spoil



Right:- TP201 pit

DRAFT

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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP202

Dates : 11/09/13 - 11/09/13
Location :

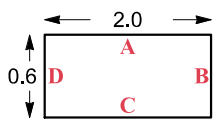
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
1	1.00 -	D1 ES1 ES2				MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.50)	
					1.50	EOTP		1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
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Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd		Trial Pit No. TP202
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:



Above:- TP202 spoil



Right:- TP202 pit

DRAFT

Quantum Geotechnical
Ty Berwig, Bynea
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Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP203

Dates : 11/09/13 - 11/09/13
Location :

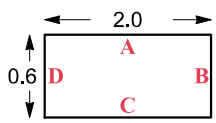
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
1	1.00 -	D1				MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.50)	
	1.50 -	ES1 ES2			1.50	MADE GROUND: Compact grey and dark grey slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural with some brick) with some to many cobbles EOTP		(0.10) 1.50	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea
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Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd		Trial Pit No. TP203
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:



Above:- TP203 spoil



Right:- TP203 pit

DRAFT

Quantum Geotechnical
Ty Berwig, Bynea
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Tel: 01554 744880
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email: enquiries@quantum-geotech.co.uk

Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

Contract : Enviroparks, Hirwaun

Client : Dawnus Construction Ltd

Trial Pit No.
TP204

Dates : 11/09/13 - 11/09/13
Location :

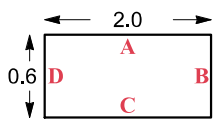
Job Number : G345
Engineer : Waterman

Ground Level :
Coordinates:

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	STRATA Legend	STRATA Depth (Thick-ness)	Water
1	1.00 -	D1				MADE GROUND: Grass over: Compact brown slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural + occ brick) with some to many cobbles and occasional boulders		(1.70)	
	1.80 -	ES1 ES2			1.70	MADE GROUND: Compact grey and dark grey slightly clayey slightly silty sandy GRAVEL (fine to coarse, ang to sub ang of natural with some brick) with some to many cobbles		1.70 (0.20)	
					1.90	EOTP		1.90	

DRAFT

PLAN



Groundwater:

Stability: Stable

Shoring: None

Remarks :

Equipment Used: JCB 3CX

Quantum Geotechnical
Ty Berwig, Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-geotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
	JS	1 Of 2	4	All measurements in metres unless otherwise stated

AGS

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd			Trial Pit No. TP204
Dates : 11/09/13 - 11/09/13 Location :	Job Number : G345 Engineer : Waterman	Ground Level : Coordinates:	



Above:- TP204 spoil



Right:- TP204 pit

DRAFT

Quantum Geotechnical
Ty Berwig, Bynea
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Fax: 01554 776150
email: enquiries@quantum-geotech.co.uk

Operator:	Logged By. JS	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	AGS

APPENDIX III – Laboratory Test Results

Arwel Jones
Quantum Laboratories
Quantum Geotechnical
Ty Berwig
Bynea
Llanelli
Carmarthenshire
SA14 9ST

t: 01554 744880

e: ajones@quantum-geotech.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 13-46334

Project / Site name:	Enviroparks , Hirwaun	**Samples received on:**	20/09/2013
Your job number:	G345	**Samples instructed on:**	20/09/2013
Your order number:		**Analysis completed by:**	27/09/2013
Report Issue Number:	1	**Report issued on:**	27/09/2013
Samples Analysed:	5 leachate samples - 10 soil samples		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Customer Services Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 13-46334

Project / Site name: Enviroparks , Hirwaun

Lab Sample Number				287007	287008	287009	287010	287011
Sample Reference				201	201	201	201	202
Sample Number				ES1	ES2	ES3	ES4	ES1
Depth (m)				1.00	1.00	2.00	2.00	1.00
Date Sampled				11/09/2013	11/09/2013	11/09/2013	11/09/2013	11/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	7.9	6.3	13	9.8	9.7
Total mass of sample received	kg	0.001	NONE	0.44	0.17	0.40	0.15	0.43
General Inorganics								
Organic Matter	%	0.1	MCERTS	0.7	-	6.6	-	1.1
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.47	-
Acenaphthylene	mg/kg	0.2	MCERTS	-	< 0.20	-	< 0.20	-
Acenaphthene	mg/kg	0.1	MCERTS	-	< 0.10	-	< 0.10	-
Fluorene	mg/kg	0.2	MCERTS	-	< 0.20	-	< 0.20	-
Phenanthrene	mg/kg	0.2	MCERTS	-	< 0.20	-	1.3	-
Anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	0.24	-
Fluoranthene	mg/kg	0.2	MCERTS	-	< 0.20	-	1.3	-
Pyrene	mg/kg	0.2	MCERTS	-	< 0.20	-	1.1	-
Benzo(a)anthracene	mg/kg	0.2	MCERTS	-	< 0.20	-	0.99	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.78	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	-	0.80	-
Benzo(k)fluoranthene	mg/kg	0.2	MCERTS	-	< 0.20	-	0.38	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	< 0.10	-	0.54	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	MCERTS	-	< 0.20	-	< 0.20	-
Dibenz(a,h)anthracene	mg/kg	0.2	MCERTS	-	< 0.20	-	< 0.20	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	< 1.6	-	8.0	-
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 13-46334

Project / Site name: Enviroparks , Hirwaun

Lab Sample Number				287007	287008	287009	287010	287011
Sample Reference				201	201	201	201	202
Sample Number				ES1	ES2	ES3	ES4	ES1
Depth (m)				1.00	1.00	2.00	2.00	1.00
Date Sampled				11/09/2013	11/09/2013	11/09/2013	11/09/2013	11/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	5.2	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	5.2	-	2.7
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	29	-	18
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	40	-	21
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	4.8	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	27	-	18
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	27	-	12
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	59	-	30

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 13-46334

Project / Site name: Enviroparks , Hirwaun

Lab Sample Number				287012	287013	287014	287015	287016
Sample Reference				202	203	203	204	204
Sample Number				ES2	ES1	ES2	ES1	ES2
Depth (m)				1.00	2.00	2.00	1.80	1.80
Date Sampled				11/09/2013	11/09/2013	11/09/2013	11/09/2013	11/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	34	< 0.1
Moisture Content	%	N/A	NONE	9.1	9.3	9.1	7.9	9.7
Total mass of sample received	kg	0.001	NONE	0.16	0.40	0.15	0.43	0.15
General Inorganics								
Organic Matter	%	0.1	MCERTS	-	1.3	-	1.5	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	0.71
Acenaphthylene	mg/kg	0.2	MCERTS	< 0.20	-	< 0.20	-	< 0.20
Acenaphthene	mg/kg	0.1	MCERTS	0.29	-	0.42	-	0.83
Fluorene	mg/kg	0.2	MCERTS	0.41	-	0.55	-	0.92
Phenanthrene	mg/kg	0.2	MCERTS	4.6	-	5.4	-	6.7
Anthracene	mg/kg	0.1	MCERTS	1.6	-	2.2	-	2.1
Fluoranthene	mg/kg	0.2	MCERTS	6.1	-	7.2	-	8.3
Pyrene	mg/kg	0.2	MCERTS	4.7	-	5.5	-	6.6
Benzo(a)anthracene	mg/kg	0.2	MCERTS	2.0	-	2.1	-	3.1
Chrysene	mg/kg	0.05	MCERTS	1.4	-	1.6	-	2.1
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	1.2	-	1.2	-	1.8
Benzo(k)fluoranthene	mg/kg	0.2	MCERTS	0.65	-	0.68	-	0.96
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.80	-	0.76	-	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.2	MCERTS	< 0.20	-	< 0.20	-	0.42
Dibenz(a,h)anthracene	mg/kg	0.2	MCERTS	< 0.20	-	< 0.20	-	< 0.20
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	0.28	-	0.44
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	24	-	28	-	36
Monoaromatics								
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 13-46334

Project / Site name: Enviroparks , Hirwaun

Lab Sample Number				287012	287013	287014	287015	287016
Sample Reference				202	203	203	204	204
Sample Number				ES2	ES1	ES2	ES1	ES2
Depth (m)				1.00	2.00	2.00	1.80	1.80
Date Sampled				11/09/2013	11/09/2013	11/09/2013	11/09/2013	11/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	4.7	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0	-	16	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	18	-	32	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	18	-	53	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0	-	4.9	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	21	-	36	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	22	-	25	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	42	-	66	-

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Analytical Report Number: 13-46334

Project / Site name: Enviroparks , Hirwaun

Lab Sample Number				287017	287018	287019	287020	287021
Sample Reference				201	201	202	203	204
Sample Number				D1	ES3	D1	D1	D1
Depth (m)				1.00	2.00	1.00	1.00	1.00
Date Sampled				11/09/2013	11/09/2013	11/09/2013	11/09/2013	11/09/2013
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Monoaromatics								
Benzene	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C6 - C8	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C8 - C10	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C7 - C8	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C8 - C10	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number : 13-46334

Project / Site name: Enviroparks , Hirwaun

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
287007	201	ES1	1.00	Light brown sandy topsoil with gravel.
287008	201	ES2	1.00	Light brown sandy topsoil with gravel.
287009	201	ES3	2.00	Black gravelly topsoil with coal.
287010	201	ES4	2.00	Black gravelly topsoil with coal.
287011	202	ES1	1.00	Light brown sandy topsoil with gravel and rubble.
287012	202	ES2	1.00	Light brown sandy topsoil with gravel and rubble.
287013	203	ES1	2.00	Light brown sandy topsoil with gravel and rubble.
287014	203	ES2	2.00	Light brown sandy topsoil with gravel and rubble.
287015	204	ES1	1.80	Light brown sandy topsoil with gravel and stones.
287016	204	ES2	1.80	Light brown sandy topsoil with gravel.

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Analytical Report Number : 13-46334

Project / Site name: Enviroparks , Hirwaun

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in leachates	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L017-UK		NONE
BTEX and MTBE in soil	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073S-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-UK		NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Stones not passing through a 10 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH7 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of pentane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Notes & Limitations:

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Groundwater conditions referred to in this report are those taken from data supplied appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole; does not, in any way, purport to include any manner of legal advice or opinion; and are based upon the information made available to Quantum Geotechnical at the date of this document and on current UK standards, codes, technology and construction practices as at the date of this document.

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APPENDIX V – QUANTUM GEOTECHNICAL REPORT (REF: G345-LET02 280115)

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Waterman Infrastructure and Environment
38 Cathedral Road
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CF11 9LL

28th January 2015
Our Ref: G345-Let02 280115

For the attention of Mr. Alan Wilkinson,

Re: Enviroparks, Hirwaun: Geo-Environmental Planning Conditions – Application No. 08/02488/FUL

This document aims to provide clarification and guidance relating to two particular existing Planning Conditions on the Enviroparks scheme as undertaken by Dawnus Construction Ltd, as set out in the Notice of Decision document stipulated by the Brecon Beacons National Park Authority also referred to as the 'Local Planning Authority' within the document.

The two Planning Conditions of note pertain to Geo-Environmental land issues and are headlined below:

Ref;	***Condition Summary;***
BB23	Submission and approval of a contaminated land risk assessment and monitoring verification plan
BB24	Submission and approval of a contaminated land remediation verification report

Prior to commencement of the development works, several stages of Geo-Environmental Assessments on the site were undertaken, most recently by Quantum Geotechnical Ltd in October 2013.

The following summarises and brings together all the elements of investigations and reporting undertaken on site, to demonstrate that the Planning Conditions quoted have been satisfied.

The table below summarises the investigation work undertaken on site that we are aware of. A commentary on the ownership of these is added.

	Report	Comments
1.	Wallace Evans & Partners (for Welsh Industrial Estate Corporation): Proposed Development of the Northern Section of the Hirwaun Industrial Estate. Report on a Ground Investigation. Ref.S/8731, January 1972.	Contained in Appendix to Report Ref.3, provided by Enviroparks via Employer's Agent.
2.	Exploration Associates (for Thomas Morgan & Associates): 17 Acre Site Hirwaun Industrial Estate, Interpretive Report on Ground Investigation. Ref. 155102, July 1992.	Contained in Appendix to Report Ref.3, provided by Enviroparks via Employer's Agent.
3.	Thomas Morgan & Associates (for Welsh Development Agency): Report on a 17 Acre Site at the Hirwaun Industrial Estate Site Investigation Data. Ref.P329.02, September 1995.	Provided by Enviroparks via Employer's Agent

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4.	Soil Mechanics (for Enviroparks, via Pell Frischmann): Hirwaun Industrial Estate Development, Interpretive Report on Site Investigation. Ref.H8076, January 2009.	Provided by Enviroparks via Employer's Agent. Soil Mechanics Report refers to *'A previous desk study report had been carried out by Enviroparks Ltd (dated November 2007).*
	Report	Comments
5.	Pell Frischmann (for Enviroparks (Hirwaun) Ltd): Letter Report – Enviroparks Hirwaun Ground Conditions Review. Ref.E57006/MWJ/001, July 2011.	Provided by Enviroparks via Employer's Agent
6.	Quantum Geotechnical Ltd (for Dawnus Construction Ltd): Enviropark, Hirwaun – Supplementary Geotechnical & Geo-Environmental Report. Ref.G345 Enviropark_LR01, October 2013.	Issued via Dawnus Construction.

From the foregoing Reports the sequence of investigation and advice on the site can be shown.

Historical ground investigation has been undertaken on the site up to 1995 (Reports Ref.1, 2 & 3 above).

Subsequent to that a detailed investigation was commissioned and carried out by Soil Mechanics in 2009 (Ref.4), following a Desk Study prepared by Enviroparks (referenced in Soil Mechanics 2009 Report).

A summary interpretation was provided by Pell Frischmann (Ref.5) on the findings of the Soil Mechanics 2009 Report, giving recommendations on further investigation requirements to address the outstanding issues specifically relating to guidelines on foundation choice; potential contamination hot-spot around Trial Pit 2 from Soil Mechanics 2009 Investigation; and mobility of contamination affecting controlled waters.

These specific matters were investigated by Quantum and reported in Report Ref.6. The conclusions drawn were that the risk was negligible and that no further investigation or remediation was necessary.

Recommendations:

The aforementioned documentation should be provided in an ordered package to Brecon Beacons National Park Authority which should comply with and satisfy Planning Condition 23.

The reports have identified that no risk exists from contaminated soils or groundwater on site i.e. any potential contaminants held within the soils are non-mobile and therefore no source or pollutant linkage can be realised which may pose a risk to controlled waters i.e. ground water or proximal surface waters. Therefore, no Remediation Strategy and Verification Plan is considered necessary for the scheme based on ground investigation findings to date.

This in turn, would negate the requirement for a Verification Report which constitutes Planning Condition 24, effectively demonstrating that Condition 24 is not required for this scheme.

We trust that you will find the foregoing of assistance, but should you require any further information please do not hesitate to contact us.

Yours faithfully,
For and on behalf of
QUANTUM GEOTECHNICAL LTD



Ross McDermott ***M.Sc., B.Sc. (Hons), C.Geol., F.G.S.***

Notes & Limitations:

The following conditions and notes on site investigation procedures should be read in conjunction with this report.

Recommendations made and opinions expressed in this report are based on the strata observed on site, together with the results of any site or laboratory tests and survey data. No responsibility can be held for conditions which have not been revealed by the exposures or which occur between locations. Whilst the report may suggest the likely configuration of strata, this is only indicative and liability cannot be accepted for its accuracy.

Groundwater conditions referred to in this report are those taken from data supplied appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole; does not, in any way, purport to include any manner of legal advice or opinion; and are based upon the information made available to Quantum Geotechnical at the date of this document and on current UK standards, codes, technology and construction practices as at the date of this document.

It should be noted and it is expressly stated that no independent verification of any of the documents or information supplied to Quantum Geotechnical has been made. No liability is accepted by Quantum Geotechnical for any use of this document, other than for the purposes for which it was originally prepared and provided.

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APPENDIX E

STATISTICAL ASSESSMENT OF CHEMICAL ANALYSES

Client/client ref:
Project ref: Enviropark, Hirwaun
Site ref: Enviropark, Hirwaun
Data description:
Contaminant(s): Metals
Test scenario: Planning
Date: 12 January 2017
User details: Olly Roberts

	antimony (mg/kg)	arsenic (mg/kg)	boron (mg/kg)	cadmium (mg/kg)	chromium in chromium(III) compounds (mg/kg)	chromium in chromium(VI) compounds (mg/kg)	copper (mg/kg)	lead (mg/kg)	mercury (mg/kg)	molybdenum (mg/kg)	nickel (mg/kg)	selenium (mg/kg)
Critical concentration, C_c		**640**	**240000**	**410**	**8600**	**49**	**68000**	**2330**	**58**		**980**	**12,000**
Notes												
Sample size, n	35	35	35	35	35	28	35	35	35	35	35	35
Sample mean, $\overline{X}$	0.57714286	6.31142857	2.65428571	0.21857143	12.3545714	0.1	19.9371429	17.0828571	0.12857143	0.72285714	15.9142857	0.53714286
Standard deviation, s	0.26018739	2.59725777	3.00062178	0.31920068	7.0091618	4.2397E-17	31.2953397	8.55238136	0.14268729	0.65037804	4.14517032	0.12387307
Number of non-detects	**30**	0	**20**	**12**	**1**	**28**	0	0	**31**	**28**	0	**32**
Set non-detect values to:	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit
Outliers?	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**	**95%**	Use Normal distribution to test for outliers					
t statistic, t_0 (or k_0)		-1443.427062	-473183.0757	-7594.907401	-7248.398166	-6.10308E+18	-12850.97013	-1599.952315	-2399.456735		-1375.964692	-573084.8426
Upper confidence limit (on true mean concentration, μ)	0.76884591	8.22505796	4.86510903	0.45375479	17.5188405	0.1	42.995186	23.3841525	0.23370177	1.20204814	17.0990515	0.6284111
Evidence level		**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**		**100%**	**100%**
Base decision on:	lower bound	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	lower bound	evidence level	evidence level
Result		**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**		**μ < Cc**	**μ < Cc**
Select dataset	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Client/client ref:
Project ref: Enviropark, Hirwaun
Site ref: Enviropark, Hirwaun
Data description:
Contaminant(s): TPH & BTEX
Test scenario: Planning
Date: 12 January 2017
User details: Olly Roberts

	benzene (mg/kg)	toluene (mg/kg)	ethylbenzene (mg/kg)	xylene (mg/kg)	>C8-C10 (mg/kg)	>C10-C12 (mg/kg)	>C12-C16 (mg/kg)	>C16-C21 (mg/kg)	>C21-C35 (mg/kg)			
Critical concentration, C_c	**98**	**56000**	**5700**	**5900**	**2000**	**9700**	**36000**	**28000**	**28000**			
Notes					Ali	Ali	Aro	Aro	Aro			
Sample size, n	40	40	40	40	40	40	40	40	40	0	0	0
Sample mean, $\overline{X}$	18.25	18.25	18.25	36.675	1.93075	2.7775	52.99975	16.13125	44.67925	No Data	No Data	No Data
Standard deviation, s	44.4451549	44.4451549	44.4451549	89.036549	0.92419164	4.46200412	315.431231	42.1502852	123.989945			
Number of non-detects	**40**	**40**	**40**	**40**	**39**	**38**	**30**	**26**	**19**			
Set non-detect values to:	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit	Detection limit
Outliers?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal			
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		95%	Use Normal distribution to test for outliers				
t statistic, t_0 (or k_0)	-11.34844254	-7966.21534	-808.5142748	-416.4910226	-13673.46222	-13745.08371	-720.7554918	-4198.91645	-1425.962187			
Upper confidence limit (on true mean concentration, μ)	48.8817091	48.8817091	48.8817091	98.0392066	2.56770513	5.85272412	270.395723	45.1813293	130.133422			
Evidence level	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**			
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level			
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**			
Select dataset	○ Y	○ Y	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**