Proposed Biggins Wood Development, Folkestone.

Interim Generic Quantitative Environmental Risk Assessment

June 2016

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Client Name:	Biggins Wood Homes Ltd
Document Reference:	WIE10619-101.R.3.1.3.JC
Project Number:	WIE10619

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

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Comments

Comments

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Executive Summary

Objectives

Waterman Infrastructure & Environment Limited ("Waterman") was instructed by Biggins Wood Homes Ltd to undertake a Generic Quantitative Environmental Risk Assessment for ground contamination for the proposed redevelopment of a plot of land referred to as Biggins Wood Development, West Folkestone.

Site Setting

Current Use	Rectangular shaped undeveloped grassed plot of land.
History	The south east of the Site, and later the central portion and north east of the Site were occupied by brickworks and associated excavations from 1875. Infilling occurred from mid to late 20th century and comprised refuse and road and park waste. Other areas of the Site have remained undeveloped.
Ground Conditions	Made Ground overlying clay of the Gault Formation. Made Ground was encountered up to 7.5m thick. Topsoil on some areas of the north of the Site are directly underlain by the Gault Formation. Elevated concentrations of PAHs and Lead were recorded in shallow soils across the south of the Site when compared against Waterman's Generic Assessment Criteria for residential end-use with plant uptake, and public open space. Concentrations of contaminants in soils in the north of the Site were mainly below Waterman's Generic Assessment Criteria for commercial end-use. Asbestos fibres were identified in two samples of Made Ground.
Controlled Waters	Discontinuous shallow groundwater in the Made Ground. Groundwater recovered from monitoring wells were assessed against the Environment Agency (EA) derived Environmental Quality Standards (EQS) for the protection of surface water quality. Elevated concentrations of chromium VI, lead, mercury, and zinc were identified in a single monitoring well in the south of the Site. Elevated biological oxygen demand (BOD) was identified in groundwater sampled in several monitoring wells.
Ground Gas Regime	Ground Gas and vapour monitoring undertaken to date indicate a Characteristic Situation CS2 and appropriate ground gas protection measures would be required for the Development. The results of soil headspace monitoring, soil and water VOC and SVOC analysis, and vapour monitoring of monitoring wells has indicated there is not a significant vapour risk.

Conceptual Model

Potential pollutant linkages have been identified between contaminants in shallow soils, perched water in soil and ground gas and future Site users, soft landscaping, construction workers, and off-site users.

Conclusions

Given the proposed end use the overall risk rating for the Site is medium. However, following the implementation of the recommendations, post redevelopment, the Site should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

Environmental Recommendations

- A Remediation Strategy to address potential pollutant linkages;
- Capping layers with a minimum 600mm thickness of clean imported soils and capillary break layers for areas of soft landscaping in private gardens and the use tree pits. Capping layers in public open spaces are likely to be thinner;
- Ground gas protection measures will be required for the Development. The type and extent of the protection measures will be confirmed following completion of the ground gas monitoring and confirmation of the

foundation solution. Ground gas protection requirements for commercial property is likely to be less than those required for residential property;

- A Foundation Works Risk Assessment if piles are the preferred foundation type;
- All construction workers should be subject to mandatory health and safety requirements under the Construction, Design and Management (CDM) Regulations 2015, Control of Substances Hazardous to Health (COSHH) Regulations 2002 and Control of Asbestos Regulations 2012. The requirements included within the Confined Space Regulations 1997 should be adhered to.
- Preliminary Waste Assessment of the Soils has indicated the majority of soil samples contain non-hazardous properties. Segregation and testing of different waste streams, such soils containing hazardous properties would be required prior to disposal of materials off-site.

Geotechnical Assessment

- Gault Clay (Cohesive) has been identified as a suitable bearing strata, with a design bearing resistance of at least 150kPa. This stratum has been encountered at depths of less than 2.5m below proposed ground level across the area outwith the infilled former brickworks and as such shallow foundations (strip / pad foundations) could be adopted.
- Foundations placed on shrinkable soils should be deepened where necessary to accommodate the effects of existing and proposed trees and hedgerows.
- Due to the presence of unsuitable bearing strata at shallow founding depths and significant depths of un-engineered fill, consideration should be given to the use of vibro-compaction techniques as a foundation solution in the area of the infilled former brickworks. Based on the results of the investigation, the Made Ground may be suitable for treatment by vibrated stone columns.
- If vibro compaction is to be considered further, it is essential that all available information is forwarded to a specialist contractor and they provide written confirmation as to the suitability of the specialist technique.
- The installation of vibro stone columns would introduce preferential pathways for the migration of ground gas. Gas protection measures should be reviewed following confirmation of the preferred foundation solution, as site conditions will have changed significantly from those analysed as part of this report.
- Alternatively, piled foundations could be utilised and the advice of a specialist piling contractor should be obtained to confirm the suitability of piling and the most appropriate pile type.
- However, based on the site investigation information, frictional piles could derive support from the Gault Formation (Cohesive) at depths from approximately 5m bgl.
- The Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be; Made Ground: DS-3 AC-3, Gault Formation: DS-4 AC-3s and Groundwater: DS-1 AC-1
- The results of compaction testing undertaken on samples of Made Ground and Gault Formation indicate that it could generally be recompacted to achieve >95% of MDD and <5% air voids. Based upon the results obtained, it could be used as an engineered fill, subject to other suitability considerations. Test results suggest that some of the Made Ground material is significantly wet or dry compared to optimum moisture content. It may be necessary to condition the material prior to re-use.
- The natural subgrade has very low CBR values, i.e. generally less than 2.5% and is not likely to support construction traffic without deteriorating rapidly. Low strength subgrades should be improved either by re-engineering materials, capping, lime/cement stabilisation or the use of geogrids.
- Suspended floor slabs should be adopted due to the potential hazardous gas risk, the low CBR value of the subgrade, the depth and variability of Made Ground and the variability of the subgrade across the development area.
- The design of floor slabs should only be finalised when gas monitoring has been completed and assessed, as the recommendations of the gas monitoring report will influence the final choice of floor slab design. The above advice is provided for guidance only at this stage.
- Based on observations made during fieldwork, shallow excavations (<1.2m) in the area outwith the infilled former brickworks are likely to be stable in the short term. However, even shallow excavations in area of the infilled former brickworks are likely to require shoring to maintain stability. Further advice should be sought from the temporary works designer. It is likely that both shoring and dewatering measures will be required to maintain stability.
- Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc.

1. Introduction

1.1 Objectives

Waterman Infrastructure & Environment Limited ("Waterman") was instructed by Biggins Wood Homes Ltd to undertake a Generic Quantitative Environmental Risk Assessment for ground contamination for the proposed redevelopment of a plot of land referred to as Biggins Wood Development (hereafter termed "the Site") located off Caesar's Way, West Folkestone.

This assessment follows on from the Preliminary Environmental Risk Assessment prepared by Waterman in December 2015 (report ref. WIE10619-100-R-2-1-5-JT and hereafter termed "the Waterman PERA").

This report comprises an assessment of the contamination status of the Site to facilitate the discharge of Condition 14 (2) of Planning Permission Y13/0024/SH dated August 2014, a Preliminary Waste Characterisation Assessment of the soils on Site, and a Geotechnical Assessment to assist with foundation and pavement design.

1.2 Proposed Development

The Site comprises a rectangular shaped grassed plot of land which at the time of writing is currently undeveloped.

The proposed layout is included in Appendix A. It comprises low-rise residential properties with soft landscaping in the form of private gardens and public open spaces in the south of the Site and commercial uses comprising offices and storage units in the northern portion of the Site. The commercial extent of the Development comprises buildings and hardstanding. Some soft landscaping is proposed in the east of the commercial extent of the Site to the north of the proposed vehicular access road, and in the extreme north east of the Site.

1.3 Regulatory Context

Outline planning permission was granted for the development in August 2014 (ref: Y13/0024/SH). Conditions 14 and 15 relate to contaminated land and require the production of a Preliminary Environmental Risk Assessment (PERA), Intrusive Investigation, Remediation Strategy, and Verification Report. This report relates to Condition 14 (2) of the above permission which states the following:

"2. If the desk top study shows that further investigation is necessary, an investigation and risk assessment shall be undertaken by competent persons and a written report of the findings shall be submitted to and approved in writing by the Local Planning Authority prior to commencement of the development. It shall include an assessment of the nature and extent of any contamination on the site, whether or not it originates on the site. The report of the findings shall include:

(i) A survey of the extent, scale and nature of contamination;

(ii) An assessment of the potential risks to:

- Human health;

- Property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,

- Adjoining land,

- Ground waters and surface waters,

-Ecological systems,

- Archaeological site and ancient monuments; and

(iii) An appraisal of remedial options and identification of preferred options(s)

All work pursuant to this condition shall be conducted in accordance with the DEFRA and Environment Agency document Model Procedures for the Management of Land Contamination (Contamination Report 11).”

The National Planning Policy Framework (NPPF) sets out Government planning policy for England and how this is expected to be applied to development. Paragraphs 120 to 122 of Section 11 – Conserving and enhancing the natural environment of the NPPF relate to contaminated land matters and state the following:

“To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Planning policies and decisions should ensure that:

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
- *Adequate site investigation information, prepared by a competent person, is presented.*

In doing so, local planning authorities should focus on whether the development itself is an acceptable use of the land and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

In order to assess the contamination status of the Site, with respect to the proposed end use, it is necessary to assess whether the Site could potentially be classified as “Contaminated Land”, as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

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

b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused.

It should be noted that DEFRA has advised (Ref. Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as "Contaminated Land" where:

a) the relevant substance(s) are already present in controlled waters;

b) entry into controlled waters of the substance(s) from land has ceased; and

c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2010, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England and Wales, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

1.4 Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Biggins Wood Homes Ltd, as documented in Waterman's fee letter (WIE10619-100-F-006-BG, dated 24 December 2015), and with Waterman's standard Terms of Appointment.

The benefit of this report is made to Biggins Wood Homes Ltd.

The information contained in this report is based on the findings of the Waterman PERA, observations made on Site, exploratory hole records, laboratory test results, groundwater monitoring and ground gas monitoring.

The ground conditions reported relate only to the point of excavation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the Site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions, these cannot be determined with complete certainty.

Waterman has endeavoured to assess all information provided to them during this investigation, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this site investigation includes an assessment of the presence of asbestos containing materials in the ground at the Site but not within buildings or structures or below ground structures (basements, buried service ducts and the like).

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.

2. Procedures

This Generic Quantitative Environmental Risk Assessment has been undertaken in general accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11 – Environment Agency, September 2004).

The report includes the following:

- outline Conceptual Model for the Site;
- results of Intrusive Ground Investigation;
- confirmation of Generic Assessment Criteria used to assess risks;
- assessment of results against Generic Assessment Criteria;
- formulation of a new Conceptual Model for the Site;
- identification of potentially unacceptable risks; and
- recommendations for further action.

This report forms a decision record for the pollutant linkages identified, the generic assessment criteria used to assess risks, the unacceptable risks identified and the proposed next steps in relation to the Site. The report also provides an explanation of the refinement of the outline conceptual model following the ground investigation, the selection of criteria and assumptions, the evaluation of potential risks and the basis for the decision on what happens next.

3. Outline Conceptual Model

The outline conceptual model of the Site developed in the Preliminary Environmental Risk Assessment (report ref. WIE10619-100-R-2-1-5-JT) is reproduced below.

3.1 Ground Conditions

The geology beneath the Site has been established from the British Geological Survey (BGS) 1: 50,000 scale Geological Map, Sheet 305 Folkestone and Dover Solid and Drift Edition, the BGS website (accessed online 11/12/2015) and existing reports pertaining to the Site reviewed in report ref. WIE10619-100-R-2-1-5-JT. See Table 1.

Table 1: Previous environmental reports reviewed

Author	Title	Date and Reference
Kent County Council	Shepway District Council, Biggins Wood Development. Folkestone. Site Investigation Report	Ref: 81.RJJ/DC.14/15, April 1981
Ashdown Site Investigation Limited	Geotechnical & Contamination (Phase I and II) Assessment	Ref: LW21271, October 2010
Peter Brett Associates LLP	Phase I Addendum & Synopsis Report	Ref: R001/rev00, dated December 2012
Ashdown Site Investigation Limited	Enhanced Ground Contamination Risk Assessment, Remediation Strategy & Verification	Ref: LW25193, dated September 2014

A summary of the anticipated geology is provided in Table 2:

Table 2: Geological strata encountered

Soil Type	Area Covered	Estimated Thickness (m)	Typical Description
Made Ground	Generally absent or limited in thickness in the northern and north-eastern portion of the Site.	Proven up to 5.2m bgl*	Clay containing a variable proportion of silt, sand and gravel of brick, flint, chalk, clinker, ash, concrete, sandstone, glass metal and organic matter was recorded to depths of between 0.8m and 5.2m bgl*.
Gault Formation	Entire Site	38-49m (not proven)	Stiff clay becoming very stiff to hard.
Folkestone Beds	Entire Site	1-43m	Medium- and coarse-grained, well-sorted cross-bedded sands and weakly cemented sandstones.
Sandgate Beds	Entire Site	5-37m	Medium- and coarse-grained, well-sorted cross-bedded sands and weakly cemented sandstones.

*based upon Geotechnical & Contamination Assessment (ref: LW21271) prepared by Ashdown Site Investigation Limited, dated October 2010.

3.2 Controlled Waters

3.2.1 Surface Waters

The nearest surface water feature to the Site is a seasonal surface drain located in the northeast portion of the Site, although water was not observed in the drain during the Site walkover or Site Investigation. A culverted drain runs from the centre of the Site eastwards towards Caesar's Way. Some of the drain's inspection covers appeared to have been dislodged leaving the drain open to surface run off. The drain was observed containing residual standing water. It is not apparent what and where the culverted drain is running. However, it is assumed it drains towards a sewer in Caesar's Way. It is our understanding the drain is to be removed or capped off for the Development.

The closest significant surface water feature is the Pent Stream located 104m east, which flows to the southeast. The Pent Stream is culverted 105m southwest of the Site.

According to the Ecological Potential under the Water Framework Directive, the Environment Agency (EA) has classified the Pent Stream as having a moderate ecological potential. There are four recorded surface water discharge consents within a 1km radius of the Site, the closest of which is located 420m west for surface water discharges to a freshwater stream.

According to the EA's indicative flooding data, the Site is not located in an area of fluvial or tidal flooding.

3.2.2 Groundwater

According to the EA Groundwater Vulnerability Map, the geological deposits underlying the Site are classified as per Table 3:

Table 3: Summary of the hydrogeological properties of the main geological strata

Stratum	EA Classification	Hydrological Significance
Made Ground	Unclassified	Not classified by the EA, but likely to be of sufficient permeability as to allow the vertical and lateral migration of any contaminants.
Gault Formation	Unproductive Strata	Contains insignificant quantities of vertically or laterally extensive groundwater
Folkestone Beds	Principal Aquifer	Regionally important aquifer, likely to be used to support potable abstractions
Sandgate Beds	Principal Aquifer	Regionally important aquifer, likely to be used to support potable abstractions

The eastern extremity of the Site is located within a groundwater Source Protection Zone 1c (Inner Protection Zone), while the eastern portion of the Site is located within a groundwater Source Protection Zone 2c (Outer Protection Zone).

Given the presence of Unproductive Strata beneath the entire Site, it is considered unlikely that significant groundwater flow would be present in the shallow soils. Water abstractions in the surrounding areas are from the Principal Aquifers (Folkestone and Sandgate Beds) beneath the Gault Formation.

There are surface water features to the southeast and southwest of the Site, it is assumed that the groundwater flow in the deep aquifer is south/south-easterly. A previous intrusive investigation by Kent County Council encountered groundwater between 3.0m and 6.9m bgl at five locations in 1981.

Groundwater was encountered by Ashdown Site Investigation (ALI) Limited at depths between 0.4m and 3.0m in October 2010. In 2014, ASI encountered groundwater between 0.2m and 0.95m bgl within the Made Ground. Water encountered is discontinuous in the Made Ground rather than representative of water from the Gault Formation.

There is one recorded Environmental Permit for discharge to groundwater, this is located 933m northwest and covers final / treated effluent discharges to underground water.

There are ten recorded groundwater abstractions within a 1km radius of the Site, it is assumed these are abstracting from the Folkestone and/or Sandgate Beds, below the Gault Formation. The closest of these is for a potable water supply operated by Affinity Water Limited approximately 174m northeast of the Site.

3.3 Ecological Systems

The Landmark Envirocheck Report identified the following ecological systems to be within 500m of the Site:

- Kent Downs Area of Outstanding Natural Beauty located 254m north.
- Folkestone to Etchinghill Escarpment Site of Special Scientific Interest and Special Area of Conservation, located 390m north.

3.4 Potentially Significant Pollution Linkages

A review of historical maps, environmental data sources and reports was undertaken as part of the PERA (ref. WIE10619-100-R-2-1-5-JT) to determine the likelihood of historical and current potential contaminative sources. A summary is provided below.

3.4.1 Historical Land Uses

The Site

Two large stockpiles of rubble were identified in the northeast during the Site reconnaissance.

Historical maps show the south east of the Site, and later the central portion and north east of the Site were occupied by brickworks and associated excavations from 1875. Buildings and potentially railway sidings are denoted next to the brickworks in the central portion of the Site on historical mapping from early to mid-20th century. The brickworks excavation in the central portion of the Site is shown as a pond from mid to late 20th century when it appears that brickworks activities ceased and associated infrastructure was cleared.

Existing environmental reports reviewed as part of the Waterman PERA show detail the southern extent of the Site was used as a refuse dump by Folkestone Borough Council from 1962 and occasionally by Shepway District Council from 1974. In the latter period of its refuse use, it was used for tipping of road and park waste. The date of last tipping is not known.

Information obtained from intrusive investigations undertaken by Ashdown Site Investigation Limited in 2010 (report ref. Ref: LW21271) and 2014 (report ref. Ref: LW25193) proved the thickness of Made Ground to 5.2m bgl. Soil analytical results from these investigation were rescreened against current Waterman Generic Assessment Criteria (GAC) as part of the Waterman PERA. Exceedances of lead, PAHs and localised arsenic were noted in soils with respect to the proposed residential with gardens end

use in the south of the Site. Localised exceedances of PAHs were noted in soils with respect to the proposed commercial end use in the north of the Site.

Three rounds of ground gas monitoring were undertaken as part of the 2010 investigation and six rounds of ground gas monitoring for the 2014 investigation. Maximum concentrations of carbon dioxide and methane were recorded as 17.6% and 15.7% for 2010 respectively, and 10% and 4.7% respectively.

Site Surroundings

The surroundings comprise the M20 motorway to the north and Hanson Quarry Products Europe Ltd (LAPPC Permit), approximately 20m northeast. Land uses to the east of the Site comprise a coach depot and warehouse unit, and commercial and light industrial uses of the Biggins Wood Industrial Estate.

Residential properties and gardens are located to the immediate south of the Site. Cemex UK Materials Ltd (LAPPC Permit) is located approximately 400m southeast. A school with playing fields is located to the west of the Site. A petrol filling station (LAPPC Permit) registered to Eurotunnel Uk Terminal Totalfinaelf (Uk) Ltd is located approximately 370m west of the Site.

Historical maps show the presence of brickworks and associated excavations to the south and southeast of the Site from 1875 and to the northeast from the early 20th century. The mapping indicates the brickwork's operations ceased circa 1950. Unspecified works, vehicle works, factories and depots are denoted in the vicinity of the Site from around the mid 20th century. Historical maps also indicate the presence of laundries greater than 170m south and southeast and an electricity sub-station 80m northeast.

The potential contaminants of concern identified in the Waterman PERA are detailed in Table 4.

Table 4: Potential contaminants of concern

Source	Associated Contaminants
On-Site (current)	
Made Ground	Potentially contains total petroleum hydrocarbon (TPH), PAHs, asbestos, metals, metalloids, ground gas, vapours, and leachate.
Rubble Stockpiles	Metal, metalloids, PAHs, TPH and asbestos and leachate
Unidentified heaps	Metal, metalloids, PAHs, TPH and asbestos and leachate
On-Site (historic)	
Potential refuse heap	Metals, metalloids, PAH, TPH, and asbestos, and leachate
Brickworks	Metals, metalloids, PAH, TPH, and leachate
Infilling of brickwork excavations and ponds	Potentially contains asbestos, metals and metalloids, ground gas and vapours, and leachate
Off-Site (current)	
Coach depot	Metals, metalloids, PAHs, fuels, oils and solvents
Motorway	Metals, metalloids, TPH, PAHs
Off-Site (historic)	
Brick Works	Metals, metalloids, PAH, TPH and leachate.

Laundries	Solvents, polychlorinated biphenyls (PCBs) and fuels, asbestos
Infilling of brickwork excavations	Potentially contains, TPH, PAHs asbestos, metals and metalloids, ground gas and vapours, and leachate
Concrete Works	TPH, PAHs, asbestos, metals, metalloids
Motor Vehicle Works	TPH, PAHs, asbestos, metals, metalloids
Electricity sub-station	PCBs

Potentially significant linkages between contamination hazard sources and relevant receptors are summarised in Table 5.

Table 5: Potentially significant pollutant linkages

Receptor		Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
Human Health						
Future Site Users		Contaminants arising from current and historical land uses	Direct contact, ingestion, and dust inhalation.	Medium	Previous intrusive investigations have identified elevated contaminant levels within the underlying soils. Delineation through further assessment is therefore required. The proposed development may include areas of soft landscaping. Therefore, there are considered a direct active pollutant pathways to future human health receptors. Following the results of the further intrusive Site investigation, a remedial strategy will be required to mitigate the risks to human health receptors.	Low
		Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces.	Medium	Elevated levels of ground gases have been identified during limited ground gas monitoring in previous intrusive investigations. The potential for vapours cannot be discounted. The proposed developments residential and commercial end use is likely to include confined spaces. As such, the potential for the accumulation of ground gases/vapours is considered to be a medium risk. Further ground gas monitoring should be undertaken The results of the ground gas and vapour monitoring should be used to identify the scope of ground gas and vapour protection measures required.	Low
Off-site residents/users		Contaminants arising from the Site's current and historical uses.	Migration off-site via wind entrainment, allowing contaminants to be in direct contact, ingested, or inhaled by off-site residents / workers.	Medium	Previous intrusive investigations have identified elevated contaminant levels within the underlying soils. During the construction process measures will be put in place to prevent fugitive emissions of dust. In areas not capped by the built development or paving suitable capping will be use to prevent fugitive emissions of contaminated dust.	Low
		Ground gas and vapours	Lateral migration off-	Medium	Due to significant depths of potentially contaminated Made Ground on-site, there is potential for off-site migration via granular	Low

Receptor		Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
		from Made Ground and infilling.	site and accumulation within confined spaces.		materials and ingress into confined spaces. The residential land use directly to the south of the Site is therefore considered to be particularly at risk due to their proximity to the Site, and low air change capacity. Further ground gas monitoring should be undertaken. The results of the ground gas monitoring should be used to identify what ground gas protection measures, if any, are required.	
Construction Workers		Contaminants arising from current and historical land uses	Direct contact, ingestion, and dust inhalation.	Medium	Previous intrusive investigations have identified the presence of elevated contaminants on-Site During the construction phases, ground workers should wear the appropriate PPE, RPE, and maintain good hygiene standards. These measures will act as appropriate precaution measures to mitigate the risks to ground workers. The potential for asbestos to be presented within the ground should be considered.	Low
		Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces.	High	Previous intrusive investigations have identified the presence of elevated ground gases on-Site. Vapours may also be present. The requirements of the Confined Space Regulations 1997 should be followed during the redevelopment works.	Low
Property						
On-Site structures		Contaminants arising from current and historical land uses on-Site,	Chemical attack on buried services and concrete	Medium	Building foundations and associated services should be designed to mitigate the risk of chemical attack. Previous reports have identified that soil has a sulphate content falling into Design Sulfate Class DS-1 to DS-3 of Table C2 of the Building Research Establishment Special Digest No 1 “Concrete in aggressive ground”, 2005. The results of previous pH tests indicate that the underlying soils are alkaline. All new developments buried foundations and services, should be designed in accordance with the appropriate guidance.	Low
		Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces	Medium	Previous intrusive investigations have identified the presence of elevated ground gases on-Site. Vapours may also be present. These ground gases/vapours may accumulate within confined spaces. Given the previous intrusive investigation was limited to six rounds only, further ground gas and vapour monitoring should be undertaken The results of the ground gas and vapour monitoring	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				should be used to identify the scope of ground gas and vapour protection measures required.	
Off-site structures	Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces.	Low	Previous intrusive investigations have identified the presence of elevated ground gases on-Site. Vapours may also be present. Due to dense clayey nature migration ground gas and vapours is unlikely. Further gas monitoring should be undertaken on-Site, in order to fully quantify the Site's ground gas/vapour regime.	Low
Ecological Systems					
AONB and SSSI	Contaminants from on Site sources,	Lateral migration	Low	The Kent Downs Area of Outstanding Natural Beauty is located 254m north. The Folkestone to Etchinghill Escarpment Site of Special Scientific Interest and Special Area of Conservation is located 390m north. Given the distance of the identified receptors and the absence of Made Ground extending to the north of the Site (M20 road cutting is present) the potential for contaminants to migrate off-site to the north is considered reduced.	Low
Controlled Waters					
Drainage feature in northeast of the Site	Contaminants from on-Site sources,	Run-off from stockpiled arisings during redevelopment	Low	Some potentially contaminated Made Ground in the shallow soils on-Site will be excavated during construction works. The stockpiled arisings from these works could potentially lead to contaminated surface run-off reaching the drainage feature on-Site. During the redevelopment of the Site, appropriate measures for managing waste and techniques for preventing run-off from stockpiled arisings should be utilised.	Low
Culverted drain running through the centre of the Site towards Caesar's Way	Contaminants from on-Site sources	Migration off-site through preferential pathways	Low	A culverted drain runs through the centre of the Site and towards Caesar's Way. Some of the drain's inspection covered appeared to have been dislodged leaving the drain open to surface run off. The drain was observed containing residual standing water. It is not apparent what and where the culverted drain is draining. However, it is assumed it drains towards a sewer in Caesar's Way.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				It is our understanding the drain is to be removed or capped off for the Development.	
Principal Aquifers at depth	Contaminants from on-Site uses	Vertical migration	Low	The Gault Formation beneath the Site is an unproductive clay aquiclude. It will act as a barrier between potential shallow soil contamination and the underlying Principal Aquifers (Folkestone and Sandgate Beds). Therefore it is highly unlikely that vertical migration of contaminants will occur, causing contamination to deep groundwater. There are no abstraction wells or mineshafts recorded on-Site which are likely to act as a pathway for contaminants to reach the Principal Aquifers. The proposed development is due to consist of residential houses and commercial uses it is considered unlikely that the foundations of new structures will penetrate the Gault Formation into the deep Principal Aquifers.	Low
Pent Stream	Contaminants from on-Site uses, including TPH, PAH, Asbestos, Metals	Lateral migration through soil	Low	The Gault Formation beneath the Site is an unproductive clay aquiclude and will prevent the migration of water within soils to the Pent Stream. It is highly unlikely lateral migration of contaminants will occur and impact the Pent Stream.	Low

4. Rationale and Specific Objectives

The objective of this investigation is to and characterise the ground conditions, the hazard sources, pathways and receptors and to reduce uncertainties. Information obtained from this investigation will be used to augment existing site investigation data obtained on Site from previous site investigations.

The development proposals comprise low rise residential properties with gardens in the south of the Site with open space soft landscaping. The north of the Site comprises commercial uses included office units and industrial/storage units and hardstanding.

Specific objectives include:

- Assess ground conditions and contaminants on-Site, adding to existing data;
- Assess the soil properties to inform design of foundations and paved areas;
- Preliminary Waste Classification of the soils on-Site;
- Assess the Site's ground gas and vapour regime;
- Generic Quantitative Risk Assessment for contamination receptor linkages; and
- The Generic Quantitative Risk Assessment will inform the preparation of a Remediation Strategy for the Site which will describe how identified contamination receptor linkages will be broken as part of the Site's redevelopment.

5. Methodology

The intrusive investigation work was undertaken in general accordance with the Code of Practice for Site Investigation BS 5930 (2015) and the Code of Practice for the Investigation of Potentially Contaminated Sites BS 10175 (2011).

5.1 Design of Investigation

The design of the investigation was informed by the findings of the Waterman PERA, existing site investigation information, the development proposals and the requirement to provide an indication of disposal options for existing soils on Site.

The proposed works are detailed in the Specification for Site Investigation Works (Report Ref. WIE10619.100.S.1.2.1.JC dated April 2016) and are summarised as follows:

- Clearing all SI locations for buried services;
- 5No. boreholes to terminate in the Gault Formation (2 x 10mbgl and 3 x 20mbgl);
- 16 to 17No. trial pits to a maximum depth of 3 to 4mbgl;
- CBR testing for pavement design;
- In-situ geotechnical testing within the boreholes progressed;
- Ground gas and vapour monitoring installations within new and existing boreholes and window sample holes progressed on-Site;
- Permeability testing of the Gault Formation, comprising falling head tests ;
- Collection of soil samples and groundwater for environmental and geotechnical testing, and for Preliminary Waste Classification of soils; and
- In-situ headspace analysis using a Photo-ionisation Detector (PID).

Strategy for Selection of Exploratory Hole Locations

Sampling locations were carefully selected in order to characterise the zones layers and anomalous features of the conceptual model and to target, as far as possible, potentially contaminated areas identified in the Waterman PERA.

A summary of the investigation locations and features investigated is presented in Table 6: Ground investigation strategy.

Table 6: Ground investigation strategy

Site Investigation Location ID	Proposed End Use at Site Investigation Location	Rationale	Termination Depth and Stratum	Monitoring Well Details - Strata Targeted	Environmental Soil Samples Analysed	Suite of Environmental Analysis for Soils	Geotechnical Samples Analysed
Trial Pits							
TP1	Commercial	Establish nature and extent of Made Ground and supplement existing data. Previous site investigations identified hydrocarbon staining in adjacent Made Ground.	2.2m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP2	Residential	Establish nature and extent of Made Ground and supplement existing information. Previous investigations encountered Made Ground in adjacent area 2.6m thick.	3.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, inorganic non-metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground) Shear vane test of cohesive materials.
TP3	Public Open Space	Establish nature and extent of Made Ground and supplement existing data. Previous investigation identified elevated PAHs and lead in adjacent Made Ground.	3.3m (Gault Formation)	N/A	0.5m bgl (Made Ground)	Metals, PAHs, Asbestos. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP4	Public Open Space	Establish nature and extent of Made Ground and supplement existing data. Previous investigation identified elevated PAHs and lead in adjacent N/A Made Ground.	3.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP5	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	2.2m bgl (Made Ground)	N/A	2.0m bgl (Made Ground)	Metals, inorganic non-metals, TPH (Total), PAHs, Asbestos. WAC analysis.	Not Scheduled

Site Investigation Location ID	Proposed End Use at Site Investigation Location	Rationale	Termination Depth and Stratum	Monitoring Well Details - Strata Targeted	Environmental Soil Samples Analysed	Suite of Environmental Analysis for Soils	Geotechnical Samples Analysed
						PID monitoring of all environmental samples.	
TP6	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	3.2m bgl (Made Ground)	N/A	0.5m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP7	Commercial	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	2.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Gault Formation). Shear vane test of cohesive materials.
TP8	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	2.2m bgl (Made Ground)	N/A	0.5m bgl (Made Ground)	Metals, inorganic non-metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP9	Public Open Space	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data. Thickness of Made Ground not established in the south east of the Site.	3.1m bgl (Gault Formation)	N/A	1.5m bgl (Made Ground)	Metals, TPH (Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP10	Commercial	Establish the nature of the stockpiled material for preliminary waste classification purposes.	N/A	N/A	Representative Sample Taken of the Made Ground.	Metals, inorganic non-metals, TPH (Total), PAHs, Asbestos. WAC analysis.	Shear vane test of cohesive materials.

Site Investigation Location ID	Proposed End Use at Site Investigation Location	Rationale	Termination Depth and Stratum	Monitoring Well Details - Strata Targeted	Environmental Soil Samples Analysed	Suite of Environmental Analysis for Soils	Geotechnical Samples Analysed
						PID monitoring of all environmental samples.	
TP11	Area of Tree Planting	Establish nature and extent of Made Ground associated with the historical clay pit in the north east of the Site.	3.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PCBs. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP12	Public Open Space	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data. Previous investigations encountered Made Ground in adjacent area.	2.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP13	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	3.6m bgl (Made Ground)	N/A	0.5m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP14	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data.	2.8m bgl (Made Ground)	N/A	0.5m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos, VOCs, SVOCs. PID monitoring of all environmental samples.	Bulk Sample (Made Ground). Shear vane test of cohesive materials.
TP15	Commercial	Establish ground conditions in north of the Site and supplement existing data.	2.0m bgl (Gault Formation)	N/A	1.0m bgl (Gault Formation)	Metals, TPH (Total), PAHs. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.

Site Investigation Location ID	Proposed End Use at Site Investigation Location	Rationale	Termination Depth and Stratum	Monitoring Well Details - Strata Targeted	Environmental Soil Samples Analysed	Suite of Environmental Analysis for Soils	Geotechnical Samples Analysed
TP16	Commercial	Establish ground conditions in north of the Site and supplement existing data.	2.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, inorganic non-metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP17	Commercial	Establish ground conditions in north of the Site and supplement existing data.	2.0m bgl (Gault Formation)	N/A	0.1m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
TP18	Commercial	Establish the nature of the stockpiled material for preliminary waste classification purposes.	N/A	N/A	Representative Samples Taken of the Made Ground.	Metals, inorganic non-metals, TPH (Total), PAHs, Asbestos. WAC analysis. PID monitoring of all environmental samples.	Shear vane test of cohesive materials.
Boreholes							
BH101	Residential	Establish nature and extent of Made Ground and supplement existing data. Previous investigation identified elevated PAHs and lead in adjacent Made Ground. Provide geotechnical information to assist with foundation design.	12.5m bgl (Gault Formation)	Made Ground	0.5m bgl (Made Ground	Metals, TPH (CWG and Total), PAHs, Asbestos, VOCs, SVOCs. PID monitoring of all environmental samples.	Disturbed Samples (Made Ground), Undisturbed and Disturbed Samples (Gault Formation). Shear vane test of cohesive materials.

Site Investigation Location ID	Proposed End Use at Site Investigation Location	Rationale	Termination Depth and Stratum	Monitoring Well Details - Strata Targeted	Environmental Soil Samples Analysed	Suite of Environmental Analysis for Soils	Geotechnical Samples Analysed
		Install ground gas/vapour monitoring wells into Made Ground and undertake ground gas/vapour monitoring and supplement existing data to ascertain the requirement for ground gas protection measures. Groundwater sampling if groundwater present in monitoring wells.			1.5m bgl (Gault Formation)	Metals, TPH (Total), PAHs.	
BH102	Commercial	Establish nature and extent of Made Ground associated with the historical landfill activities and supplement existing data. Previous investigation indicates Made Ground in the vicinity of this location is >5m thick. Provide geotechnical information to assist with foundation design. Install ground gas/vapour monitoring wells into Made Ground and undertake ground gas/vapour monitoring and supplement existing data to ascertain the requirement for ground gas protection measures. Groundwater sampling if groundwater present in monitoring wells. Assess the permeability of the Gault Formation.	14m bgl (Gault Formation)	Made Ground	0.5m bgl (Made Ground) 3.0m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PID monitoring of all environmental samples. Metals, TPH (Total), PAHs, Asbestos.	Disturbed Samples (Made Ground), Undisturbed Samples (Gault Formation). Shear vane test of cohesive materials. Falling head test in the Gault Formation.

BH103	Residential	Establish nature and extent of Made Ground associated with the historical landfill activities and supplement existing data. Previous investigation identified elevated PAHs in adjacent Made Ground. Provide geotechnical information to assist with foundation design. Install ground gas/vapour monitoring wells into Made Ground and undertake ground gas/vapour monitoring and supplement existing data to ascertain the requirement for ground gas protection measures. Groundwater sampling if groundwater present in monitoring wells. Assess the permeability of the Gault Formation.	13.5m bgl (Gault Formation)	Made Ground	0.5m bgl (Made Ground)	Metals, TPH (CWG and Total), PAHs, Asbestos. PCBs. PID monitoring of all environmental samples.	Disturbed Samples (Made Ground), Undisturbed and Disturbed Samples (Gault Formation). Shear vane test of cohesive materials. Falling head test in the Gault Formation.
					3.0m bgl (Made Ground)	Metals, TPH (Total), PAHs, Asbestos.	
BH104	Residential	Establish nature and extent of Made Ground associated with the historical landfill area and supplement existing data. Previous investigation identified elevated PAHs and lead in adjacent Made Ground. Provide geotechnical information to assist with foundation design. Install ground gas/vapour monitoring wells into Made Ground and undertake ground gas/vapour monitoring and supplement existing data to ascertain the requirement for ground gas protection measures. Groundwater sampling if groundwater present in monitoring wells.	13m bgl (Gault Formation)	Made Ground	0.1m bgl (Made Ground)	Metals, inorganic non-metals, TPH (CWG and Total), PAHs, Asbestos. WAC analysis. PID monitoring of all environmental samples.	Disturbed Samples (Made Ground), Undisturbed and Disturbed Samples (Gault Formation). Shear vane test of cohesive materials.
					4.0m bgl (Made Ground)	Metals, TPH (Total), PAHs, Asbestos.	

BH105	Commercial	Establish nature and extent of Made Ground and supplement existing data. Provide geotechnical information to assist with foundation design. Install ground gas/vapour monitoring wells into Made Ground and undertake ground gas/vapour monitoring and supplement existing data to ascertain the requirement for ground gas protection measures. Groundwater sampling if groundwater present in monitoring wells. Assess the permeability of the Gault Formation.	14.5m bgl (Gault Formation)	Upper horizons of Gault Formation	0.1m bgl (Made Ground) 1.0m bgl (Gault Formation)	Metals, TPH (CWG and Total), PAHs, Asbestos. Metals, TPH (Total), PAHs.	Undisturbed and Disturbed Samples (Gault Formation). Shear vane test of cohesive materials. Falling head test in the Gault Formation.
Window Sample Holes							
WS205 – WS209	Commercial	Install ground gas and vapour monitoring to establish the ground gas and vapour regime of the Site. Groundwater sampling if groundwater present in monitoring wells.	Made Ground and Upper Horizons of Gault Formation	Upper horizons of Gault Formation	N/A	N/A	Shear vane test of cohesive materials.
WS201 – WS204 and WS210	Residential	Install ground gas and vapour monitoring to establish the ground gas and vapour regime of the Site. Groundwater sampling if groundwater present in monitoring wells.	Made Ground	Made Ground	N/A	N/A	Shear vane test of cohesive materials.
HP01, HP02A, HP02B	Residential	Collection of shallow soil samples for VOC and SVOC analysis for assessment of the vapour regime of the Site	Made Ground	N/A	0m bgl – 0.5m bgl	VOCs and SVOCs	N/A
Existing monitoring wells (WS10, WS12, WS14*, WS115, WS122)	Residential - WS12, WS14, WS115, WS122. Commercial – WS10.	Monitoring to establish the ground gas and vapour regime of the Site. Groundwater sampling if groundwater present in monitoring wells.	Made Ground and Upper Horizons of Gault Formation	Made Ground	N/A	N/A	N/A

California Bearing Ratio Tests							
CBRs 1-3	Commercial	Establish the bearing pressure at formation level to assist with road and pavement design.	0.3 – 0.45m bgl	N/A	N/A	N/A	N/A
CBRs 4-6	Residential	Establish the bearing pressure at formation level to assist with road and pavement design.	0.3 – 0.4m bgl	N/A	N/A	N/A	N/A

*WS14 is not recorded as installed with a monitoring well by Ashdown Site Investigation. However, the Ashdown Site investigation location plan indicates no other installed WS locations in the vicinity of the monitoring well that was located. Therefore, the exploratory hole log, location and reference of WS14 has been used.

Sampling Strategy

In Made Ground, spot soil samples were collected from near surface soils then at a depth of 0.50m bgl, and at 0.5m intervals and change of strata. Additional samples were also taken on encountering visual or olfactory evidence of contamination. In natural material spot soil samples were collected at 1.00m intervals up until 10.0mbgl, after which samples were collected at 3.0m intervals. Samples were also taken at the interface between each stratum encountered. PID analysis was undertaken of all environmental soil samples to screen for the presence of VOCs.

Composite soil samples were taken from trial pits TP10 and TP18 excavated into of the two stockpiles in the east of the Site. The composite samples comprised no less than five increments to provide a representative sample of the material encountered and enable a preliminary waste assessment of the material.

A sample of bituminous surfacing was recovered from TP18 for Preliminary Waste Classification purposes. A suspected asbestos containing material (ACM) was also recovered from the stockpile for asbestos screening.

Boreholes and window sample holes were installed with monitoring wells to enable monitoring of the ground gas and vapour regime and collection of groundwater samples.

Groundwater sampling was undertaken to assess the quality of perched groundwater at the Site. The presence of hydrocarbon free product on the groundwater was investigated by retrieving a surface sample of groundwater using a disposable bailer, which did not show evidence of a hydrocarbon sheen on the surface.

A semi-quantitative approach has been used to assess risks from vapours in accordance with CIRIA C682. Concentrations of hydrocarbon vapours (ppm) have been recorded in monitoring wells using a PID. Soil headspace testing has been used to supplement the vapour monitoring along with analysis for VOCs and SVOCs in soil and groundwater samples to determine if a significant vapour regime exists at the Site and whether the collection of vapour samples was necessary.

Quality Control

The samples were then despatched in batches under a chain of custody procedure to Environmental Scientifics Group (ESG) who are a UKAS accredited laboratory, for subsequent chemical analysis. Where appropriate, samples were stored within cool boxes containing ice packs.

All contractors, including laboratories, used during this project have been approved by Waterman as a part of in-house Integrated Management System (BS ISO 9001, BS ISO 14001) procedure. This requires all third parties to demonstrate competence and a high standard of work during a regular audit scheme.

5.2 Health and Safety

All work carried out on Site was in accordance with Waterman Group Health & Safety policy.

There were no incidents during the Site Investigation works.

6. Site Activities

The work was carried out in five stages shown in Table 7.

Table 7: Summary of fieldwork activities

Phase of Work.	Activity	Contractor	Date	Supervision
Service clearance of exploratory hole locations	GPR scanning of exploratory hole locations and tracing service runs.	Discovery Surveys Ltd	11 April 2016	Geocore Site Investigations Ltd (Geocore)
Surveying in of all exploratory hole locations	Plotting exploratory hole locations and recording ground levels.	MSURV	11 April 2016	Waterman
Ground Investigation	15No. trial pits to 3.5m bgl maximum depth. Soil logging, collection of environmental and geotechnical soil samples.	Geocore	11 April – 13 April 2016 and 19 April 2016	Waterman
	5No. cable percussion boreholes locations to 15.0m bgl maximum depth. Soil logging, collection of environmental and geotechnical soil samples.	Geocore	13 April – 19 April 2016	
	10No. window sample locations to 1.1m bgl. Soil logging.	Geocore	28 April 2016	
Monitoring Well Installation	5No. boreholes installed to a maximum depth of 7.3m bgl. 10No. window samples installed to 1.1m bgl.	Geocore	13 April – 19 April 2016 and 28 April 2016	Waterman
Groundwater and Ground Gas and vapour Monitoring	Ground gas and vapour monitoring on 3No. occasions (5No. Waterman boreholes, 10No. Waterman window sample holes and 5No. Ashford monitoring wells). 6No. rounds to be undertaken in total.	Waterman	From 6 May 2016	N/A
	Sampling of groundwater in monitoring wells.	Waterman	12 May 2016	N/A

Note: m bgl = metres below ground level

6.1 Service Survey

Each exploratory hole location was cleared for services using ground penetrating radar (GPR) and a cable avoidance tool (CAT scanner). The line of the culverted drain running through the Site was traced using a sonde.

Hand pits were dug at each of borehole and window sample hole location prior to the commencement of drilling.

6.2 Ground Investigation

The rationale behind the exploratory hole locations is detailed in Table 6. The locations of the exploratory holes undertaken are shown in Appendix A.

During excavation and drilling, all arisings were placed on plastic sheeting to prevent cross-contamination of soil. Representative soil samples were obtained from the exposed strata and sealed in one litre plastic tubs with airtight lids, phials and glass jars. The environmental soil samples taken were subject to screening by a photo ionisation detector (PID). Disturbed and undisturbed samples were recovered from boreholes and bulk samples recovered from trial pits for geotechnical analysis. Shear vane tests were undertaken on cohesive materials recovered from the exploratory holes.

All the trial pits and boreholes were logged and sampled for environmental and geotechnical purposes.

6.2.1 Alterations to the Proposed Scope of Works

BH101, BH102 and BH104 had a target depth of 20m bgl and BH103 and BH105 had a target depth of 10m bgl. Target depths were altered after the cable percussion drilling encountered difficult drilling and refusal in very dense sand from around 11m bgl. All boreholes were drilled to refusal. Termination depths ranged from 13m bgl to 15m bgl which enabled additional information to be gained from BH103 and BH105.

The thickness of Made Ground encountered at borehole BH105 was insignificant (0.15m). Therefore, it was not possible to screen the Made Ground for ground gas in this location. The installation at borehole BH105 therefore targets the upper horizons of the Gault Formation.

TP13 was re-excavated on 19 April 2016 to establish the nature and extent of a shallow concrete mass encountered on the first excavation attempt. A breaker was not available during the first excavation attempt but was available to break through the concrete mass at the second excavation attempt. The concrete mass was not identified as extensive and was less than 0.1m in thickness.

An additional trial pit (TP18) was excavated to enable sampling of a stockpile of material in the north east of the Site.

Ground gas and groundwater monitoring of wells installed during previous investigations was intended. However, five out of twenty-four of these monitoring wells were located. Therefore, ten window sample holes were drilled and installed with monitoring wells for ground gas monitoring purposes across both the proposed residential and commercial end uses of the Site to augment the five installed boreholes and five existing monitoring well locations.

Two hand pits were excavated in the proposed residential extent of the Development to take additional shallow soil samples for VOC and SVOC analysis and augment information on the vapour regime at the Site.

6.2.2 Trial Pits

Eighteen trial pits were excavated up to a depth of 3.6m bgl using a wheeled mechanical excavator with a backactor. Upon completion, excavations were backfilled as far as possible with arisings and compacted with the excavator bucket.

6.2.3 Boreholes

Five boreholes were advance to a maximum depth of 15m bgl using cable percussion techniques. At each borehole location casing was advanced to beyond the Made Ground as to minimise the potential for cross-contamination between the Made Ground and Gault Formation.

6.2.4 Window Sample Holes

Ten window sample holes were advanced to a maximum depth of 1.1m bgl. Each of the window sample holes were installed with 50mm diameter monitoring wells targeting the Made Ground and upper horizons of the Gault Formation.

6.2.5 California Bearing Ratio (CBR) Tests

Six CBR tests were undertaken across the Site at likely formation levels in areas of proposed highways and pavements.

6.3 Monitoring Wells

6.3.1 Boreholes

On completion of drilling, a 50mm diameter slotted HDPE standpipe with gas tap and bung was installed in each of the boreholes to enable future ground gas, vapour and groundwater monitoring and sampling. The response zone of the wells was within the Made Ground Strata in boreholes BH101 – BH104 and within the upper horizons of the Gault Formation in borehole BH105. The intake section comprise a slotted pipe surrounded by pea gravel. The plain sections of pipe comprise a sand bridge followed by minimum bentonite thickness of 0.5m. The boreholes are kept sealed by a lockable secure cap at ground level.

6.3.2 Window Sample Holes

The window sample holes were drilled using a hand held techniques to a maximum depth of 1.1m bgl. The response zone of the wells was within the Made Ground Strata in window sample holes WS201 – WS204 and WS210, and in the Made Ground and upper horizons of the Gault Formation in window sample holes WS205 – WS209. The plain sections of pipe comprise a sand bridge followed by a minimum bentonite thickness of 500mm. The boreholes are kept sealed by a lockable secure cap at ground level.

6.4 Groundwater Monitoring and Sampling

Groundwater monitoring was carried out on 12 May 2016. Prior to monitoring being undertaken, each well was purged of three well volumes or purged dry and left to recharge if the well was of a low yield.

The presence of hydrocarbon free product on the groundwater was investigated by retrieving a surface sample of groundwater using a disposable bailer, which did not show evidence of a hydrocarbon sheen. on the surface.

Groundwater samples were retrieved from the installed monitoring wells where a retrievable column of water was present. Low-flow purging and sampling equipment was used for the majority of monitoring wells to ensure the disturbance of the water column is kept to a minimum and a high quality representative sample is obtained. A peristaltic pump was used to purge the wells targeting shallow groundwater. Purged water was passed over a multi-parameter probe which took continuous readings of several parameters, including temperature, pH, dissolved oxygen and conductivity. Dedicated plastic tubing was used for each sample hole.

Groundwater samples were retrieved from the following monitoring WS10, WS14, WS206, BH101, BH102, BH103, and BH104.

The collected water samples were then sealed into bottles with pre-measured fixatives where necessary, as supplied by the specialist laboratory, and transported in cool boxes to the testing laboratory.

A full set of groundwater monitoring results is presented in Appendix D.

6.5 Ground Gas and Vapour Monitoring

Ground gas and vapour monitoring is currently ongoing. A minimum of six rounds of monitoring are to be undertaken across a three month period. Three visits have been carried out on 6, 12 and 25 May 2016 which included ground gas and vapour monitoring of monitoring wells installed at part of the Waterman Site Investigation and the located monitoring wells from the Ashford Site investigations. A further three ground gas and vapour monitoring visits are scheduled.

Monitoring was generally undertaken when the barometric atmospheric pressure was high but falling. One visit was undertaken during a period of low pressure (<1000mb). On each visit, the peak and steady concentration readings of methane, carbon dioxide and oxygen were recorded, together with flow readings and atmospheric pressure. This was undertaken using an infrared gas analyser. Groundwater levels were also measured. Monitoring for Volatile Organic Compounds (VOCs) was undertaken using a PID.

A full set of ground gas monitoring results, including the model type and detection limits of the on Site equipment used for the fieldwork, is presented in Appendix C.

7. Results

7.1 Geological Strata

Detailed logs of the strata encountered, together with records of the samples taken during the SI are provided in Appendix B.

The strata encountered in the investigation were generally consistent with the anticipated geology identified in the Waterman PERA. The thickness of the Folkestone Beds and Sandgate Beds was not proven. Geological cross sections utilising logs from this site investigation and previous investigations are provided in Appendix A.

A summary of the geological strata encountered is shown in Table 8 and Table 9.

Table 8: Geological strata encountered in proposed commercial area

Soil Type	Depth of Top of Stratum (m bgl)	Thickness (m)	Typical Description
Made Ground	0m	Absent to 7.3m	Sandy gravelly CLAY of varying proportions. Gravel consists of sub-angular medium to coarse sized quartz, flint, sandstone, limestone, brick, concrete, coal, ash, clinker and cobbles of concrete. Occasional rootlets. Metals sheets encountered in TP16. Slight organic odour in TP1. Made Ground is generally absent or limited in thickness in the northern and north eastern portion of the Site. Made Ground thickness generally <0.4m* with the exception of BH012 (7.5m), TP1 (1.2m) and TP11 (1.9m).
Gault Formation	0m – 7.3m	5.9m – 13.35m where proven	Stiff grey slightly sandy CLAY with shell fragments.
	13.2m – 13.5m	Not proven	Very dense greenish grey slightly clayey, slightly gravelly SAND. Gravels consist of sub-angular to sub-rounded fine to medium pyrite, quartz and limestone from 13.2m bgl in BH102 and 13.5m bgl in BH105. Possible lower boundary of the Gault Formation.

*TP10 and TP18 excluded as these locations were excavated into stockpiles.

Trial pits TP10 and TP18 were excavated into two separate stockpiles of Made Ground in the east of the Site.

TP10 comprises Made Ground comprising gravelly slightly sandy clay with many cobbles and fragments of plastic, metal, wood, and vinyl flooring. The gravel comprises sub angular medium to coarse coal, brick, sandstone and clinker. Cobbles are of sub angular brick, concrete and clinker.

TP18 comprises Made ground of gravelly coarse sand with many cobbles and boulders. The gravel is of sub angular medium to coarse brick, concrete, bituminous road surfacing, clinker and ash. The cobbles and bounders are sub angular concrete and brick. The suspected ACM sample recovered from this trial pit was not identified by the laboratory as containing asbestos.

The geological strata encountered in the proposed residential area of the Site is summarised in Table 9

Table 9: Geological strata encountered in proposed residential area

Soil Type	Depth of Top of Stratum (m bgl)	Thickness (m)	Typical Description
Made Ground	0m	Up to 7.5m where proven	Sandy gravelly CLAY of varying proportions. Gravel consists of sub-angular medium to coarse sized quartz, flint, sandstone, limestone, brick, concrete, coal, ash, clinker and cobbles of concrete. Occasional pottery, wood, glass and metal. Occasional rootlets. Carpet encountered 1.45 – 1.9m in TP5. Bitumen road surfacing at 0.45 – 0.9m in TP14. Made Ground generally >1.8m thickness with the exception of BH101 (1.4m) and TP12 (0.45m).
Gault Formation	0.45m to 7.5m	4.8m – 9.6m where proven	Stiff grey slightly sandy CLAY with shell fragments.
	11m – 12.5m	Not proven	Very dense greenish grey slightly clayey, slightly gravelly SAND. Gravels consist of sub-angular to sub-rounded fine to medium pyrite, quartz and limestone from 11m bgl in BH101, 12.3m bgl in BH103, 12.5m bgl in BH105. Possibly lower boundary of the Gault Formation.

7.2 Permeability Testing

A total of three falling head tests were undertaken to assess the permeability of the Gault Formation and assess potential risk of vertical migration of shallow contamination to the Principal Aquifers at depth. Two falling head tests were undertaken in the Gault Formation underlying the fill material in boreholes BH102 and BH103.

The falling head tests were undertaken in borehole BH102 at 8.6m bgl, BH103 at 9m bgl and BH105 at 2m bgl. Results from the falling head tests are provided in the Factual Report in Appendix B

Monitoring the depth of water was undertaken for 45 minutes during each falling head test, during which time a fall in the water level was not observed.

7.3 Underground Structures and Obstructions

No significant underground structures or obstructions were encountered in the exploratory holes. A culverted drain runs through the centre of the Site and towards Caesar's Way to the east of the Site. Some of the drain's inspection covered appeared to have been dislodged leaving the drain open to surface run off. The drain was observed containing residual standing water. It is not apparent what and where the culverted drain is draining.

7.4 Trial Pit Stability

Trial pits remained open on completion of excavation with the exception of trial pits TP05, TP08, and TP14. These trial pit became unstable and collapsed whilst in Made Ground after encountering water.

Details on the stability of exploratory holes are provided on exploratory hole logs in the Factual Report in Appendix B

7.5 Chemical Analysis

The environmental laboratory test results are presented in Appendix D.

7.6 Groundwater Levels

The results of the groundwater monitoring are included in Appendix E. A summary of groundwater levels encountered during the intrusive investigation and levels recorded during monitoring is provided below.

7.6.1 Boreholes and Window Sample Holes

Groundwater with slow inflows was recorded during cable percussion drilling in the Made Ground and in the Gault Formation at depth. Groundwater was not encountered in the window sample holes.

Groundwater seepage and slow inflow was encountered in Made Ground in boreholes BH101at 1m bgl, BH102 at 4m bgl, and BH103 at 2m bgl.

Groundwater was encountered in the dense sand layer in the Gault Formation in boreholes BH101, BH103, BH104 and BH105. Groundwater was encountered in borehole BH101 at 12.5m bgl and no rise in water level was recorded. In borehole BH103 groundwater was encountered at 13.5m bgl. A slow inflow and groundwater rose to 12.5m bgl. In borehole BH104 groundwater was encountered at 13m bgl. A slow inflow was recorded and groundwater rose to 12.6m bgl. In borehole BH105 groundwater was encountered at 14m bgl. A slow inflow was observed and groundwater rose to 13.5m bgl. Following completion, boreholes were backfilled with bentonite up to the base of the monitoring wells.

In consideration of the ground conditions encountered during the investigation and the subsequent groundwater level monitoring, the groundwater in the Made Ground and upper horizons of the Gault Formation is considered to be discontinuous across the Site. Groundwater monitoring indicates levels of between 0.05m bgl and 4.66m bgl. Over the monitoring period no trends in flow direction have been identified.

7.6.2 Trial Pits

Groundwater was encountered in Made Ground in several trial pits. The water was perched and was encountered at 2m bgl in trial pit TP05, 1.9m bgl in trial pit TP08 and at 2.30m bgl in trial pit TP14.

7.7 Ground Gas and Vapour

Ground gas and vapour monitoring is currently ongoing. To date three rounds of ground gas and vapour monitoring have been undertaken across a five week period in order to detect the presence of ground gas and vapours. A further three ground gas and vapour monitoring visits are scheduled.

A complete set of ground gas results is included within Appendix C. Table 10 summarises the peak concentrations (% volume or parts per million) of carbon dioxide, methane, lower explosive limit, carbon monoxide, hydrogen sulphide, volatile organic compounds and flow rates that were recorded in each monitoring well installed as part of the Waterman Site investigation and the located Ashdown Site Investigation monitoring wells over the monitoring period. Details for the targeted strata are provided with proposed end uses at that monitoring well location.

A total of three rounds of ground gas monitoring were undertaken between 29 September 2010 and 13 October 2010 for the Ashdown 2010 Site investigation. A total of six rounds of ground gas monitoring were undertaken between 30 July 2014 and 28 August 2014 for the Ashdown 2014 Site investigation. A summary of the results from the Ashdown investigations is included in Section 7.7.1

Table 10: Ground gas monitoring summary – Waterman Site Investigation ground gas and vapour monitoring

Monitoring Well and Site Investigation	Proposed End Use	Target Strata	Gas Concentration					
			Methane (max % v/v)	Carbon Dioxide (max % v/v)	Oxygen (min % v/v)	Lower Explosive Limit (max %)	Volatile Organic Compounds (max ppm)	Flow rate (max L/hr)
BH101 - Waterman	Residential	Made Ground	1.3	17.9	2.0	30.5	0.6	-0.2
BH102 - Waterman	Commercial	Made Ground	<0.1	6.5	11.3	<0.1	0.4	<0.1
BH103 - Waterman	Residential	Made Ground	0.5	5.5	<0.1	16.1	0.2	<0.1
BH104 - Waterman	Residential	Made Ground	0.3	8.7	0.2	7.3	0.7	<0.1
BH105 - Waterman	Commercial	Made Ground	<0.1	3.0	<0.1	<0.1	0.8	<0.1
WS201 - Waterman	Residential	Made Ground	<0.1	0.6	19.1	<0.1	0.4	<0.1
WS202 - Waterman	Residential	Made Ground	<0.1	4.9	13.7	<0.1	0.4	<0.1
WS203 - Waterman	Public Open Space	Made Ground	<0.1	13.1	8.7	<0.1	<0.1	<0.1
WS204 - Waterman	Residential	Made Ground	<0.1	0.8	10.7	<0.1	0.6	<0.1
WS205 - Waterman	Commercial	Upper horizons of Gault Formation	<0.1	1.5	20.0	<0.1	<0.1	<0.1
WS206 - Waterman	Commercial	Upper horizons of Gault Formation	<0.1	1.6	7.2	<0.1	<0.1	<0.1
WS207 - Waterman	Commercial	Upper horizons of Gault Formation	<0.1	1.9	18.8	<0.1	<0.1	<0.1
WS208 - Waterman	Commercial	Upper horizons of Gault Formation	<0.1	1.1	7.9	<0.1	<0.1	<0.1
WS209 - Waterman	Commercial	Upper horizons of Gault Formation	<0.1	0.5	2.1	<0.1	<0.1	<0.1

WS210-Waterman	Public Open Space	Made Ground	<0.1	3.6	17.6	<0.1	<0.1	<0.1
WS10 - Ashdown	Commercial	Made Ground	<0.1	5.5	12.6	<0.1	<0.1	<0.1
WS12 - Ashdown	Residential	Made Ground	0.7	7.0	<0.1	17.2	0.8	<0.1
WS14* - Ashdown	Residential	Made Ground*	0.1	7.4	<0.1	2.4	0.7	<0.1
WS115 - Ashdown	Residential	Made Ground	3.0	6.9	<0.1	69.5	0.2	<0.1
WS122 - Ashdown	Residential	Made Ground	1.2	4.4	<0.1	27.6	0.3	<0.1

*Assumed installation details based on the exploratory hole log of WS14

Gas flows in the same monitoring wells ranged between <0.1 and -0.2 litres per hour. Flows of 1.4 and -6.5 l/hr were recorded in BH101, 13.3 l/hr in WS206 and 3.4 l/hr in WS209. However, these readings quickly fell to either <0.1 l/hr or steady at -0.2 l/hr (in BH101). Groundwater has been recorded as rising above the screened section in BH101, WS206 and WS209. Therefore, the readings of 1.4 l/hr,-6.5 l/hr, 3.4 l/hr and 13.3 l/hr are considered not representative of ground gas flows and have been excluded.

A peak methane reading of 3.0% was recorded. This reading was obtained from WS115, in the centre of the Site in the proposed area of residential development. A peak carbon dioxide reading of 17.9% was recorded. This reading was obtained from BH101, also in the proposed area of residential development. Depleted oxygen levels were recorded in numerous monitoring wells. Readings below the limit of detection for oxygen were recorded in six monitoring wells.

Lower explosive limit concentrations were generally below the limit of detection. Where concentrations were recorded above the limit of detection, concentrations between 2.4% LEL and 69.5% LEL were observed. These were recorded in the proposed residential extent of the Site.

The maximum concentrations of carbon monoxide and hydrogen sulphide were recorded as of 6ppm and 1ppm respectively.

A maximum VOC concentration of 0.8ppm was recorded in the monitoring wells.

VOC concentrations from soil headspace testing were largely below the PID limit of detection (<0.1ppm). A maximum concentration of 3.2ppm was recorded from a sample taken at 1.5m bgl in trial pit TP9. Concentrations of VOCs and SVOCs in soils and groundwater are discussed in Section 10.

7.7.1 Ashdown Site Investigation Ground Gas Monitoring

2010 Ashdown Site Investigation

A total of three monitoring rounds were undertaken. Peak concentrations of methane and carbon dioxide were recorded as 15.7% and 17.6% respectively. Depleted oxygen levels were recorded in the monitoring wells. The lowest concentration was recorded as 0.3%. A peak carbon monoxide concentration of 10ppm was recorded. Hydrogen sulphide concentration were below the limit of detection. Flow rates were recorded as being below the limit of detection.

The peak methane and lowest concentration of oxygen were both recorded in WS10, located in the central portion of the Site and in the commercial area of the proposed Development. The peak carbon dioxide concentration was recorded in WS5, located in the west of the proposed commercial area.

2014 Ashdown Site Investigation

A total of six monitoring rounds were undertaken. Peak concentrations of methane and carbon dioxide were recorded as 4.7% and 10.2% respectively. The lowest oxygen concentration was recorded as 0.2%. The peak methane concentration was detected in WS122 in the central portion of the Site in the proposed residential area of the Development. The peak carbon dioxide concentration was recorded in WS104 in the west of the proposed commercial area. Flow rates were recorded as being below the limit of detection.

7.8 Preliminary Waste Assessment and Materials Management

A preliminary assessment has been undertaken to characterise soils using HazWasteOnline™. Soil samples taken from the Waterman site investigation only have been assessed as these provide the most up to date analysis of potential waste soils on Site. The laboratory analysis results for a sample of road surfacing identified on the surface of trial pit TP18 were also entered into HazWasteOnline™.

HazWasteOnline™ is a web-based tool for classifying hazardous waste. The tool follows the latest Environmental Agency guidance and European regulations. A summary of the assessment results are provided in Section 11.

8. Geotechnical Testing

8.1 In-Situ Testing

8.1.1 Standard Penetration Tests

Standard Penetration Tests (SPT's) were undertaken at regular intervals within the boreholes to provide 'N' values for empirical assessment of strength and density parameters. Detailed results of the SPT tests and blow counts are included on the borehole logs included in Appendix B and a summary is presented in Table 11:

Table 11: Standard penetration test results

Stratum / Geological Origin	Range of SPT 'N' Values	Number of Tests	Comments	Derived Values Range of φ' or cu
Made Ground (Granular)	0 – 6	5	Very loose to loose Sand, typically very loose	-
Made Ground (Cohesive)	0 – 15	7	Extremely low strength to medium strength Clay	-
Gault Formation (Cohesive)	11 – 50	13	Medium strength to very high strength Clay, typically high strength Strength increases with depth	cu = 55kPa – 250kPa
Gault Formation (Granular)	>50	10	Very dense Sand	φ' = 41°

8.1.2 Hand Shear Vane Testing

Shear strength of the shallow cohesive strata was determined by undertaking hand vane tests within the trial pits. The results of these tests are presented in the logs in Appendix B, and are summarised in Table 12:

Table 12: Hand Vane test results

Stratum / Geological Origin	Apparent Cohesion Values – Hand Vane Tests (kN/m²)	Undrained Shear Strength / Comments
Made Ground (Cohesive)	50 - 90	Medium to high strength
Gault Formation (Cohesive)	80 - >130	High strength

The majority of the results for the Gault Formation ranged between 100kN/m² and >130kN/m², indicating clays of high strength, which are consistent with the descriptions presented within the exploratory hole logs.

8.1.3 Field Based CBR Testing

Field based CBR tests were undertaken at regular spacings beneath the proposed access roads and parking areas for the purposes of pavement design. Tests were undertaken at shallow depths (300mm to

450mm) below existing ground level at the time of the investigation, which is likely to be representative of the subgrade to the pavement development areas. The results and plots of CBR values are included in Appendix E and summarised in the Table 13:

Table 13: CBR test results

Stratum / Geological Origin	Type of Test	Range of CBR Values (%)	Characteristic CBR Value (%)	Comments
Made Ground (Cohesive)	In-situ CBR Test	1.51% – 11.54%	1.5%	Tests suggest very variable subgrade strength
Gault Formation (Cohesive)		1.14% – 2.32%	1.2%	Relatively consistent subgrade strength

In addition to the above assessment of near surface subgrade, consideration should also be given to materials at deeper levels which will have a more significant effect on the long-term settlement of the slab / pavement.

8.2 Laboratory Testing

Representative soil samples were scheduled for:

- Natural moisture content and plasticity index;
- pH value and water soluble sulphate (SD1 Suite);
- Undrained Shear Strength Triaxial Tests;
- Particle Size Distribution Tests;
- Compaction Testing; and
- One dimensional Consolidation Tests.

The results are summarised below and presented in Appendix E.

8.2.1 Natural Moisture Content and Plasticity Index

Samples of natural cohesive material were taken for moisture content and plasticity index determinations. The test results are included in Appendix E and are summarised in Table 14. The modified plasticity index can be used as an indicator of volume change potential of the soil and is calculated as the plasticity index of the soil multiplied by the fraction of particles less than 425µm.

Table 14: Volume change potential

Stratum / Geological Origin	Range of Plasticity Indices % (Modified)	Volume Change Potential
Made Ground (Cohesive)	15% – 19%	Low
Gault Formation (Cohesive)	32 – 45%	Medium to high

8.2.2 pH Value and Water Soluble Sulphate (SD1 Suite)

The Aggressive Chemical Environment for Concrete classifications for the soil types identified at the Site have been determined in accordance with BRE Special Digest 1:2005 (SD1). SD1 requires that sites are

first identified as being in one of four categories based on natural ground / 'Brownfield' conditions and pyrite content. The Site has been categorised as: Brownfield – may contain pyrite.

The results of laboratory testing are included in Appendix E and summarised in Table 15:

Table 15: Summary of SD1 suite analysis

Stratum / Geological Origin	Sample Location and Depth(m bgl)	Characteristic Water Soluble Sulphate Value (mg/l SO4)	Characteristic pH Value	Total Potential Sulphate (%)	Oxidisable Sulphides (%)
Made Ground	BH101 – 0.5m	558	7.7	0.228	0.147
	BH102 – 0.5m			0.102	0.068
	BH102 – 2.0m			0.279	0.195
	BH103 – 3.0m			0.342	0.262
	BH104 – 0.5m			0.375	0.304
	BH104 – 3.5m			1.125	0.745
Gault Formation	BH101 – 1.5m	1,860	7.7	0.129	0.053
	BH103 – 9.0m			2.199	0.179
	BH105 – 1.0m			2.085	0.605
Groundwater	-	236	6.9	-	-

As the characteristic value of sulphate is less than 3000mg/l and the characteristic pH is greater than 5.5, the concentrations of magnesium, nitrate and chloride are not considered significant in determining the design sulphate class.

8.2.3 Undrained Triaxial Testing

Shear strength of the natural superficial strata was determined by quick undrained triaxial tests (single-stage) on single 100mm diameter specimens. The results of these tests are presented in Appendix E, and are summarised in Table 16:

Table 16: Triaxial and Lab Vane test results

Stratum / Geological Origin	Apparent Cohesion Values – Quick Triaxial Tests (kN/m^2)	Undrained Shear Strength / Comments
Gault Formation (Cohesive)	38 – 209	Low to very high strength Clay, typically high strength

The majority of the results for the Gault Formation (Cohesive) ranged between 90kN/m² and 135kN/m², indicating clays of high strength, which are consistent with the descriptions presented within the exploratory hole logs.

8.2.4 Particle Size Distribution Testing

Samples of the Made Ground and shallow Gault Formation were tested for Particle Size Distribution (PSD) tests. The results of the PSD tests are presented within Appendix E and summarised within Table 17.

Table 17: Particle size distribution test results and Specifications for Highways Works Classification

Stratum / Geological Origin	Sample Loc & Depth (m bgl)	% passing 0.063mm sieve	Spec for Highway Works Classification
Made Ground	TP1 – 0.5m	90%	Class 2A/B
	TP2 – 0.5m	64%	Class 2A/B
	TP4 – 0.5m	41%	Class 2C
	TP6 – 0.5m	32%	Class 2C
	TP8 – 1.0m	94%	Class 2A/B
	TP9 – 0.5m	92%	Class 2A/B
	TP14 – 0.5m	10%	Class 1A/B
Gault Formation (Cohesive)	TP7 – 1.0m	98%	Class 2A/B

8.2.5 2.5kg Dry Density / Moisture Content Relationship Testing

Dry Density / Moisture Content Relationship testing was undertaken on a total of 4No. samples of Made Ground and 1No. sample of Gault Formation to assess the feasibility of re-compaction of shallow fills at the Site. The results of the compaction tests are presented within Appendix E and summarised within Table18.

Table 18: Dry Density / Moisture Content Relationship Results

Stratum / Geological Origin	Sample Loc & Depth	MDD (Mg/m^3)	Initial Moisture Content %	OMC %	> 95% of MDD?	<5% air voids?
Made Ground (Cohesive)	TP1 – 0.5m	1.37	37%	31%	N	Y
	TP2 – 0.5m	1.79	17%	15%	Y	Y
	TP6 – 0.5m	1.62	21%	19%	Y	Y
Made Ground (Granular)	TP14 – 0.5m	1.91	11%	13%	Y	N
Gault Formation (Cohesive)	TP7 – 1.0m	1.47	30%	29%	Y	Y

The compaction data has been assessed by comparing the results against criteria commonly used in earthworks to achieve an adequate density for engineered fills. The criteria summarised in the above table indicate whether the samples could achieve in excess of 95% of maximum dry density (a requirement often included in highways specifications) and whether they could be compacted to less than 5% air voids ratio (a requirement applied where raft foundations are to be adopted).

8.2.6 Laboratory CBR Testing

CBR tests were undertaken on recompacted samples at natural moisture content to assess the feasibility of re-compaction of shallow fills. The results and plots of CBR values are included in Appendix E and summarised in the Table 19:

Table 19: CBR test results

Stratum / Geological Origin	Sample Loc & Depth	CBR Values (%)
Made Ground (Cohesive)	TP1 – 0.5m	3.1%
	TP2 – 0.5m	3.8%
	TP6 – 0.5m	5.6%
Made Ground (Granular)	TP14 – 0.5m	23.0%
Gault Formation (Cohesive)	TP7 – 1.0m	6.4%

8.2.7 One Dimensional Consolidation

One dimensional consolidation tests were undertaken on 100mm diameter specimens of natural soils at a series of confining pressures. The results of the tests are presented within Appendix E and summarised within Table 20 below.

Table 20: Summary of 1D consolidation testing

Stratum / Geological Origin	Range of mv values at overburden plus 100kPa (m^2/MN)	Qualitative Description of Compressibility / Comments
Gault Formation (Cohesive)	0.135 – 0.180	Medium compressibility Compressibility reduces with depth

8.3 Excavations, Trench Shoring & Dewatering

All trenches should be excavated in accordance with CIRIA Report 97 'Trenching Practice'. Comments relating to the stability of excavations (i.e. trial pits) and groundwater seepages are included in the logs in Appendix B and a summary of the stability is provided in Table 21.

Table 21: Stability of excavations and groundwater flows

Stratum / Geological Origin	Stability / Seepages	Comments
Made Ground	A number of trial pits collapsed, particularly where perched groundwater was encountered	Excavations in soft, loose or water bearing strata are likely to require shoring to maintain stability. Simple sump pumping may be required to control moderate groundwater seepages in granular materials.
Gault Formation	All pits in natural strata remained dry and stable upon completion	Shallow excavations (<1.2m) likely to be stable in the short term

9. Generic Assessment Criteria

The information requirements for generic quantitative risk assessment will depend on:

- The substance being assessed;
- The receptors being considered;
- The pathways being considered; and
- The complexity of the Site.

The outline conceptual model developed for the Site and reported in the Waterman PERA has identified potential pollutant linkages. These potential pollutant linkages have been investigated and the results assessed against generic assessment criteria.

The generic assessment criteria selected for each potential pollutant linkage are summarised in Table 22:

Table 22: Generic assessment criteria

Source	Pathway	Receptor	Generic Assessment Criteria
Contaminants present in soils and shallow groundwater.	Direct contact, inhalation.	Future users of the proposed Development. Off-site users.	Waterman Generic Assessment Criteria for residential, commercial and public open space.
Contaminated soils and shallow groundwater.	Direct contact and inhalation.	Construction workers.	Qualitative Risk Assessment.
Contaminants present in soils and shallow groundwater.	Leaching, lateral migration and migration through preferential pathways.	Off-site surface waters.	Environmental Quality Standards (EQS) for freshwater.
Ground gas and vapours from soils. Vapours from contaminated shallow groundwater.	Migration through soil matrix and accumulation in internal spaces. Inhalation and risk of explosion.	Future users of the proposed Development.	Gas Screening Value determination and assessment in accordance with CIRIA C665 for ground gas. Semi-quantitative risk Assessment for vapours utilising PID measurements alongside soil contamination results accordance with CIRIA C682.
Contaminants in soils and shallow groundwater.	Direct Contact.	New water supply pipes.	UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites.
Contaminated soils.	Direct Contact and root uptake.	Proposed soft landscaped areas.	Requirements for topsoil as specified in BS3882:2015.
Contaminated soils and groundwater.	Direct Contact.	New buried structures.	BRE Special Digest 1: 2005 Concrete in Aggressive Ground.

The generic assessment criteria used in this report are included in Appendix I.

9.1 Site Specific Information used to Support the Generic Risk Assessment

The Site specific information used to support the generic risk assessment undertaken as part of this investigation are described in the sections below. The results from the Waterman Site investigation and the Ashford site investigations (2010 and 2014) have been assessed against the relevant GACs.

Human Health Risk – Proposed End Uses

The data obtained during the Site investigation have been compared to the Waterman GAC for residential end use with plant uptake, commercial end use, and residential public open space for soils with 1% Soil Organic Matter (SOM). 1% was selected as a conservative and consistent approach across the Site and was based on the lowest SOM % identified in the soils. Soils up to 1.5m bgl have been screened against the relevant GACs for human health. This information will be used to inform of potential risk to humans from materials retained on Site for the Development.

The GACs selected are considered appropriate given the proposed end uses of the Site. Residential properties with private gardens are proposed in the southern portion of Site with areas of public open spaces also proposed. The northern portion of the Site comprises commercial end uses.

Human Health Risk – Construction Workers

A qualitative assessment of the risk to construction workers has been undertaken as part of this assessment, given that there are no specific GAC currently available for contamination risks to this receptor.

Controlled Waters

Controlled waters at the Site are considered to be the Principal Aquifers of the Folkestone Beds and Sandgate Beds. However, the Folkestone Beds and Sandgate Beds are overlain the low permeability Gault Formation.

Falling head tests were undertaken in the Gault Formation at borehole locations BH102, BH103 and BH105 to assess the permeability of the Gault Formation and the potential risk from shallow contamination to the Principal Aquifers. The failing head tests in BH102 and BH103 were undertaken in Gault Clay underlying a significant thickness of Made Ground.

The permeability tests showed the Gault Formation has negligible permeability. Therefore, the risk to the Principal Aquifers at depth from shallow contamination at the Site is considered low as a pathway is considered not to exist. The use of EQS for drinking water is consider not applicable.

The closest significant surface water feature is the Pent Stream located 104m east, which flows to the southeast. The Pent Stream is culverted 105m southwest of the Site. The Pent Steam is not considered to be in hydraulic continuity with the Site and a pathway is considered to not exist to this controlled water. However, a conservative approach has been utilised for assessing the quality of groundwater encountered at the Site and groundwater has been assessed against EQS for surface water receptors.

Ground Gas and Vapours

Potential receptors of ground gas generation are considered to be future Site users. The potential risk arising from ground gas has been assessed based of the approach recommended in CIRIA C665, BS 8485: 2015, and BS 8576: 2013 and a gas screening value (GSV) for the Site has been derived.

A minimum gas protection score has been derived in accordance with BS 8485: 2015. The proposed Development is considered to comprise Type A buildings (e.g. private housing) in the proposed residential extent and Type C (e.g. offices) and Type D buildings (e.g. warehouses) in the proposed commercial extent of the Site.

A semi-quantitative approach has been used to assess risks from vapours in accordance with CIRIA C682. Concentrations of hydrocarbon vapours (ppm) have also been recorded in monitoring wells using a PID. Soil headspace testing has been used to supplement the vapour monitoring along with analysis for VOCs and SVOCs in soil and groundwater samples.

Water Supply Pipes

The risk to water supply pipes has been assessed in accordance with UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites.

Re-use of Topsoil

The Development contains areas of soft landscaping in the proposed residential extent of the Site. Therefore, the risk to vegetation on the Site from contaminated soils will be assessed in general accordance with the requirements for topsoil as specified in BS3882:2015.

Buried Concrete

The risk to buried concrete has been assessed in accordance with the guidance provided in accordance with the guidance provided in the BRE special Digest 1 (2005) 3rd Edition.

10. Quantitative Environmental Risk Assessment

The potential pollutant linkages identified in Section 9 have been evaluated using the Generic Assessment Criteria described in Section 9 and Appendix G. The results of this evaluation are reported below:

10.1 Risk to Human Health

The results of the soil analysis were compared against the Waterman GACs for land intended for residential end use with plan uptake, commercial end use, and residential public open space. 1% SOM, for organic contaminants has been selected. A summary of the findings is presented in Tables 23 to 24.

10.1.1 Inorganic Contaminants

An overview of the comparison of inorganic contaminant concentrations with the relevant GACs is provided in Table 23. The table presents a summary of the GAC exceedances. Full results of laboratory analysis and screening criteria are provided in Appendix D and G respectively.

Table 23: Summary of generic quantitative risk assessment for human health from inorganic contaminants

Contaminant	Number of Samples Tested	Generic Assessment Criteria (mg/kg)	Maximum Concentration (mg/kg)	Number of Exceedances
Proposed Residential Area				
Lead	46	200	2280	25
Proposed Commercial Area				
No exceedances of the GAC identified	N/A	N/A	N/A	N/A
Proposed Public Open Space				
No exceedances of the GAC identified	N/A	N/A	N/A	N/A

A total of twenty-five exceedances for the relevant GAC for inorganic contaminants were identified. All exceedances identified were for lead and present in Made Ground in the proposed residential portion of the Site. The exceedances were identified in exploratory holes advanced across the residential portion of the Site. However, clusters of exceedances were also identified in the central portion of the Site. Clusters identified comprise exploratory hole locations: WS115, TP13, TP14, WS122, WS121, and WS123 in the proposed residential plot, and WS124, TP6, WS14 and WS125 located in the south of the proposed residential plot.

A plan showing exceedances of the relevant GAC for inorganic contaminants and their depth is provided in Appendix A.

Mitigation measures will be required to break pollutant linkages (direct contact, inhalation and ingestion) between future Site users of the proposed residential development and elevated concentrations of lead in shallow soils.

10.1.2 Organic Contaminants

An overview of the comparison of organic contaminant concentrations with the relevant GACs is provided in Table 24. The table presents a summary of the GAC exceedances. Full results of laboratory analysis and screening criteria are provided in Appendix D and G respectively.

Table 24: Summary of generic quantitative risk assessment for human health from organic contaminants (1% SOM)

Contaminant	Number of Samples Tested	Generic Assessment Criteria (mg/kg)	Maximum Concentration (mg/kg)	Number of Exceedances
Proposed Residential Area				
Naphthalene	46	2.3	40.5	4
Phenanthrene	46	95	529	4
Fluoranthene	46	280	661	2
Benzo(a)anthracene	46	7.2	330	15
Chrysene	46	15	300	8
Benzo(b)fluoranthene	46	2.6	274	25
Benzo(k)fluoranthene	46	77	248	2
Benzo(a)pyrene	46	2.2	341	29
Indeno(1,2,3-cd)pyrene	46	27	218	5
Di-benzo(a.h.)anthracene	46	0.24	81.1	29
Aromatic EC12-EC16	9	140	222	1
Aromatic EC16-EC21	9	260	446	1
Aromatic EC21-EC35	9	1100	1570	1
Proposed Commercial Area				
Di-benzo(a.h.)anthracene	30	3.5	7.63	1
Proposed Public Open Space				
Benzo(b)fluoranthene	9	7.1	10.7	3
Benzo(a)pyrene	9	5.7	15.9	3
Di-benzo(a.h.)anthracene	9	0.77	3.02	4

Exceedances of the relevant GACs for speciated PAHs have been identified in Made Ground across the proposed residential development. The exceedances are wide spread and have been identified in the majority of exploratory holes advanced in this extent of the Site. Exceedances for several PAHs have also been identified in proposed public open space areas. However, the majority of the GAC for public open space have been identified in the proposed public open space in the south west of the Site. A single exceedance of Di-benzo(a.h.)anthracene has been identified in the proposed public open space in the south east of the Site in TP9 at 1.5m bgl. A single exceedance has also been identified in the proposed commercial extent of the Site. The exceedance was identified in WS117 at 0.2m bgl for Di-benzo(a.h.)anthracene. The elevated concentrations PAHs are associated with Made Ground from historical landfilling activities on Site including the disposal of domestic refuse and road and park waste.

A plan showing exceedances of the relevant GAC for organic contaminants and their depth is provided in Appendix A.

The proposed residential extent of the Site comprises soft landscaping and public open space. Speciated PAHs in shallow soils have been indicated to be widespread across this area of the Site. Therefore, mitigation measures will be required to break the pollutant linkages (direct contact, inhalation and ingestion) between future Site users of the proposed residential development, public open spaces and elevated concentrations of speciated PAHs in shallow soils.

Potential pollutant linkages (direct contact, inhalation and ingestion) between the residual exceedance of Di-benzo(a.h.)anthracene in the proposed commercial area of the Site and future Site users are considered to be broken by the presence of buildings and hardstanding.

10.1.3 Asbestos Containing Materials

A total of sixty-six Made Ground samples taken for the Waterman Site investigation and Ashford 2014 Site investigation respectively were screened for the presence of asbestos containing materials (ACMs). No laboratory screening for the presence of ACMs was undertaken as part of the Ashford 2010 investigation.

The Ashford 2014 investigation did not record the presence of any detectable asbestos in the Made Ground samples. Two Made Ground samples were identified as containing ACMs. These were identified in exploratory holes TP2 at 0.1m bgl (amosite free fibres) and BH103 at 3m bgl (chrysotile free fibres). Asbestos quantification analysis of these soil samples recorded concentrations of less than 0.001%.

The primary pathway from asbestos in soils to human receptors is inhalation of free fibres. Asbestos fibres in soils at 3m bgl in borehole BH103 are not a risk to future Site users as they are unlikely to be disturbed at that depth by future Site users.

Soils at 0.1m bgl in trial pit TP2 underlie an area of proposed future hardstanding (a driveway). The presence of hardstanding would break the potential inhalation pathway. However, should the layout of the Development be altered to comprise soft landscaping in this area mitigation measures will be required to break the potential inhalation pathway between asbestos fibres in soil and future Site users.

10.1.4 Ground Gas and Vapours

Ground Gas

The peak methane concentration recorded at the Site is 15.7% and the peak carbon dioxide concentration recorded is 17.9%. A peak flow of -0.2l/hr has been recorded. Lower explosive limit concentrations were recorded above the limit of detection in the proposed residential extent of the Site. Concentrations of between 2.4% LEL and 69.5% LEL were recorded. On this basis a GSV of 0.0358l/hr has been calculated.

The monitoring results obtained to date indicate the Site's preliminary ground gas regime is classified as Characteristic Situation 2 – CS2. This classification applies to all development types except low rise housing with a ventilated floor flab. Type A buildings require a minimum gas protection score of 3.5. A minimum gas protection score has been derived on this basis using BS8485: 2015. Type C buildings require a minimum score of 2.5 and Type 3 buildings require a minimum score of 1.5.

Appropriate gas protection measures to achieve these scores are provided in the summary of BS8485-2015 in Appendix I.

Should a block and beam construction with a clear sub-floor void be selected for the residential properties then an NHBC traffic light classification of Amber 2 has been indicated by the ground gas monitoring results to date.

Ground gas protection measures for residential property will require a gas resistant membrane incorporated into foundation design and ventilated sub-floor void. Certification that these passive protection measures have been installed correctly should be provided.

Monitoring and assessment is ongoing and further detail of the requirements for ground gas protection measures will be incorporated into the final GQRA upon completion of the ground gas and vapour monitoring.

The potential risks from ground gas migrating from the Site to off-site receptors is considered low. Negligible flows have been recorded in the monitoring wells. Furthermore, the infilled former brickworks located on Site historically extended south of the Site to where residential properties are now located. Therefore migration of off-site sources of ground gas to off-site receptors is considered more plausible for these properties.

Made Ground thickness in the south west of the Site was indicated to be less than 2m in thickness. Residential property to the south west of the Site stands approximately 2m below the ground level of the western extent of the Site. Furthermore, historical maps indicate that these properties were constructed on undeveloped land, likely to be the low permeability Gault Formation

Therefore, it is considered that ground gas migration from this extent of the Site is unlikely.

The proposed Development is not considered to increase the risk to off-site receptors as the proposed residential extent, where a significant thickness of Made Ground has been identified, comprises numerous areas of soft landscaping, including along the southern boundary. Therefore, ground gas migrating vertically would not be forced to migrate laterally off-site.

The proposed commercial extent of the Site comprises buildings and hardstanding. However, this extent of the Site generally directly overlies the low permeability clay of the Gault Formation, as shown on the cross section drawings in Appendix A.

The protective measures required for the proposed commercial area are likely to be less than those required for the proposed residential area. However, this will be confirmed upon completion of the gas and vapour monitoring and discussed in final GQRA report. The ground gas regime should also be reviewed following confirmation of the proposed foundation solution.

Vapours

A maximum VOC concentration of 0.8ppm was recorded in the monitoring wells and VOC concentrations from soil headspace testing were largely below the PID limit of detection (<0.1ppm). A maximum concentration of 3.2ppm was recorded from a sample taken at 1.5m bgl in trial pit TP9.

Four soil samples were submitted for both VOC and SVOC analysis.

VOC and SVOC concentrations were below the laboratory limit of detection in sample BH101 at 0.5m bgl.

SVOC concentrations were generally below the laboratory limit of detection in sample TP14 at 0.5m bgl. SVOC concentrations in TP14 at 0.5m bgl above the laboratory limit of detection include speciated PAHs,

Dibenzofuran, 2-Methylnapthalene, and 1-Methylnapthalene. A peak SVOC concentration of 72.4mg/kg was reported, reported for Phananthrene. Excluding speciated PAHs, a peak SVOC concentration of 22.4mg/kg was reported for Dibenzofuran.

VOC concentrations were mainly reported as being below the laboratory limit of detection in sample TP14 at 0.5m bgl. VOC concentrations above the laboratory limit of detection include Benzene, Ethylbenzene, o-Xylene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene and Napthalene. A peak VOC concentration of 10.3mg/kg of Naphthalene was reported. 1,2,4-Trimethylbenzene was the next highest VOC concentration, reported as 0.018mg/kg.

Analysis of groundwater samples recovered from the monitoring wells reported the vast majority of SVOC concentrations as below the limit of detection. Acenaphlene and Fluorene were reported as above the limit of detection in groundwater samples recovered from monitoring wells BH102 (0.006mg/l and 0.002mg/l) and BH103 (0.011mg/l and 0.005mg/l). Phenanthrene was also reported above the limit of detection in BH102 (0.005mg/l).

VOC concentrations in groundwater samples recovered from monitoring wells were all report as below the limit of detection.

In consideration of vapour monitoring undertaken to date and laboratory analysis undertaken a significant vapour regime is not present on Site, and the risk to human health and structures considered low. As a result of the semi-quantitative vapour assessment, the collection of vapour samples are is not considered required to confirm the risk.

10.2 Risk to Controlled Waters

Laboratory results from groundwater samples have been assessed against current EA derived EQS. Contaminant exceedances are detailed in Table 25

Table 25: Summary of elevated determinands in groundwater samples

Contaminant	Generic Assessment Criteria (ug/l unless stated)	Location	Concentration (ug/l unless stated)
Inorganic Contaminants			
Chromium VI	3.4	BH104	60
Lead	7.2	BH104	57
Mercury	0.07	BH104	2.1
Zinc	125	BH104	257
Organic Contaminants			
Anthracene	0.4	BH104	0.638
Fluoranthene	1.0	BH104	1.82
Benzo(b)fluoranthene	0.03	WS14	0.081
		BH101	0.072
		BH102	0.214
		BH103	0.175
		BH104	0.12

Benzo(k)fluoranthene	0.03	WS14	0.031
		BH102	0.074
		BH103	0.06
		BH104	0.046
Benzo(a)pyrene	0.1	BH102	0.158
		BH103	0.132
Indeno(1,2,3-cd)pyrene	0.002	WS10	0.018
		WS14	0.049
		BH101	0.04
		BH102	0.12
		BH103	0.13
		BH104	0.074
Water Properties			
Biological Oxygen Demand	2.5 mg/l	BH101	4.4
		BH103	16.4
		WS10	3.7

No freshwater EQS are available for speciated TPHs. However, Aliphatics >C8-C44 was reported above the limit of detection in groundwater sampled from monitoring wells BH102 (0.013mg/l) and BH104 (0.047mg/l). Aromatics >C8-C44 was reported above the limit of detection in monitoring wells BH101 (0.032mg/l), BH102 (0.05mg/l), BH103 (0.043mg/l), BH104 (0.043mg/l), WS10 (0.011mg/l), and WS14 (0.013mg/l).

Elevated speciated PAHs were identified in all but one of the monitoring wells sampled for groundwater.

Elevated inorganic contaminants were identified in groundwater sampled in monitoring well BH104 in the south of the Site and elevated biological oxygen demand (BOD) was identified in monitoring wells BH101, BH103 and WS10. Groundwater level monitoring to date has indicated that groundwater is discontinuous across the Site and considered to be perched in the Made Ground. Falling head tests indicated the Gault Formation is of a negligible permeability. No significant controlled waters are considered to be in hydraulic continuity with the Site. Therefore, risks to controlled water are considered low.

10.3 Risk to Ecological Systems/Vegetation

Concentrations of copper, nickel and zinc in shallow soil samples (≤1.5m bgl) taken from the proposed residential extent of the Site were assessed against chemical thresholds for topsoil as detailed in BS3882:2015 (see Appendix I). Exceedances of the chemical thresholds are detailed below in Table 26

Table 26: Summary of generic quantitative risk assessment for vegetation

Contaminant	Number of Samples Tested	Generic Assessment Criteria (mg/kg)	Maximum Concentration (mg/kg)	Number of Exceedances	Exceedance Locations
Copper	49	200	1513	2	WS13 (1.1m bgl) WS122 (0.3m bgl)

Nickel	51	110	60	0	N/A
Zinc	49	300	434	6	TP4 (0.1m bgl) WS6 (1.0m bgl) WS11 (0.5m bgl) WS15 (0.70m bgl) WS107 (0.2m bgl) WS121 (0.2m bgl)

Exceedances are spread across the proposed residential portion of the Site. However, exploratory hole locations WS107 and TP4 are located in the west of the Site and are in close proximity to each other. Window samples WS121 and WS122 are in the central portion of the Site and are also in close proximity to each other.

Topsoil across is limited in volume, typically less than 0.2m in thickness. Furthermore, in addition to the soils identified as containing elevated concentrations of phytotoxic contamination, the presence of medium and course gravels, cobbles of concrete, and other anthropogenic objects (metal and plastic objects etc) is likely to render the majority of Made Ground across the Site as unsuitable for use as a topsoil.

In order to assess the suitability of topsoil to be reused the full range of testing specified needs to be carried out as specified in BS3882: 2015 and assessed by an appropriately qualified specialist. However, it is considered that a suitable thickness of topsoil for use as a capping layer and growth medium for vegetation will be required for soft landscaping to break the potential pollutant pathway between residual phytotoxic contaminants in Made Ground and further soft landscaped areas. Areas of tree planting require tree pits and a greater depth of clean imported materials to break the potential pollutant linkages to contaminants in soils. The use of capillary break layers could be used to break the potential pollutant linkage between contaminants in shallow groundwater and proposed areas of soft landscaping. Given the current status of the Site this material is likely to have to be imported.

10.4 Risk to Structures

An assessment on the appropriate concrete classifications has been undertaken in Section 12.3.1. All concrete must be suitably designed in accordance with this specification in order to prevent chemical attack from soils and perched groundwater to buried structures forming part of the Development.

10.5 Risk to Water Supply Pipes

The UKWIR project steering group decided that barrier pipes would provide sufficient protection for the supply of drinking water in all Brownfield site conditions. However, this approach needs to be agreed with the local water company.

10.6 Risk to Construction Workers

Construction and maintenance workers should wear appropriate PPE and if necessary RPE during any below ground works in order to mitigate potential effects from direct contact, dermal absorption, inhalation, and ingestion of contaminants in soils perched groundwater and asbestos fibres in soils. Elevated concentrations of carbon dioxide, methane, and depleted oxygen levels have been detected during ground gas monitoring. Therefore, the requirements included within the Confined Space Regulations 1997 should be adhered to.

All construction workers should be subject to mandatory health and safety requirements under the Construction, Design and Management (CDM) Regulations 2015 and Control of Substances Hazardous to Health (COSHH) Regulations 2002 and Control of Asbestos Regulations 2012.

11. Preliminary Waste Assessment of Soils

A Preliminary Waste Assessment has been undertaken on samples recovered from exploratory boreholes undertaken on-site. The assessment has not been undertaken in accordance within the guidelines given in WM3. The below assessment should therefore be regarded as preliminary only, and indicative of likely costs for the construction only. Further assessment will be required once it is known how the waste will arise, and what off-site recovery or disposal options are available.

Chemical analysis results from the samples taken as part of the Waterman Site investigation (twenty-eight dry soil samples and one sample of road surfacing encountered at the surface of TP18) have been entered into the HazWasteOnline™. Samples of Made Ground and Gault Formation have been screened for hazardous properties.

Results from the HazWasteOnline™ assessment and details on soil hazardous properties are included as Appendix J.

In addition to the HazWasteOnline™ assessment, Waste Acceptance Criteria (WAC) analysis was undertaken on the following samples:

- TP5 at 2m bgl (Made Ground);
- TP10 (composite sample of stockpiled Made Ground);
- BH104 at 0.1mbgl (Made Ground)

11.1 Hazardous Property Assessment

Two of the twenty-eight dry soil samples have been reported as containing hazardous properties by HazWasteOnline™ .Both samples were taken from Made Ground.

The sample of road surfacing taken from the surface of TP18 was identified as containing hazardous properties.

Details of the sample containing hazardous properties are provided in Table 27.

Table 27: Summary of samples reported as containing hazardous properties by HazWasteOnline™

Sample Reference	Strata	Hazardous Properties
TP14 – 0.5m bgl	Made Ground	HP3 (i): Flammable - TPH C6 to C40 (unknown oil); 1,2,4-trimethylbenzene; 1,3,5- trimethylbenzene. HP7: Carcinogenic - TPH C6 to C40 (unknown oil). HP11: Mutagenic - TPH C6 to C40 (unknown oil). HP14: Ecotoxic - benzo(a)anthracene.
BH101 – 4.0m bgl	Made Ground	HP14: Ecotoxic – Copper (I) oxide; lead compounds; zinc oxide.
TP18 – Blacktop	N/A	HP3(i): Flammable - TPH C6 to C40 (unknown oil). HP7: Carcinogenic -TPH C6 to C40 (unknown oil). HP11: Mutagenic TPH C6 to C40 (unknown oil).

The sample of road surfacing taken from the surface of TP18 was reported as containing hazardous properties. EA documents Hazardous Waste: Technical Guidance (WM3) Chapter 3 (Further guidance on assessment) advises that if the waste contains coal tar and coal tar distillates at or above 0.1% then

the waste would poses the hazardous property HP7 Carcinogenic. If concentration of benzo(a)pyrene is at or above 50mg/kg in the black top alone then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material to be hazardous and thus coded 17 03 01*. Assessment of the PAHs in the road surface sample reported benzo(a)pyrene below the laboratory limit of detection (<0.4mg/kg). Therefore, it is considered that the sample does not contain coal tar and the HP7 hazardous property for coal tar does not apply.

The TPH in the sample has been reported as not petrol or diesel and has been assessed as an 'unknown oil'. For an unknown oil at a concentration ≥ 0.1% (1000mg/kg) the waste will be HP7 Carcinogenic and HP11 Mutagenic unless the concentration of benzo(a)pyrene is <0.01% of the concentration of the TPH. The TPH in the sample was reported as 0.167% (1670mg/kg). Therefore, a benzo(a)pyrene concentration <0.16mg/kg would be required for HP7 and HP11 to not apply. However, the benzo(a)pyrene was reported as below the laboratory limit of detection <0.4mg/kg - a limit of detection higher than <0.16mg/kg required to disregard the HP7 and HP11 hazardous properties. The higher limit of detection was due to the dilution factor required to analyse the material.

It is considered that the HP3(i) Flammable hazard is unlikely to apply to this sample. In consideration of Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore TPH interpretation indicates a similarity to mineral oil which has a flash point >75ºC.

Asbestos fibres were identified in samples TP2 at 0.1m bgl (amosite free fibres) and BH103 at 3m bgl (chrysotile free fibres). However, Asbestos quantification analysis of these soil samples did not detect the presence of asbestos above the limit of detection (>0.001% w/w).

11.2 Waste Acceptance Criteria

The three Made Ground samples submitted for WAC analysis were identified as containing non-hazardous properties. WAC analysis has indicated the samples failed the inert landfill criteria and would be suitable for disposal as non-hazardous waste at a non-hazardous landfill.

11.3 Preliminary Waste Assessment Summary

Two Made Ground samples and a sample of road surfacing at TP18 have been reported as containing hazardous properties in HazWasteOnline™. All other of Made Ground samples and all Gault Formation samples were identified as containing non-hazardous properties.

The results of the HazWasteOnline™ assessment has indicated that the relevant European Waste Catalogue (EWC) codes for the disposal of the materials are as follows:

Table 28: Summary of likely waste streams

Material	EMC Code	EWC Code Description
Made Ground containing hazardous properties	17 05 03*	Soils and stones containing hazardous substances
Made Ground containing non-hazardous properties	17 05 04	Soils and stones other than those mentioned in 17 05 03
Gault Formation containing non-hazardous properties	17 05 04	Soils and stones other than those mentioned in 17 05 03
Road surfacing containing hazardous properties	17 03 01*	Bituminous mixtures containing coal tar

Samples of Made Ground submitted for WAC analysis were identified as containing non-hazardous properties. However, these samples failed the inert land fill criteria and would therefore likely be suitable for disposal as non-hazardous waste at a non-hazardous landfill.

The majority of Made Ground samples and all samples of Gault Formation were identified as containing non-hazardous properties. Composite soil samples taken from trial pits excavated into stockpiled materials in the east of the Site (trial pits TP10 and TP18) were reported as containing non-hazardous properties.

The sample of road surfacing was reported as containing hazardous properties by HazWasteOnline™. However, it is considered that his material could potentially be shown to contain non-hazardous properties upon laboratory analysis of benzo(a)pyrene with a limit of detection <0.01% of the concentration of the TPH.

Is it considered that the removal of soils from the Site can be minimised by their reuse on Site to facilitate filling where required provided they are geotechnically suitable. However, in consideration of the presence of anthropogenic objects in Made Ground it is considered that mechanical screening would be required to facilitate their reuse.

Any soils reused on Site should follow the CL:AIRE Definition of Waste: Development Industry Code of Practice, subject to appropriate sampling and testing, risk assessment and compliance with the requirements of the CL:AIRE Code of Practice.

Further validation and waste classification pursuant to EA documents Hazardous Waste: Technical Guidance (WM3) and Hazardous Waste: Waste Sampling (Appendix D) should be undertaken on materials to be removed from Site to confirm the most appropriate method of disposal.

Segregation of different waste streams would be required prior to disposal of materials off-site.

Natural uncontaminated soils may be acceptable as inert waste without testing at some landfills. However, acceptance of waste soils is at the discretion of the receiving landfill/treatment Site. It is recommended that the landfill operator is consulted at the appropriate time to discuss the conditions of their Environmental Permit.

12. Geotechnical Assessment

12.1 Proposed Development

This assessment has been prepared on the understanding that the Site is to be developed with two to three storey residential properties in the south and low rise commercial properties in the north, with associated gardens and access roads, in line with the proposed Development layout detailed in Appendix A If development proposals change, it may be necessary to revise the conclusions and recommendations made in this report and Waterman should be contacted to provide further advice.

The Site can be split in to two zones for the purposes of geotechnical assessment:

- Zone A - The area within the former clay pit, where a significant thickness of Made Ground is present; and,
- Zone B - The area outside the former clay pit, where Made Ground is typically less than 2m in thickness.

The Zones are identified on Waterman drawing ref: WIE10619-100-SA-80-0005-F01, in Appendix A.

12.2 Zone A

In the area within the former clay pit, shallow foundations are not likely to be suitable for the proposed residential and commercial development. Ground improvement, such as vibro-compaction, or piled foundations are likely to be required.

The Made Ground within the former clay pit has been identified to predominantly contain demolition rubble, ash and clinker, with limited quantities of ‘waste’ materials, such as metal, plastic and wood. The presence of pockets of ‘waste’ materials that may be unsuitable for ground improvement cannot be entirely ruled out.

12.2.1 Vibro-Compaction

Where significant/variable depths of un-engineered fill are present, consideration should be given to the use of vibro-compaction techniques. Vibro compaction is generally employed to stiffen and densify the ground to enable either reinforced strip footings or raft foundations to be utilised following treatment.

Compaction is achieved by the introduction of stone columns using a vibrating poker (where a proportion of fine material is present in the fill) or by deep compaction without stone columns (where the fill contains predominantly sand and gravel sized fractions). Conditions acceptable for vibro treatment are defined as those falling within two zones of a particle size distribution gradings chart, identified in NHBC Standards Chapter 4.6.

The gradings results obtained in the investigation classify as follows:

Table 29: Suitability for vibro techniques

Stratum / Geological Origin	NHBC Gradings Zone	Comments
Made Ground (Cohesive)	B	Soils falling within Zone B may be suitable for Vibrated Stone Columns

Made Ground (Granular)	A and B	Made Ground (Granular) may be suitable for Vibrated Stone Columns or deep compaction techniques

The above table confirms that the Made Ground (Cohesive) that makes up the majority of the Made Ground material within the clay pit may be suitable for treatment by vibrated stone columns. The Made ground (Granular) may also be suitable for treatment by vibrated stone columns.

In addition to the above gradings assessment, the following ground conditions are not suitable for vibro:

- soft clays with a stiffness < 30kN/m2 (however specialised 'bottom feed' techniques may still be suitable at lower strengths);
- ground with peat layers;
- voided filled ground (e.g. where cellars, tanks, drums may be present);
- chalk fill;
- clay fills subject to collapse compression;
- clay fills affected by rising or fluctuating water levels;
- filled ground still settling or expected to settle (i.e. recently placed non-engineered fills);
- fill containing degradable material where organic material forms more than 15% by volume; and
- clays with a plasticity index greater than 40%.

The deeper ground conditions should also be considered. Even where vibro may be employed at relatively shallow levels to form a stiff crust (e.g. to a depth of 6m), buildings should not be sited in locations where major changes in ground conditions could be expected at deeper levels without a more detailed consideration of the effects of differential settlement and global stability.

Where they are affected by shrinkable soils, vibro foundations should be deepened as necessary in accordance with NHBC Chapter 4.2 (Building near Trees). This may increase the depth to the underside of the reinforced strip footing (i.e. top of stone column level) and a tree survey would be required to confirm the required depth.

It should also be noted that the vibration generated during vibro works can cause damage to adjacent structures and buried services. A minimum standoff of distance of 5m to existing structures and services should be assumed at this stage and this should be confirmed by the specialist contractor.

Having reviewed the results of the Site investigation and the requirements outlined above, it is considered that the Site is not significantly affected by any of the above factors, although occasional buried obstructions have been identified during the ground investigation, and that vibro should be considered as a potential foundation option for the proposed development within Zone A.

It is essential that written confirmation as to the suitability of the technique is obtained from the specialist vibro contractor and this confirmation should be made available to NHBC, who should be notified of any proposed vibro ground improvement in advance.

The installation of vibro stone columns would introduce preferential pathways for the migration of ground gas. Gas protection measures should be reviewed following confirmation of the preferred foundation solution, as Site conditions will have changed significantly from those analysed as part of this report.

The specialist contractor should also be asked to fulfil the other requirements of NHBC Chapter 4.6, which include providing: justification for the design; a schedule of work; a validation testing regime, the

layout and depth of stone columns, and the accuracy to be achieved. On completion of the work, a full validation report should also be provided.

12.2.2 Piled Foundations

Should vibro-compaction not be suitable, piled foundations could be utilised. It is recommended that the advice of a specialist piling contractor should be obtained to confirm the suitability of piling and the most appropriate pile type. However, based on the Site investigation information, frictional piles could derive support from the high strength Gault Formation (Cohesive) present immediately beneath the Made Ground, from depths of between 5m to 7m below ground level to significant depth beneath the Site.

The final design of the piles will be the responsibility of the piling contractor. An allowance for probing of pile positions and/or drilling of obstructions should be allocated. The carrying capacity of the actual pile groups will in part depend on the number, type and size of pile chosen by the contractor and the quality of workmanship. Where cast in situ concrete piles are proposed, the roughness of the rock socket will influence the carrying capacity of the pile.

The piles should be designed based on the requirements of Eurocode 7 and guidance such as CIRIA Report 181, Piled Foundations in Weak Rock.

Given that the Site is affected by soft/loose material liable to settle and the Site may be subject to increased loadings due to filling activity, the effect of 'downdrag' or negative skin friction should be considered in the pile design.

The influence of the overlying Made Ground should be ignored in the pile capacity calculations. During detailed pile design the choice of factors of safety should ensure that appropriate safe working loads and settlement tolerances are met.

Subject to any piling trials, an acceptable percentage of piles should be load tested to at least twice working load. All piles should be integrity tested.

Significant underground obstructions were encountered in the Site investigation (e.g. buried concrete obstructions). The pile design should allow for the presence of any such obstructions.

On significantly contaminated sites, the Environment Agency may object to the use of piles on the basis that they can introduce pathways for contaminant migration. Such objections can usually be overcome if piles are designed in accordance with the EA's advice "Piling and Penetrative Ground Improvement Methods on Land Affected by contamination: Guidance on Pollution Prevention. NC/99/73.

Consideration should be given to the re-use of pile arisings if bored piles are used. It may be possible to re-use pile arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

Given the proximity of existing structures, the effects of noise and vibration (e.g. from piling plant) should be addressed as part of the contractors method statement.

12.2.3 Design Class for Concrete

Based on the characteristic values derived from SD1 testing, the Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be:

- Concrete in contact with Made Ground: DS-3 AC-3
- Concrete in contact with Gault Formation: DS-4 AC-3s

- Concrete in contact with Groundwater: DS-1 AC-1

12.2.4 Earthworks / Pavement Design

The results of compaction testing undertaken on samples of Made Ground indicate that it could generally be recompacted to achieve >95% of MDD and <5% air voids. Based upon the results obtained, it could be used as an engineered fill, subject to other suitability considerations. It should be noted that suitability for compaction is highly dependent on the initial moisture content of the material to be compacted, particularly as the results suggest that some of the material is significantly wet or dry of optimum moisture content. It may be necessary to condition the material prior to re-use.

Engineered fills should be subject to a confirmatory testing regime where they were required to achieve a compaction specification as a structural fill.

Construction plant should be provided with an adequate working platform in line with the requirements of BRE report, "BR 470: Working Platforms for Tracked Plant". Again, further advice should be sought from the temporary works designer. However, the following factors should be considered.

The Made Ground has CBR values in the range 1.5% to 11.5% and it is recommended that a value of 1.5% is used for the purposes of pavement design and temporary works design. Subgrade strength may vary considerably across the Site, especially where affected by variations in moisture content. The subgrade is not likely to support construction traffic without deteriorating rapidly. Low strength subgrades could be improved using one of the following options:

- The material at the surface could be removed and replaced with suitable material. The thickness removed may typically be between 0.5 and 1.0m and the new Design CBR should be assumed to be equivalent to 2.5%;
- A lime / cement stabilisation process could be utilised to increase the CBR value of the near surface subgrade, enabling proposed pavement areas, temporary access roads and working platforms to be designed based on an improved CBR value (design value in excess of say 2.5%). A specialist contractor should be asked to confirm suitability and the most appropriate method and technique; and,
- The incorporation of a geogrids/geosynthetic material may be assist in reducing capping layer thicknesses. However, it should be noted that excavating back through areas treated with geogrid, e.g. to install drainage or foundations, would result in damage to the geogrids which would then require repairing.

During construction, the in-situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.

12.2.5 Floor Slabs

It is recommended that suspended floor slabs should be adopted due to the potential hazardous gas risk, the low CBR value of the natural subgrade, the depth and variability of Made Ground and the variability of the subgrade across the building footprint.

The design of floor slabs should only be finalised when gas monitoring has been completed and assessed, as the recommendations of the gas monitoring report will influence the final choice of floor slab design. The above advice is provided for guidance only at this stage.

12.2.6 Groundwater / Stability of Excavations

Comments relating to the stability of excavations (i.e. trial pits) and groundwater seepages are included in the logs in Appendix B. Perched groundwater was identified at between 2m bgl and 4m bgl within the Made Ground. Groundwater was also struck in the Gault Formation (Granular) at greater depth, typically 12.5m bgl to 14m bgl. The presence of groundwater at depth should be considered during pile design.

Based on observations made during fieldwork, even shallow excavations in Zone A are likely to require shoring to maintain stability.

With regard to shoring and de-watering measures, further advice should be sought from the temporary works designer, however, the following factors should be considered:

- All trenches should be excavated in accordance with CIRIA Report 97 'Trenching Practice';
- Trench shoring should be keyed into basal materials beneath the base of the trench. The embedment depth clay may be significantly deeper than the depth of the excavation being supported; and
- Dewatering measures to be considered include: simple sump pumping; and well point dewatering. Simple sump pumping may be required to control moderate groundwater seepages in granular materials. Well point de-watering would likely be required in deeper excavations to control significant groundwater flows.

Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc. Where contamination has been encountered, it may be possible to reuse foundation arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

In line with BS6031, all excavations should be examined daily by a competent person to ensure that they remain safe. Where the sides cannot be sloped back to a safe angle, as approved by a competent and experienced person, their continued stability should not be taken for granted. Vertical or steep faces should be provided with support unless instructed otherwise by a competent person.

12.3 Zone B

In the area outside the former clay pit, shallow foundations are likely to be suitable for the proposed residential and commercial development.

12.3.1 Characteristic Values and Design Bearing Resistance

Based upon the Site investigation data and a review of the derived values summarised in Section 8, characteristic values can be assigned to each strata. EC7 defines the characteristic value of a soil or rock as a cautious estimate of the value affecting the occurrence of the limit state. The characteristic values to be used in design are highlighted in Table 20 and presented graphically in the plots in Appendix E and considered to be:

Table 30: Characteristic values for geotechnical design

Stratum / Geological Origin	Strength / Density Descriptor	Range of Derived Values (kPa)	Characteristic Undrained Strength (cu - kPa)
Gault Formation (Cohesive)	Low to very high strength Clay, typically high strength	38 - 250	100kPa at approx. 1m bgl

The imposed permanent and variable actions (loads) are not currently known.

For the purposes of estimating design bearing resistance, shallow foundations placed on high strength cohesive deposits (i.e. Gault Formation), with a characteristic cu value of at least 100kPa would be expected to have a design bearing resistance of at least 150kPa. Long term consolidation settlement has a limiting influence on the design resistance of cohesive deposits; a higher design bearing resistance may be obtained if a more detailed assessment of consolidation settlement is undertaken.

The above preliminary assessment of design bearing resistance is based on a 1.0m square pad or 0.6m wide strip footing founded in suitable bearing strata at 1m below ground level, where horizontal actions are less than 20% of the total vertical actions.

It has also been assumed that a maximum total settlement of 25mm would be acceptable within the serviceability of the design. Differential settlement should be assessed when the foundation layout has been developed, however provided all foundations are taken onto a consistent bearing strata, pad or strip footings should yield differential settlements of less than 1 in 400.

12.3.2 Shrinkability / Volume Change Potential

Gault Formation has been shown to have a high shrinkability.

Foundations placed on shrinkable soils should be deepened where necessary to accommodate the effects of trees and hedgerows. Where foundations are beyond the influence of existing and proposed planting (i.e. 1.5 times the mature tree height), the minimum founding depth in Gault Formation of a high volume change potential would be 1.0m below existing or proposed ground level (whichever is lower).

Foundations within the zone of influence of existing or proposed trees should be deepened as necessary in accordance with recommendations provided in NHBC Chapter 4 – Building Near Trees. If trees are present within influencing distance of proposed foundations, a tree survey should be undertaken to identify appropriate founding depths.

12.3.3 Shallow Foundations

Made Ground is not considered to be suitable bearing strata. Where these materials are present, foundations should be placed on adequate bearing strata at deeper levels. Foundations should be placed on uniform founding strata to avoid differential settlement.

Identification of the appropriate founding stratum on Site must be undertaken by an experienced engineer. If necessary, Waterman should be contacted to provide further advice.

The descriptions and results of lab and in-situ testing suggest that pad or strip foundations could be placed on the high strength Gault Formation (Cohesive) at relatively shallow founding depths (i.e. generally less than 2.5m below existing ground level) within Zone B. If pad or strip foundations are utilised, they should be placed on a uniform bearing strata (i.e. high strength cohesive deposits), and as

such it may be necessary to deepen foundations if Made Ground or softened clay is encountered at foundation level.

The design bearing resistance(s) quoted above have been estimated in accordance with EC7, Design Approach 1. Bearing resistance and settlement are functions of shape and depth of foundation, and the magnitudes of inclined, static and variable loads and these should be checked as part of detailed geotechnical design.

12.3.4 Design Class for Concrete

Based on the characteristic values derived from SD1 testing, the Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be:

- Concrete in contact with Made Ground: DS-3 AC-3
- Concrete in contact with Gault Formation: DS-4 AC-3s
- Concrete in contact with Groundwater: DS-1 AC-1

12.3.5 Earthworks / Pavement Design

The result of compaction testing undertaken on a sample of Gault Formation indicates that it could be recompacted to achieve >95% of MDD and <5% air voids. Based upon the results obtained, it could be used as an engineered fill, subject to other suitability considerations. It should be noted that suitability for compaction is highly dependent on the initial moisture content of the material to be compacted.

Engineered fills should be subject to a confirmatory testing regime where they were required to achieve a compaction specification as a structural fill.

Construction plant should be provided with an adequate working platform in line with the requirements of BRE report, “BR 470: Working Platforms for Tracked Plant”. Again, further advice should be sought from the temporary works designer. However, the following factors should be considered.

The Gault Formation has CBR values in the range 1.1% to 2.3% and it is recommended that a value of 1.2% is used for the purposes of pavement design and temporary works design. Subgrade strength may vary considerably across the Site, especially where affected by variations in moisture content. The subgrade is not likely to support construction traffic without deteriorating rapidly. Low strength subgrades could be improved using one of the following options:

- The material at the surface could be removed and replaced with suitable material. The thickness removed may typically be between 0.5 and 1.0m and the new Design CBR should be assumed to be equivalent to 2.5%;
- A lime / cement stabilisation process could be utilised to increase the CBR value of the near surface subgrade, enabling proposed pavement areas, temporary access roads and working platforms to be designed based on an improved CBR value (design value in excess of say 2.5%). A specialist contractor should be asked to confirm suitability and the most appropriate method and technique; and,
- The incorporation of a geogrids/geosynthetic material may be assist in reducing capping layer thicknesses. However, it should be noted that excavating back through areas treated with geogrid, e.g. to install drainage or foundations, would result in damage to the geogrids which would then require repairing.

During construction, the in-situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.

12.3.6 Floor Slabs

It is recommended that suspended floor slabs should be adopted due to the low CBR value of the natural subgrade across the proposed development.

The design of floor slabs should only be finalised when gas monitoring has been completed and assessed, as the recommendations of the gas monitoring report will influence the final choice of floor slab design. The above advice is provided for guidance only at this stage.

12.3.7 Groundwater / Stability of Excavations

Comments relating to the stability of excavations (i.e. trial pits) and groundwater seepages are included in the logs in Appendix B. Groundwater was struck in the Gault Formation (Granular) at significant depth, typically 12.5m bgl to 14m bgl. Perched groundwater may be present within the limited thickness of Made Ground within Zone B.

Based on observations made during fieldwork, shallow excavations (<1.2m) in Zone B are likely to be stable in the short term.

Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc. Where contamination has been encountered, it may be possible to reuse foundation arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

In line with BS6031, all excavations should be examined daily by a competent person to ensure that they remain safe. Where the sides cannot be sloped back to a safe angle, as approved by a competent and experienced person, their continued stability should not be taken for granted. Vertical or steep faces should be provided with support unless instructed otherwise by a competent person.

13. Conclusions

13.1 Environmental Assessment

Following the implementation of the ground investigation, the pollutant linkages identified during the Preliminary Environmental Risk Assessment have been re-evaluated and reclassified in relation to the additional information obtained. The results of the reassessment are summarised in Table 31:

Table 31: Updated Conceptual Site Model

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
Human Health					
Future Site Users	Contaminants arising from current and historical land uses	Direct contact, ingestion, and dust inhalation.	Medium	Elevated concentrations of inorganic and organic contaminants have been identified across the proposed residential extent of the Development. Asbestos fibres were also identified at low concentrations in two soil samples. Elevated speciated PAHs were also identified in the proposed public open space areas. Potential pollutant linkages exist between the residential and public open space end users and the contaminants identified in shallow soils. Potential pathways include direct contact, ingestion and dust inhalation. Soft landscaping and private gardens are proposed. A remediation strategy should be devised to address the potential risks to end users and break the potential pollutant linkages. Measures to break the potential pollutant linkages may include the use of capping layers in soft landscaped areas. These could include the use capping layers >600mm thick comprising certified clean imported topsoil. The use of the CL:AIRE Code of Practice could be utilised for soils identified as chemical unsuitable for residential end-use to be used in commercial end use areas.	Low
	Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces.	Medium	Ground gas and vapour monitoring undertaken to date has identified elevated concentrations of methane and carbon dioxide in soils. A Characteristic Situation – CS2 and Amber 2 have been identified and appropriate ground gas protection measures will be required. However, this will be confirmed upon completion of the gas and vapour monitoring and discussed in final GQRA report. Migration of ground gas is considered to be confined by the presence of impermeable Gault Formation clay. Ground gas protection measures for residential property will likely include a gas resistant membrane incorporated into foundation design, passive ventilation and validation of ground gas protection measures.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				Vapour monitoring to date has indicated that a significant vapour regime is not present on-Site, and the risk to human health and structures considered low. The ground gas regime should also be reviewed following confirmation of the proposed foundation solution	
Off-site residents/users	Contaminants arising from the Site's current and historical uses.	Migration off-site via wind entrainment, allowing contaminants to be in direct contact, ingested, or inhaled by off-site residents / workers.	Medium	During the construction process measures will be put in place to prevent fugitive emissions of dust. In areas not capped by the built development or paving suitable capping will be use to prevent fugitive emissions of contaminated dust. A remediation strategy should be devised to address the potential risks to off-site residential and users and break the potential pollutant linkages	Low
	Ground gas and vapours from Made Ground and infilling.	Lateral migration off-site and accumulation within confined spaces.	Medium	The potential risks from ground gas migrating from the Site to off-site receptors is considered low. Negligible flows have been recorded in the monitoring wells. Migration of ground gas is considered to be confined by the presence of impermeable Gault Formation clay. Furthermore, the infilled former brickworks located on-Site historically extended south of the Site to where residential properties are now located. Therefore, the migration of off-site sources of ground gas to off-site receptors is considered more plausible. Vapour monitoring to date has indicated that a significant vapour regime is not present on-Site, and the risk to human health and structures considered low. A remediation strategy should be devised to address the potential for off-site migration of contamination/ground gas through the construction of new service corridors constructed as part of the Development.	Low
Construction Workers	Contaminants arising from current and historical land uses	Direct contact, ingestion, and dust inhalation.	Medium	Elevated concentrations of lead and speciated PAHs have been identified on the Site. Asbestos fibres were also identified at low concentrations in two soil samples. During the construction phases, ground workers should wear the appropriate PPE, if required, RPE, and maintain good hygiene	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				standards. These measures will act as appropriate precaution measures to mitigate the risks to ground workers.	
	Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces.	High	Elevated concentrations of carbon dioxide, methane, and depleted oxygen levels have been detected during ground gas monitoring. Therefore, the requirements included within the Confined Space Regulations 1997 should be adhered to. All construction workers should be subject to mandatory health and safety requirements under the Construction, Design and Management (CDM) Regulations 2015 and Control of Substances Hazardous to Health (COSHH) Regulations 2002 and Control of Asbestos Regulations 2012.	Low
Property					
On-Site structures	Contaminants arising from current and historical land uses on-Site,	Chemical attack on buried services and concrete	Medium	Building foundations and associated services should be designed to mitigate the risk of chemical attack. The Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be: • Concrete in contact with Made Ground: DS-3 AC-3 • Concrete in contact with Gault Formation: DS-4 AC-3s • Concrete in contact with Groundwater: DS-1 AC-1	Low
	Ground gas and vapours from Made Ground and infilling.	Migration and accumulation in confined spaces	Medium	Ground gas monitoring undertaken to date has indicated a Characteristic Situation – CS2. Vapour monitoring to date has indicated that a significant vapour regime is not present on-Site, and the risk to human health and structures considered low. Migration of ground gas is considered to be confined by the presence of impermeable Gault Formation clay. Appropriate ground gas protection measures for residential and commercial properties to meet the requirements of BS 8485: 2015 will be required. However, this will be confirmed upon completion of the gas and vapour monitoring and discussed in final GQRA report. The ground gas regime should also be reviewed following confirmation of the proposed foundation solution.	Low
Off-site structures	Ground gas and vapours from Made		Low	The potential risks from ground gas migrating from the Site to off-site receptors is considered low. Negligible flows have been recorded in the monitoring wells. Migration of ground gas is	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
	Ground and infilling.	Migration and accumulation in confined spaces.		considered to be confined by the presence of impermeable Gault Formation clay. Furthermore, the infilled former brickworks located on-Site historically extended south of the Site to where residential properties are now located. Therefore, the migration of off-site sources of ground gas to off-site receptors is considered more plausible. Vapour monitoring to date has indicated that a significant vapour regime is not present on-Site, and the risk to human health and structures considered low. A remediation strategy should be devised to address the potential for off-site migration of contamination/ground gas through the construction of new service corridors constructed as part of the Development.	
Ecological Systems					
Future Areas of Soft Landscaping on-Site	Contaminants in shallow soils and groundwater.	Direct Contact, root update	Medium	Elevated concentrations of phytotoxic contaminants have been identified in the proposed residential portion of the Site It is considered that topsoil across the Site is limited in volume, and less than 0.2m in thickness. It is considered that a suitable thickness of topsoil for use as a capping layer and growth medium for vegetation will be required for soft landscaping to break the potential pollutant pathway between residual phytotoxic contaminants in Made Ground and further soft landscaped areas. Capillary break layers could be utilised to break potential pollutant pathways between contaminants in perches water and future areas of vegetation.	Low
AONB and SSSI	Contaminants from on-Site sources,	Lateral migration	Low	The Kent Downs Area of Outstanding Natural Beauty is located 254m north. The Folkestone to Etchinghill Escarpment Site of Special Scientific Interest and Special Area of Conservation is located 390m north. Given the distance of the identified receptors and the absence of Made Ground extending to the north of the Site (M20 road cutting is present) the potential for contaminants to migrate off-site to the north is considered reduced.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
				Permeability testing of the Gault Formation indicated negligible permeability and groundwater in the Made Ground is considered perched and discontinuous. Therefore, migration off-site of shallow contamination to these receptors is not considered plausible.	
Controlled Waters					
Drainage feature in northeast of the Site	Contaminants from on-Site sources,	Run-off from stockpiled arisings during redevelopment	Low	Some potentially contaminated Made Ground in the shallow soils on-Site will be excavated during construction works. The stockpiled arisings from these works could potentially lead to contaminated surface run-off reaching the drainage feature on-Site. During the redevelopment of the Site, appropriate measures for managing waste and techniques for preventing run-off from stockpiled arisings should be utilised. A remediation strategy should be devised outlining appropriate measures for protecting drainage features from potentially contaminated run-off at the Site.	Low
Culverted drain running through the centre of the Site towards Caesar's Way	Contaminants from on-Site sources	Migration off site through preferential pathways	Low	A culverted drain runs through the centre of the Site and towards Caesar's Way. It is our understanding the drain is to be removed or capped off for the Development.	Low
Principal Aquifers	Contaminants from on-Site uses	Vertical migration	Low	Falling head tests were undertaken in the Gault Formation at borehole locations BH102, BH103 and BH105 to assess the permeability of the Gault Formation and the potential risk from shallow contamination to the Principal Aquifers at depth. The tests showed the Gault Formation has negligible permeability. Therefore, the risk to the Principal Aquifers at depth from shallow contamination at the Site is considered low as a pathway is considered not to exist. Should piling be the preferred foundation type, a Foundation Works Risk Assessment should be prepared to assess the potential risks to Principal Aquifers.	Low
Pent Stream	Contaminants from on-Site uses, including TPH, PAH,	Lateral migration through soil	Low	Permeability testing of the Gault Formation indicated negligible permeability and groundwater in the Made Ground is considered perched and discontinuous. Therefore, migration off-site of shallow contamination to the Pent Stream is not considered plausible.	Low

Receptor	Potential Sources	Pathways	Risk	Justification / Mitigation	Residual Risk
	Asbestos, Metals				

13.2 Geotechnical Assessment

Gault Clay (Cohesive) has been identified as a suitable bearing strata, with a design bearing resistance of at least 150kPa. This stratum has been encountered at depths of less than 2.5m below proposed ground level across Zone B and as such shallow foundations (strip / pad foundations) could be adopted.

Identification of the appropriate founding stratum on-Site must be undertaken by an experienced engineer. If necessary, Waterman should be contacted to provide further advice.

Foundations placed on shrinkable soils should be deepened where necessary to accommodate the effects of trees and hedgerows.

Due to the presence of unsuitable bearing strata at shallow founding depths and significant depths of un-engineered fill, consideration should be given to the use of vibro-compaction techniques as a foundation solution in Zone A. Based on the results of the investigation, the Made Ground may be suitable for treatment by vibrated stone columns.

The installation of vibro stone columns would introduce preferential pathways for the migration of ground gas. Gas protection measures should be reviewed following confirmation of the preferred foundation solution, as Site conditions will have changed significantly from those analysed as part of this report.

If vibro compaction is to be considered further, it is essential that all available information is forwarded to a specialist contractor and they provide written confirmation as to the suitability of the specialist technique.

The installation of vibro stone columns would introduce preferential pathways for the migration of ground gas. Gar protection measures should be reviewed following confirmation of the preferred foundation solution, as Site conditions will have changed significantly from those analysed as part of this report.

Alternatively, piled foundations could be utilised and the advice of a specialist piling contractor should be obtained to confirm the suitability of piling and the most appropriate pile type.

However, based on the Site investigation information, frictional piles could derive support from the Gault Formation (Cohesive) at depths from approximately 5m bgl.

Given that the Site is affected by soft/loose material liable to settle and the Site may be subject to increased loadings due to filling activity, the effect of ‘downdrag’ or negative skin friction should be considered in the pile design.

Design bearing resistance and settlement should be checked as part of detailed geotechnical design.

The Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be:

- Concrete in contact with Made Ground: DS-3 AC-3
- Concrete in contact with Gault Formation: DS-4 AC-3s
- Concrete in contact with Groundwater: DS-1 AC-1

The results of compaction testing undertaken on samples of Made Ground indicate that it could generally be recompacted to achieve >95% of MDD and <5% air voids. Based upon the results obtained, it could be used as an engineered fill, subject to other suitability considerations. It should be noted that suitability for compaction is highly dependent on the initial moisture content of the material to be compacted,

particularly as the results suggest that some of the material is significantly wet or dry of optimum moisture content. It may be necessary to condition the material prior to re-use.

The result of compaction testing undertaken on a sample of Gault Formation indicates that it could be recompacted to achieve >95% of MDD and <5% air voids. Based upon the results obtained, it could be used as an engineered fill, subject to other suitability considerations.

The subgrade has very low CBR values, i.e. generally less than 2.5% and is not likely to support construction traffic without deteriorating rapidly. Pavements should be designed appropriately. Low strength subgrades should be improved either by re-engineering materials, capping, lime/cement stabilisation or the use of geogrids.

During construction, the in-situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.

Suspended floor slabs should be adopted due to the potential hazardous gas risk, the low CBR value of the subgrade, the depth and variability of Made Ground and the variability of the subgrade across the development area.

The design of floor slabs should only be finalised when gas monitoring has been completed and assessed, as the recommendations of the gas monitoring report will influence the final choice of floor slab design. The above advice is provided for guidance only at this stage.

Based on observations made during fieldwork, shallow excavations (<1.2m) in the Zone B are likely to be stable in the short term.

However, even shallow excavations in Zone A are likely to require shoring to maintain stability. Further advice should be sought from the temporary works designer. All trenches should be excavated in accordance with CIRIA Report 97 'Trenching Practice' and it is likely that both shoring and dewatering measures will be required to maintain stability.

Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc. Where contamination has been encountered, it may be possible to re-use foundation arisings subject to risk assessment, however certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

14. Recommendations

Environmental

The following actions are recommended to address the potentially unacceptable risks that remain:

- A Remediation Strategy to address potential pollutant linkages between contaminants in shallow soil and groundwater, future Site users and future areas of soft landscaping. The remediation strategy should include ground gas protection measures and the potential for off-site migration of contamination and ground gas from the creation of service corridors. Measures required to suppress the generation of potentially contaminated dust should also be addressed;
- Ground gas protection measures will be required for the Development. Ground gas protection measures for residential property will likely include a gas resistant membrane incorporated into foundation design, passive ventilation and validation of the installed ground gas protection measures. The protective measures required for the proposed commercial area are likely to be less than those required for the proposed residential area. The ground gas regime should be reviewed following confirmation of the proposed foundation solution. Three further rounds of ground gas and vapour monitoring are required. Once completed, the ground gas and vapour assessment shall be updated along with the recommended ground gas and vapour protection measures;
- Capping layers with a minimum 600mm thickness of clean imported soils and capillary break layers for areas of soft landscaping in private gardens and the use tree pits. Capping layers in public open spaces are likely to be thinner;
- A Foundation Works Risk Assessment to be prepared if piles are the preferred foundation type;
- All construction workers should be subject to mandatory health and safety requirements under the Construction, Design and Management (CDM) Regulations 2015, Control of Substances Hazardous to Health (COSHH) Regulations 2002, and Control of Asbestos Regulation 2012. The requirements included within the Confined Space Regulations 1997 should be adhered to;
- Preliminary Waste Assessment of the Soils has indicated the majority of soil samples contain non-hazardous properties. Segregation of different waste streams, such soils containing hazardous properties would be required prior to disposal of materials off-site. Confirmation of the soil's waste classification will be required prior to material being sent to landfill;
- Once updated and finalised with the ground gas monitoring information this report can then be issued to the Regulatory Body to facilitate the discharge of Planning Condition 14(2) of Planning Permission ref: Y13/0024/SH.

Geotechnical

The following actions are recommended to address the potentially unacceptable risks that remain:

- The amount of development within Zone A should be minimised as costs associated with the construction of foundations in this area are likely to be significantly greater than in Zone B. Areas of Public Open Space should be located within Zone A, where possible.
- If vibro compaction is to be considered further, it is essential that all available information is forwarded to a specialist contractor and they provide written confirmation as to the suitability of the specialist technique.

- The ground gas regime and the required gas protection measures should be reviewed following confirmation of the preferred foundation solution, as Site conditions will have changed significantly from those analysed as part of this report.
- The design of floor slabs should only be finalised when gas monitoring has been completed and assessed, as the recommendations of the gas monitoring report will influence the final choice of floor slab design. This will also be impacted by the proposed foundation solution.

APPENDICES

Appendix A Site Plans

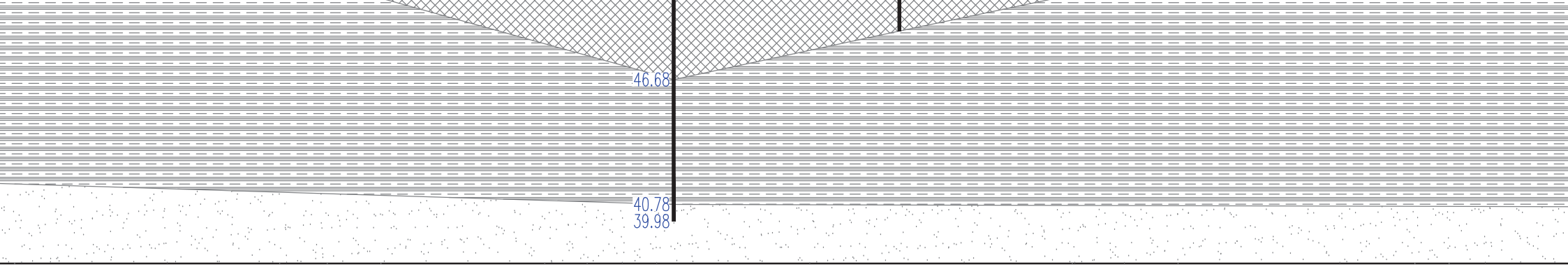
- Site Location Plan
- Proposed Development Layout
- Site Investigation Locations Over Proposed Development Layout
- Location of Site Geology Cross Sections
- Cross Sections A B and C
- Areas of Made Ground Greater Than 2.5m Thick
- Locations of Inorganic Contaminant Exceedances of the GAC in Soil Samples
- Locations of Organic Contaminant Exceedances of the GAC in Soil Samples
- Conceptual Site Model

Project Details | WIE106

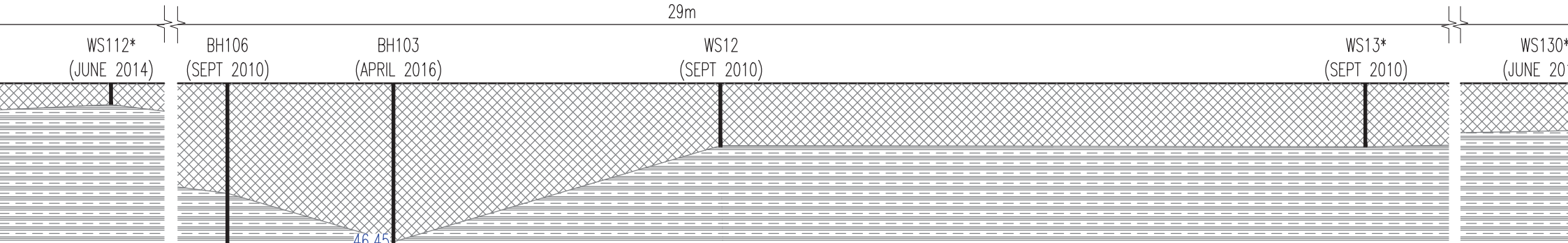

FUTURE PHASE
HAUL ROAD

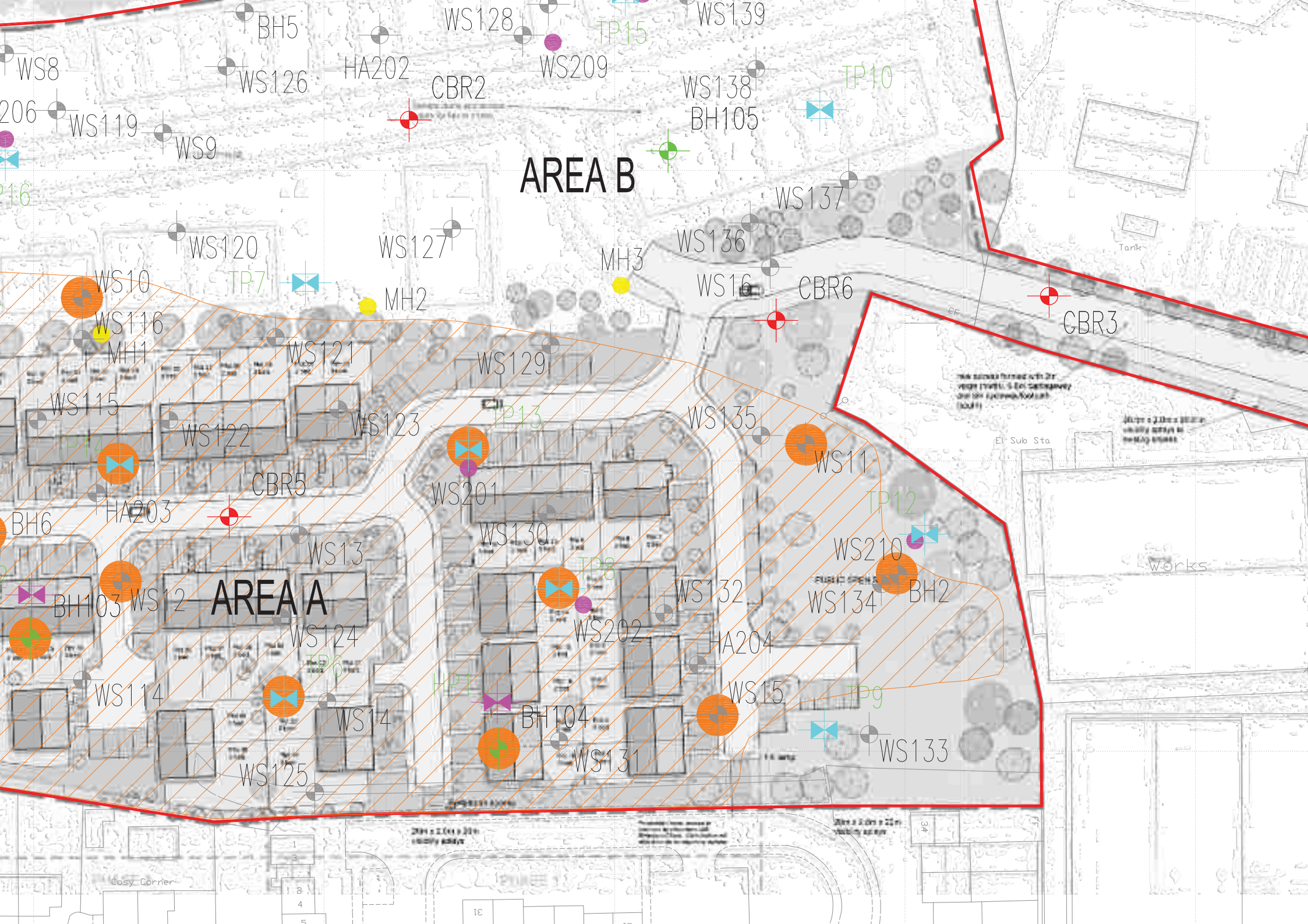

BH5
WS128
TP15
WS139
WS8
WS126
HA202
CBR2
WS209
WS138
TP10
206
WS119
WS9
BH105
P16
WS137
WS120
WS127
WS136
MH3
WS10
TP7
WS16
CBR6
MH1
WS116
CBR3
MH2
WS12
WS129
WS115
WS123
TP13
WS135
WS122
TP14
WS11
CBR5
WS201
TP12
HA203
BH6
WS130
WS210
WS13
TP8
WS132
WS134
BH2
BH103
WS12
WS124
WS202
HA204
TP6
HP1
WS15
TP9
WS114
WS14
BH104
WS133
WS131
WS125
Tank
El Sub Sta
works
1:4 ramp
Cosy Corner

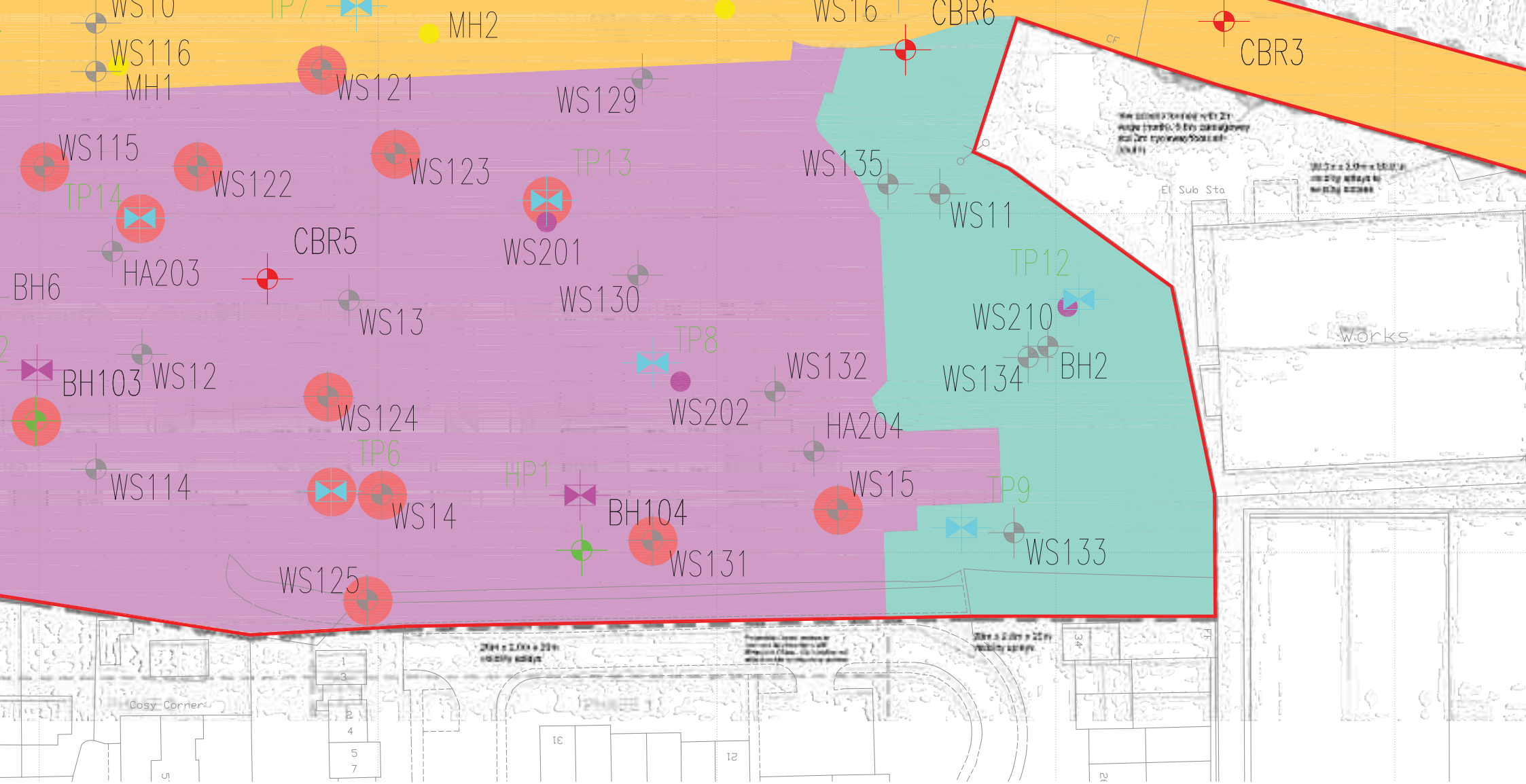

BH5
WS128
TP15
WS139
WS8
WS126
HA202
CBR2
WS209
WS138
TP10
206
WS119
WS9
BH105
WS137
WS120
WS127
WS136
MH3
WS10
TP7
WS16
CBR6
CBR3
MH1
WS116
MH2
WS12
WS129
WS115
WS122
WS123
TP13
WS135
TP14
WS11
CBR5
WS201
HA203
TP12
BH6
WS130
WS13
WS210
TP8
WS132
BH2
BH103
WS12
WS134
WS124
WS202
HA204
TP6
WS114
HP1
WS15
TP9
WS14
BH104
WS133
WS131
WS125
Tank
El Sub Sta
works
1:4 ramp
Cosy Corner



SECTION B–B
Scale 1:250 @ A1

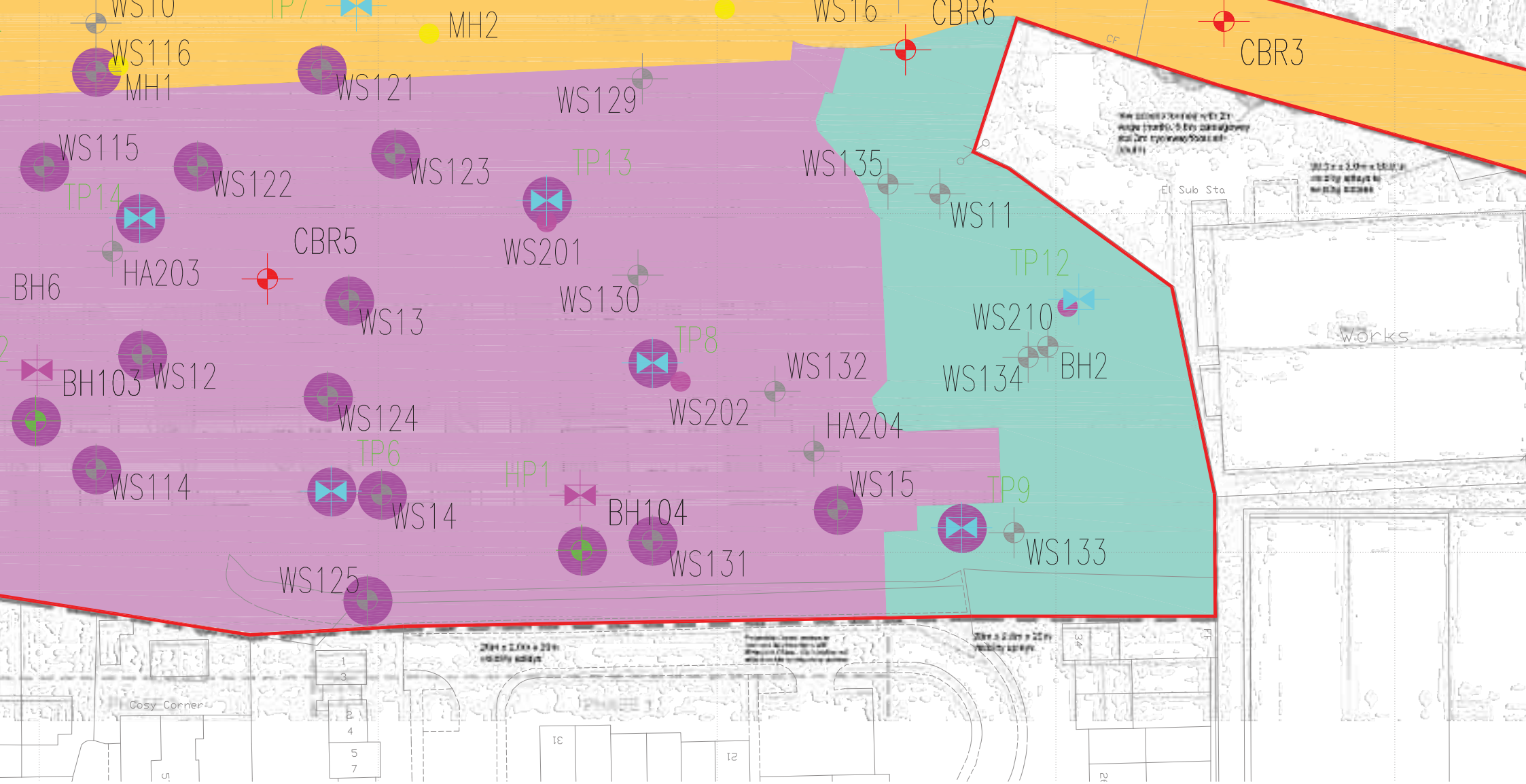



AREA A
AREA B
WS8
206
WS119
WS9
P16
BH5
WS126
HA202
WS128
CBR2
WS209
TP15
WS139
WS138
BH105
TP10
WS137
WS120
TP7
WS127
MH2
MH3
WS136
WS16
CBR6
CBR3
Tank
WS10
WS116
MH1
WS121
WS129
WS115
WS122
WS123
TP13
WS135
WS11
TP14
CBR5
WS201
HA203
BH6
WS130
TP12
WS210
WS13
TP8
WS132
WS134
BH2
BH103
WS12
WS124
WS202
HA204
TP6
HP1
WS15
TP9
WS114
WS14
BH104
WS133
WS131
WS125
El Sub Sta
Works
Cosy Corner



ASBESTOS IDENTIFIED IN SOIL

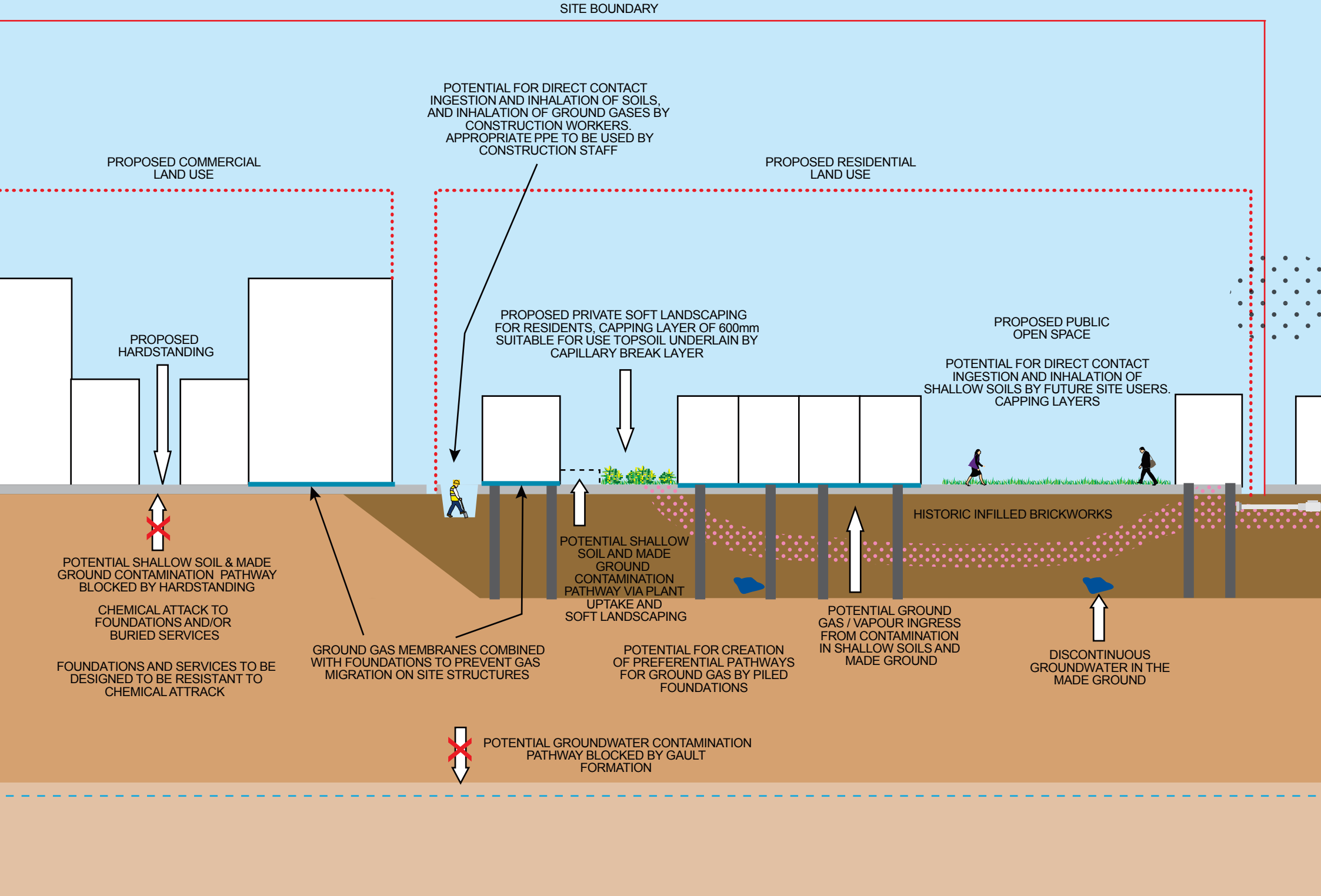
ion	Depth (m bgl)	Strata	Asbestos
	0.1	Made Ground	Amosite free fibres
3	3	Made Ground	Chrysotile free fibres



Benzo(k)fluoranthene			
SI Location	Depth (m bgl)	Strata	Benzo(k)fluoranthene (mg/kg)
WS101	0.20	Made Ground	248.00
WS115	0.70	Made Ground	83.10

Indeno(1,2,3-cd)pyrene			
SI Location	Depth (m bgl)	Strata	Indeno(1,2,3-cd)pyrene (mg/kg)
TP14	0.5	Made Ground	31.6
WS101	0.20	Made Ground	218.00
WS115	0.70	Made Ground	55.80

Di-benzo(a,h)anthracene			
SI Location	Depth (m bgl)	Strata	Di-benzo(a,h)anthracene (mg/kg)
TP14	0.5	Made Ground	022
TP2	0.1	Made Ground	033
TP3	0.5	Made Ground	077
TP4	0.1	Made Ground	081
TP6	0.5	Made Ground	16
TP8	0.5	Made Ground	138
TP9	1.5	Made Ground	059
TP13	0.5	Made Ground	107
BH103	0.5	Made Ground	189
BH104	0.1	Made Ground	243


SITE BOUNDARY
POTENTIAL FOR DIRECT CONTACT INGESTION AND INHALATION OF SOILS, AND INHALATION OF GROUND GASES BY CONSTRUCTION WORKERS. APPROPRIATE PPE TO BE USED BY CONSTRUCTION STAFF
PROPOSED COMMERCIAL LAND USE
PROPOSED RESIDENTIAL LAND USE
PROPOSED HARDSTANDING
PROPOSED PRIVATE SOFT LANDSCAPING FOR RESIDENTS, CAPPING LAYER OF 600mm SUITABLE FOR USE TOPSOIL UNDERLAIN BY CAPILLARY BREAK LAYER
PROPOSED PUBLIC OPEN SPACE
POTENTIAL FOR DIRECT CONTACT INGESTION AND INHALATION OF SHALLOW SOILS BY FUTURE SITE USERS. CAPPING LAYERS
HISTORIC INFILLED BRICKWORKS
POTENTIAL SHALLOW SOIL & MADE GROUND CONTAMINATION PATHWAY BLOCKED BY HARDSTANDING
CHEMICAL ATTACK TO FOUNDATIONS AND/OR BURIED SERVICES
FOUNDATIONS AND SERVICES TO BE DESIGNED TO BE RESISTANT TO CHEMICAL ATTRACK
GROUND GAS MEMBRANES COMBINED WITH FOUNDATIONS TO PREVENT GAS MIGRATION ON SITE STRUCTURES
POTENTIAL SHALLOW SOIL AND MADE GROUND CONTAMINATION PATHWAY VIA PLANT UPTAKE AND SOFT LANDSCAPING
POTENTIAL FOR CREATION OF PREFERENTIAL PATHWAYS FOR GROUND GAS BY PILED FOUNDATIONS
POTENTIAL GROUND GAS / VAPOUR INGRESS FROM CONTAMINATION IN SHALLOW SOILS AND MADE GROUND
DISCONTINUOUS GROUNDWATER IN THE MADE GROUND
POTENTIAL GROUNDWATER CONTAMINATION PATHWAY BLOCKED BY GAULT FORMATION

Appendix B Factual Report

- **Borehole Logs**
- **Trial Pit Logs**
- **Window Sample Logs**
- **Falling Head Test Results**
- **Hand Pit Logs**

GEOCORE

Site Investigations Ltd.

SITE INVESTIGATION FACTUAL REPORT

CLIENT: Waterman Infrastructure & Environment Ltd

ADDRESS: Biggins Wood, Folkestone, Kent

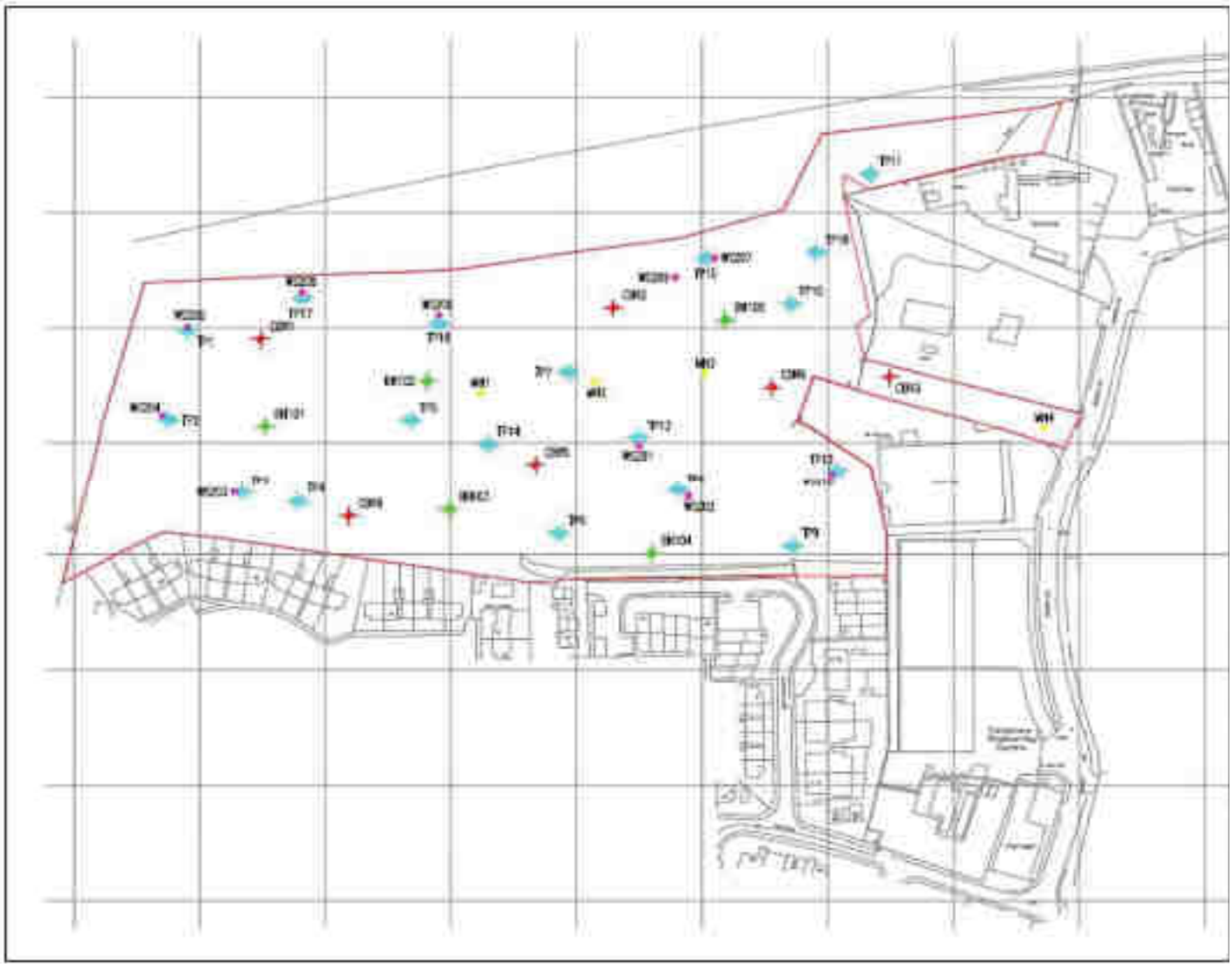
CLIENT REF: W1E10619

OUR REF: SA/16/58199 - HH/16/58239

T 01642 481144 F 01642 439419 M 07720 019665 E geocore@geocore.co.uk W www.geocore.co.uk

Managing Director: Adam Woodward MSA, BSc (Hons) FGS

GEOCORE	BOREHOLE LOCATION PLAN		
Site Crew:	R Hichens/C Carrier	**Date:**	28/04/2016
Address:	Biggins Wood, Folkestone, Kent		
Geocore Ref:	SA/16/58199 - HH/16/58239	**Client Ref:**	W1E10619



BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Yates Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				BH101
Job No: SA/16/58199	Date: 14-04-16	Ground Level (m): 54.03	Co-Ordinates (): E 620,178.1 N 137,457.1	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS

Depth	Type No	Test Result
0.10	ES1 PID	0.0ppm
0.50	ES2 PID	0.0ppm
0.50	B1 HV	60kPa@0.50m
1.00	ES3 PID	0.0ppm
1.00	SPT	2,1,2,2,3
1.00	D1 HV	90kPa@1.00m
1.50	ES4 PID	0.0ppm
1.50	B2 HV	90kPa@1.50m
1.60	D2	
2.00-2.45	UT1	43 blows
2.00	HV	95kPa@2.00m
2.50	B3 HV	100kPa@2.50m
3.00	D3 HV	100kPa@3.00m
3.00	SPT	3,2,3,3,4
3.50	ES5 PID	0.0ppm
3.50	D5 HV	110kPa@3.50m
4.00-4.45	UT2	50 blows
4.00	HV	110kPa@4.00m
4.50	D6 HV	130kPa@4.50m
5.00	SPT	5,4,6,5,7
5.00	HV	130kPa@5.00m
5.50	ES6 PID	0.0ppm
5.50	D7 HV	130kPa@5.50m
6.00	D8 HV	130+kPa@6.00m
6.50-6.95	UT3	90 blows
7.00	D9 HV	170kPa@7.00m
7.50	ES7 PID	0.0ppm
8.00	D10 HV	130kPa@8.00m
8.00	SPT	9,7,7,8,10
8.50	D3	130kPa@8.00m
9.00	D11 HV	100 blows
9.30-9.75	UT4	0.0ppm
9.50	ES8 PID	130+kPa@10.00m
10.00	D12 HV	
11.00	D13 HV	130+kPa@11.00m
11.00	SPT	17,10,12,23,5/10mm
11.50	B4	
12.00	D14	
12.50	D15 SPT	25/75, 25, 25
12.50	ES9 PID	0.0ppm

STRATA

Reduced Level	Depth (Thickness)	Description
53.13	(0.90) 0.90	MADE GROUND Firm brown slightly sandy gravelly clay. Gravel is of sub angular medium to coarse brick, limestone, concrete, clinker and coal.
52.63	1.40	MADE GROUND Stiff grey mottled brown slightly sandy slightly gravelly clay with occasional roots. Gravel is of sub angular medium to coarse coal, brick and quartz.
47.13	(5.50) 6.90	Stiff grey mottled brown slightly sandy slightly gravelly CLAY with occasional shell fragments. Gravel is of sub rounded fine to medium quartz and limestone.
43.03	(4.10) 11.00	Stiff grey slightly sandy slightly gravelly CLAY with many shell fragments. Gravel is of sub rounded fine to medium quartz and limestone.
41.03	(2.00) 13.00	Very dense greenish grey slightly clayey slightly gravelly medium SAND. Gravel is of sub angular to sub rounded pyrite, quartz and limestone.

Instrument / Backfill

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
14-04-16	00:00	12.50	1.70	150							Borehole terminated at 13.0m due to refusal in very dense sand. Water seepage at 1m. Standing water with no rise at 12.5m

All dimensions in metres Scale 1:106.25	Client Engineer: Jon Coates	Method / Plant Used: Dando 2000	Logged By: Darren Conner

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Tees Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone. CT19 4AL				BH102
Job No: SA/16/58100	Date: 15-04-16	Ground Level (m): 53.99	Co-Ordinates (): E 620,240.6 N 137,476.9	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS

Depth	Type No	Test Result
0.10	ES1 PID	0.0ppm
0.50	ES2 PID	0.0ppm
0.50	HV	50kPa@0.50m
1.00	ES3 PID	0.0ppm
1.00	HV	55kPa@1.00m
1.20	D1 SPT	7,6,3,2,1
1.50	ES4 PID	0.0ppm
1.50	HV	60kPa@1.50m
2.00	ES5 PID	0.0ppm
2.00	D2	
2.00	SPT	1,1,0,0,1
3.00	ES6 PID	0.0ppm
3.00	D3 SPT	1,0,0,0,1
3.50	B1	
4.00	ES7 PID	0.0ppm
4.00	D4 SPT	1,0,1,1,0
5.00	ES8 PID	0.0ppm
5.00	D5 SPT	1,0,0,0,0
6.00	ES9 PID	0.0ppm
6.00	D6 B1	
6.50	D7 SPT	2,1,1,2,2
7.00	ES10 PID	0.0ppm
7.00	D8 HV	50kPa@7.00m
7.20	[illegible]	
7.40	ES11	
7.50	HV	130+kPa@7.50m
8.00-8.45	U1	75 blows
8.00	HV	130+kPa@8.00m
8.50	ES12 PID	0.0ppm
8.50	D10	
8.50	HV	130+kPa@8.50m
9.00	B4 + HV	130+kPa@9.00m
9.20	ES13 PID	0.0ppm
9.50	HV	130+kPa@9.50m
9.50	D11 SPT	18,9,11,11,13
10.00	HV	130+kPa@10.00m
10.50	HV	130+kPa@10.50m
10.50	D12	
11.00-11.45	U2	100 Blows
11.00	HV	130+kPa@11.00m
11.50	D13 HV	130+kPa@11.50m
12.00	HV	130+kPa@12.00m
12.50	ES14 PID	0.0ppm
12.50	D14 SPT	12,8,10,13,12
12.50	HV	130+kPa@12.50m
13.50	D15 B5	
13.50	ES15 PID	0.0ppm
13.50	SPT	25,15,17,18 (65mm)
14.00	D16 SPT	[illegible]

STRATA

Reduced Level	Depth (Thickness)	DESCRIPTION
52.19	(1.80) 1.80	MADE GROUND: Firm brown gravelly slightly sandy clay with occasional cobbles. Gravel is of sub angular medium to coarse brick, concrete, coal, ash and clinker.
47.19	(5.00) 6.80	MADE GROUND: Very loose greenish grey clayey slightly gravelly medium sand with occasional grey clay lenses. Gravel is of sub angular medium to coarse brick coal, clinker and ash.
46.69	7.30	MADE GROUND: Firm grey slightly sandy slightly gravelly clay. Gravel is of sub angular fine to medium quartz, sandstone, limestone and coal (reworked clay).
45.79	(0.90) 8.20	Stiff grey fissured brown slightly sandy CLAY with many shell fragments.
40.79	(5.00) 13.20	Stiff grey slightly sandy CLAY with occasional shell fragments.
39.99	(0.80) 14.00	Very dense greenish grey slightly clayey slightly gravelly medium SAND. Gravel is of sub angular to sub rounded fine to medium pyrite, quartz and limestone.

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
15-04-16	00:00	14.00	7.50	150	4

Chiselling From	To	Hours	Water Added From	To

GENERAL REMARKS

Borehole terminated at 14m due to refusal on very dense sand. Falling head test: base of hole at 9.60m and base of casing at 7.50m. Perched water at 4.00m.

All dimensions in metres Scale 1:108.25	Client Engineer: Jon Coates	Method/Plant Used: Dando 2000	Logged By: Darren Comer

Falling Head Test Record

Date	15/04/16
BH No.	BH102
Base of hole depth	8.00m
Water start	4.50m
Casing depth	7.50m

Time/min	Depth of Water bgl/Mtr
1	4.50
2	4.50
3	4.50
4	4.50
5	4.50
10	4.50
15	4.50
20	4.50
25	4.50
30	4.50
45	4.50

BOREHOLE LOG

GEOCORE

AGS

Geocore Site Investigations Ltd
Tristar Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shearway, Folkestone, CT19 4AL				**BH103**
Job No: SA/16/53199	Date: 18-04-16	Ground Level (m): 53.95	Co-Ordinates (): E 620,249.5 N 137,419.4	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS

Depth	Type No	Test Result
0.10	ES1 PID	0.0ppm
0.50	ES2 PID	0.0ppm
0.50	HV	90kPa@0.50m
1.00	ES3 PID	0.0ppm
1.00	HV	52kPa@1.00m
1.20	D1 SPT	7,4,3,3,4
1.50	ES4 PID	0.0ppm
1.50	HV	55kPa@1.50m
2.00	ES5 HV	40kPa@2.00m
2.00	D2 SPT	2,1,1,2,2
2.50	HV	40kPa@2.50m
3.00	ES6 PID	0.0ppm
4.00	B1 - D3	
4.50	ES7 PID	0.0ppm
4.50	D4 HV	60kPa@4.5m
4.50	SPT	1,1,0,1,0
5.00	D5 HV	65kPa@5.00m
5.50	ES8 PID	0.0ppm
5.50	D6 HV	32kPa@5.50m
5.50	SPT	3,5,2,3,2
6.00	HV	65kPa@6.00m
6.50	ES9 PID	0.0ppm
6.50	D7 HV	88kPa@6.50m
6.50	SPT	[illegible]
7.00	HV	88kPa@7.00m
7.50	D8 HV	90kPa@7.50m
7.50	B2	
7.50	ES10 PID	0.0ppm
8.00	HV	130+kPa@8.00m
8.00-8.45	UT1	100 blows
8.50	D9 HV	130+kPa@8.50m
9.00	ES11 PID	0.0ppm
9.00	HV	130+kPa@9.00m
9.50	D10 HV	130+kPa@9.50m
9.50	SPT	2,5,7,8,8
10.00	HV	130+kPa@10.00m
10.50	D11	
11.00	HV	130+kPa@11.00m
11.00-11.45	UT2	100 blows
11.50	D12	
12.00	HV	130kPa@12.00m
12.30	D13	
12.40	ES12 PID	0.0ppm
12.50	D14 SPT	35/25,25/65mm
13.00	D15	25/110,20,21/60mm
13.50	D16 SPT	

STRATA

Reduced Level	Depth (Thickness)	DESCRIPTION
53.15	0.80 (0.80)	MADE GROUND Firm dark brown gravelly sandy clay. Gravel is of sub angular medium to coarse brick, concrete, clinker, ash and flint.
51.55	2.40 (1.60)	MADE GROUND Firm orange brown slightly sandy gravelly clay. Gravel is of sub angular medium to coarse brick, limestone, concrete, ash and flint.
49.95	4.00 (1.60)	VOIDED STRATA. MADE GROUND Dark brown slightly clayey sandy gravel with occasional cobbles. Gravel is of sub angular medium to coarse concrete, brick and metal. Cobbles are of sub angular concrete.
46.45	7.50 (3.50)	MADE GROUND Firm grey slightly sandy slightly gravelly clay. Gravel is of sub angular medium to coarse coal, quartz, brick and limestone.
41.65	12.30 (4.80)	Stiff grey slightly sandy CLAY with occasional shell fragments.
40.45	13.50 (1.20)	Very dense greenish grey slightly clayey slightly gravelly medium SAND. Gravel is of sub angular to sub rounded fine to medium pyrite, quartz and limestone.

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
18-04-16	09:00	13.50	8.00		

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Borehole terminated at 13.5m due to refusal on very dense sand. Falling head test: base of hole to 9m; base of casing to 8m. Perched water at 2m. Slow inflow rate. Sealed out at 4.5m. Water strike at 12.5m. Slow inflow rate. Rose to 12.5m.

All dimensions in metres Scale 1:66.25	Client Engineer: Jon Coates	Method/Plant Used: Dando 2000	Logged By: Darren Conner

Falling Head Test Record

Date	18/04/16
BH No.	BH103
Base of hole depth	9.00m
Water start	4.00m
Casing depth	8.00m

Time/min	Depth of Water bgl/Mtr
1	4.00
2	4.00
3	4.00
4	4.00
5	4.00
10	4.00
15	4.00
20	4.00
25	4.00
30	4.00
45	4.00

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Tralee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Tilgates Wood, Shepway, Folkestone, CT19 6AT				BH104
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58199	13-04-16	52.73	E 620,550.0 N 137,400.5	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
0.10	ES1 PID	0.0ppm				11.00	MADE GROUND Firm brown sandy slightly gravelly clay. Gravel is of sub angular brick, concrete, mortar and clinker.
0.50	ES2 PID	0.0ppm		52.73		1.00	
1.00	ES3 PID	0.0ppm		51.73		1.50	MADE GROUND Concrete.
1.40	ES4 PID	0.0ppm				11.70	MADE GROUND Firm brown sandy slightly gravelly clay. Gravel is of sub angular brick, concrete, quartzite and clinker.
2.00	ES5 PID	0.0ppm					
2.50	ES6 PID	0.0ppm		50.73		3.00	
3.00	ES7 PID	0.0ppm				12.00	MADE GROUND Dark brown gravelly coarse sand. Gravel is of sub angular medium to coarse glass, brick, coal, metal and clinker.
3.50	ES8 PID	0.0ppm					
4.00	ES9 PID	0.0ppm					
4.50	ES10 PID	0.0ppm		40.73		5.00	
5.00	D9			40.53		5.20	MADE GROUND Orange brown gravelly coarse sand. Gravel is of sub angular medium to coarse brick, clinker, coal and metal.
5.20-5.65	UT1	35 blows				11.80	
5.50	ES11 PID	0.0ppm		47.53		5.20	Firm grey mottled brown slightly sandy CLAY.
5.50	HV	90kPa@5.50m		47.33		5.40	Firm dark grey slightly sandy CLAY with many rooty
5.50	R/B/D9						
6.00	B4-D4						
6.50	D4 HV	90kPa@6.50m					
6.50	SPT	4,5,5,5					
7.00	HV	95kPa@7.00m					
7.00	D5 HV	100kPa@7.00m					
7.50	ES12 PID	0.0ppm					
8.00	HV	120kPa@8.00m					
8.00-8.45	UT2	200 blows				16.10	
8.50	D6 HV	120kPa@8.50m					
9.00	HV	130kPa@9.00m					
9.50	SPT	4,6,7,9					
9.50	D7 HV	130kPa@9.50m					
10.00	HV	130kPa@10.00m					
10.20	ES13 PID	0.0ppm					
10.50	D8						
11.00-11.45	UT3	200 blows					
11.00	HV	130 kPa@11.00m					
11.50	D8						
12.00	HV	130 kPa@12.00m		41.23		17.50	
12.50	SPT	17,14,19,17/48mm		40.73		18.00	Very dense greenish grey slightly clayey slightly gravelly medium SAND with occasional grey clay lenses. Gravel is of sub rounded fine to medium gyritic, limestone and igneous
12.50	D10						
13.00	B5- D11						
13.00	SPT	27/150, 23, 27/95mm					
13.50	ES14 PID	0.0ppm					

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
12-04-16	00:00	12.00	6.50								Borehole terminated at 18m due to refusal on very dense sand. Water strike at 15.0. Slow inflow rate. Rose to 12.0m.

All dimensions in metres
Scale 1:100.55

Client Engineer
Jon Cornes

Machine/
Plant Used
Dando 2000

Logged By
Darren Corner

BOREHOLE LOG

GEOCORE

AGS

Geocore Site Investigations Ltd
Tristee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No.
Biggins Wood, Shepway, Folkestone, CT19 4AL				BH105
Job No.	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58199	19-04-16	54.16	E 620,359.2 N 137,503.4	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 HV	50kPa@0.1m		54.01		0.15	MADE GROUND Firm brownish grey slightly sandy clay with abundant flint roots.	
0.50	D1						Firm, becoming stiff with depth light brownish grey slightly sandy CLAY with occasional shell fragments.	
1.00	ES2 HV	65kPa@1.00m						
1.00-1.45	UT1	36 blows						
1.50	D2							
2.00	ES3 D3					14.35)		
2.00	HV	68kPa@2.00M						
2.00	SPT	3,3,3,3						
2.50	B1+D4							
3.00	ES4 HV	82kPa@3.00m						
3.00-3.45	UT2	50 blows						
3.50	D5			40.66		4.50		
4.00	ES5 D6						Stiff grey slightly sandy CLAY with occasional shell fragments.	
4.00	HV	85kPa@4.00m						
4.00	SPT	7,4,6,8						
4.50	D7							
5.00	ES6 HV	103kPa@5.00m						
5.00-5.45	UT3	70 blows						
5.50	D8							
6.00	ES7 HV	120+kPa@6.00m						
6.00	D9/B2							
6.50	D10							
6.50	SPT	8,6,8,8,9						
7.00	ES8 HV	120+kPa@7.00m						
7.50	D11							
8.00	ES9 HV	120+kPa@8.00m						
8.00-8.45	UT4	100 blows				(9.00)		
8.50	D12							
9.00	ES10 HV	120+kPa@9.00m						
9.50	D13							
9.50	SPT	10,9,9,12,14						
10.00	ES11 HV	120+kPa@10.00m						
10.50	D14							
11.00	HV	120+kPa@11.00m						
11.50	D15							
11.50-11.45	UT5	100 blows						
12.00	HV	120+kPa@12.00m						
12.50	D16							
12.50	SPT	14,8,10,15,17						
13.00	HV	120+kPa@13.00m		40.66		13.50		
13.50	D17/B3						Very dense greenish grey slightly clayey slightly gravelly medium SAND. Gravel is of sub angular to sub rounded fine to medium pyrite, quartz and flintstone.	
13.60	B4/12					(1.50)		
14.00	D18/SPT	24,23, 2/2/0mm						
14.50	D19			39.16		15.00		
14.50	SPT	25/25mm, 50/45mm						

Boring Progress and Water Observations					Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth / Dia. mm	Water Dpt	From	To	Hours	From	To	
19-04-16	08:00	14.50	1.70	14						Borehole terminated at 15.0m due to refusal on very dense sand. Falling head test, base of borehole to 2.00m - base of casing to 1.00m. Water strike at 14m. Slow inflow rate. Base to 15.50m.

All dimensions in metres Scale 1:100.25	Client Engineer Jon Coates	Method Plant Used: Beretta 2000	Logged By Darren Cuner

Falling Head Test Record

Date	19/04/16
BH No.	BH105
Base of hole depth	2.00m
Water start	0.00m
Casing depth	1.00m

Time/min	Depth of Water bgl/Mtr
1	0.00
2	0.00
3	0.00
4	0.00
5	0.00
10	0.00
15	0.00
20	0.00
25	0.00
30	0.00
45	0.00

BOREHOLE LOG

Geocore Site Investigations Ltd
Tree Close
Kingsnorth Business Park, Ashford
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/55199	12-04-16	53.96	E 620,145.2 N 137,498.8	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.0ppm				(0.80)	MADE GROUND Stiff grey brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel is of sub angular medium to coarse concrete, brick, coal and quartz.	
0.30	ES2 PID	0.0ppm						
0.50	B1							
0.50	HV	90kPa@0.50m		53.16		0.80		
						(0.80)	MADE GROUND Dark grey slightly clayey gravelly coarse sand. Gravel is of sub angular medium to coarse brick, coal, clinker, concrete and wood (slight organic odour).	
1.00	ES3 PID	0.0ppm		52.76		1.20		
1.25	ES4 PID	0.0ppm					Stiff grey slightly sandy CLAY with occasional fine rootlets, coal fragments and shell fragments.	
1.50	B2 HV	100kPa@1.50m				(1.00)		
2.00	ES5 PID	0.0ppm						
2.00	HV	100kPa@2.00m		51.76		2.20		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Obs.	From	To	Hours	From	To	Trial hole terminated at 2.20m. Excavation remained open and dry on completion

All dimensions in metres Scale 1:23.75	Client Engineer Jim Coates	Method Plant Used JCB 3CX	Logged By Darren Cotter

GEOCORE

BOREHOLE LOG

AGS

Geocore Site Investigation Ltd
Tigers Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481744

Location
Biggins Wood, Shepway, Folkestone, CT19 4AL

BOREHOLE No
TP02

Job No	Date	Ground Level (m)	Co-Ordinates (m)
SA/16/58199	12-08-16	53.94	E 620,137.9 N 137,460.1

Client
Waterman Infrastructure & Environment Ltd

Sheet
1 of 1

SAMPLES & TESTS

Depth	Type No	Test Result
0.10 0.30	ES1 PID HV	0.1ppm 50kPa@0.10m
0.50 0.70	ES2 PID B1 HV	0.1ppm 100kPa@0.50m
1.00 1.20	ES3 PID HV	0.1ppm 80kPa@1.00m
1.50 1.50	ES4 PID B2	0.1ppm -
1.90 2.00	ES5 PID HV	0.0ppm 30kPa@2.00m
2.50	B3 HV	150 kPa@2.50m
2.50 3.00	ES6 PID HV	0.1ppm 150+kPa@3.00m

Water

STRATA

Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument Backfill
53.74		(0.20) 0.20	MADE GROUND: Firm grey/brown slightly sandy gravelly clay with many roots. Gravel is of sub angular medium to coarse brick, coal and quartz.	
		(1.20)	MADE GROUND: Soft brown sandy slightly gravelly clay with occasional rootlets. Gravel is of sub angular medium to coarse brick, coal, concrete, clinker and quartz.	
52.54		1.40		
		(0.60)	MADE GROUND: Light grey slightly clayey gravelly fine sand. Gravel is of sub angular medium to coarse chalk and brick.	
51.94		1.80		
		(1.20)	Soft grey slightly sandy CLAY with occasional fine roots and coal fragments.	
50.74		3.00		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpth

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Trial hole termination at 3.00m.
Excavation remained open and dry on completion.

All dimensions in metres
Scale 1:25.75

Claim Engineer
Joe Coates

Method
Plant Used JCB 3CX

Logged By
Darren Cooper

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirkbeatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58199	12-04-16	54.01	E 620,167.1 N 137,427.2	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.0ppm		53.86		0.15	MADE GROUND Firm grey/brown slightly sandy gravelly clay with many roots. Gravel is of sub angular medium to coarse brick, coal and quartz.	
0.30 0.30	ES2 PID B1	0.0ppm				(0.85)	MADE GROUND Brown clayey gravelly fine sand. Gravel is of sub angular medium to coarse brick, concrete, coal, ash and clinker.	
1.00	ES3 PID	0.0ppm		52.91		1.10		
1.50 1.50	B2 ES4 PID	0.0ppm				(0.80)	MADE GROUND Grey slightly clayey gravelly medium sand with occasional metal. Gravel is of sub angular medium to coarse brick, coal, clinker and ash.	
2.00 2.00	ES5 PID HV	0.0ppm 120kPa@2.00m		52.11		1.90	Stiff grey slightly sandy slightly gravelly CLAY with occasional fine roots and coal fragments. Gravel is of sub rounded fine to medium quartz and limestone.	
2.50	B3 HV	130+128a@2.50m				(1.40)		
3.00 3.50	ES6 PID HV	0.0ppm 130+127a@3.00m		50.71		3.30		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	Trial hole terminated at 3.30m. Excavation remained open and dry on completion

All dimensions in metres Scale 1:25.75	Client Engineer Jon Coates	Method Plant Used JCB 3CX	Logged By Darren Corner

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirklevington Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No.
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP04
Job No.	Date	Ground Level (m)	Co-Ordinates	
SA/16/58199	12-06-16	53.83	E 620,189.5 N 137,423.2	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.0ppm				(0.80)	MADE GROUND Dark brown very clayey gravelly coarse sand. Gravel is of sub angular medium to coarse brick, quartz, coal, glass metal, pottery and wood.	
0.50 0.50	ES2 PID B1	0.0ppm		53.03		0.80		
1.00 1.00	B2 HV ES3 PID	50kPa@1.80m 0.0ppm				(0.80)	MADE GROUND Firm dark brown sandy gravelly clay. Gravel is of sub angular to angular medium to coarse brick, quartz, coal, glass, metal, pottery and wood.	
1.50 1.50	B3 HV ES4 PID	80kPa@1.50m 0.0ppm		52.03		1.00	MADE GROUND Soft grey mottled brown sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal and quartz.	
2.00 2.00	ES5 PID HV	0.0ppm 100kPa@2.00m		51.93		(1.10)		
2.50	B4 HV	130+kPa@2.50m					Stiff grey slightly sandy slightly gravelly CLAY with occasional fine roots and coal fragments. Gravel is of sub rounded fine to medium quartz and limestone.	
3.00 3.00	ES6 PID HV	0.0ppm 130+kPa@3.00m		50.83		3.00		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt.	From	To	Hours	From	To	
											Trial hole commenced at 1.00m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:25 25	Client Engineer Jon Coates	Method Plant Used JCB 3CX	Logged By Darren Cooper

GEOCORE

BOREHOLE LOG

Geocore Site Investigations Ltd
Trade Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AT				TP05
Job No: SA/16/58199	Date: 12-09-16	Ground Level (m): 53.96	Co-Ordinates (): E 620,234.1 N 137,459.7	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
0.10	ES1 PID	0.0ppm					MADE GROUND Brown very clayey gravelly coarse sand with occasional cobbles. Gravel is of sub angular medium to coarse sandstone, brick, concrete, ash, coal and clinker. Cobbles are of sub angular concrete and brick.
0.50	ES2 PID	0.0ppm				(0.80)	
0.50	D1						
				53.16		0.80	
0.85	ES3 PID	0.0ppm		53.06		0.90	MADE GROUND Grey very gravelly coarse sand. Gravel is of sub angular medium to coarse concrete, brick, bitumen road surfacing and quartz.
1.00	B2						MADE GROUND Dark grey very gravelly slightly clayey medium sand with many cobbles. Gravel is of sub angular medium to coarse brick, glass, metal, sandstone, concrete, clinker and coal.
1.50	ES4 PID	0.0ppm				(0.80)	
				52.26		1.70	MADE GROUND Dark [illegible] gravelly coarse sand with abundant waste material. Gravel is of sub angular medium to coarse brick, coal and concrete. Waste material comprises of glass, plastic, [illegible], metal and vinyl flooring.
2.00	ES5 PID	0.0ppm				(0.50)	
				51.76		2.20	

Instrument / Backfill

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Trial hole terminated at 2.20m as agreed with engineer after pit became unstable. Excavation collapsed to 2.1[illegible]m with standing water at 2.00m. Concrete mass found at 0.5m in original pit. Pit extended south - edge found - pit continued.

All dimensions in metres Scale: 1:33.75	Client Engineer: Ian Coates	Method: Plant Used: JCB 3CX	Logged By: Darren Corner

BOREHOLE LOG

Geocore Site Investigations Ltd
Tripee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP06
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58199	13-04-16	53.90	E 620,293.1 N 137,909.1	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.0ppm					MADE GROUND Brown very clayey very gravelly coarse sand with occasional cobbles. Gravel is of sub angular medium to coarse brick, coal, concrete, glass, clinker and ash. Cobbles are of sub angular brick, paving slab and concrete.	
						(0.30)		
0.50	ES2 PID	0.0ppm						
0.50	B1			53.10		0.80		
						(0.30)	MADE GROUND Firm light brown very sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal and quartz.	
1.00	ES3 PID	0.0ppm		52.80		1.10		
1.00	SV	60kPa@1.00m					MADE GROUND Brown very clayey very gravelly coarse sand with occasional cobbles. Gravel is of sub angular medium to coarse brick, coal, concrete, glass, clinker and ash. Cobbles are of sub angular brick, paving slab and concrete.	
1.50	ES4 PID	0.0ppm						
1.50	B2					(1.50)		
2.00	ES5 PID	0.0ppm						
2.50	ES6 PID	0.0ppm		51.30		2.60		
2.70	B3						MADE GROUND Soft grey sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, quartz, coal and ash.	
						(0.60)		
3.00	ES7 PID	0.0ppm						
3.00	SV	100kPa@3.00m		50.70		3.20		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpth	From	To	Hours	From	To	Trial hole terminated at 3.20m. Excavation remained open and dry on completion

All dimensions in metres Scale 1:25.75	Client Engineer Ian Coates	Method Plant Used JCB 3CX	Logged By Darren Coates

GEOCORE

BOREHOLE LOG

AGS

Geocore Site Investigations Ltd
Tralee Close
Kinkcatham Business Park, Redcar
Telephone 01642 [illegible]

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				**TP07**
Job No: 5A/16/58199	Date: 12-04-16	Ground Level (m): 53.93	Co-Ordinates (): E 620,296.8 N 137,480.7	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
				53.78		0.15	MADE GROUND Firm light grey slightly sandy slightly gravelly clay with many fine cobbles and some organic matter. Gravel is of sub angular medium to coarse quartz.	
0.10 0.10	ES1 PID HV	0.0ppm 50kPa@0.10m					Stiff light grey mottled brown slightly sandy CLAY with occasional fine rootlets and shell fragments.	
0.50	HV	80kPa@0.50m						
1.00 1.00	ES2 PID B1 HV	0.0ppm 95kPa@1.00m				(1.85)		
1.50	HV	130+kPa@1.50m						
				51.93		2.00		
2.00 2.00	ES3 PID B2 HV	0.0ppm 130+kPa@2.00m						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Trial hole terminated at 2.00m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:23.75	Client Engineer: Jon Coates	Method/Plant Used: JCB 3CX	Logged By: Darren Comer

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Trales Close
Aikinsdham Business Park, Barlow
Telephone 01942 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP08
Job No: SA/16/58199	Date: 13-04-16	Ground Level (m): 53.82	Co-Ordinates (): E 620,340.5 N 137,438.0	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS				STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/Backfill
0.10 0.20	ES1 PID HV	0.0ppm 50kPa@0.25m		53.42		(0.40) 0.40	MADE GROUND Firm grey/brown slightly sandy clay.	
0.50 0.50	ES2 PID B1 HV	0.0ppm 55kPa@0.50m		52.92		(0.50) 0.90	MADE GROUND Firm dark brown very sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal, quartz, ash and clinker.	
1.00 1.00	ES3 PID B2 HV	0.0ppm 130kPa@1.00m		52.42		(0.50) 1.40	MADE GROUND Stiff grey slightly sandy slightly gravelly clay. Gravel is of sub angular medium to coarse coal, brick and quartz.	
1.50 1.50	ES4 PID HV	0.0ppm 60kPa@1.50m		52.02		(0.40) 1.80	MADE GROUND Firm dark brown very sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal, quartz, ash and clinker.	
2.00 2.00	ES5 PID B3	0.0ppm		51.62		(0.40) 2.20	MADE GROUND Greenish grey very gravelly coarse sand with many cobbles. Gravel is of sub angular medium to coarse brick, quartz, coal, metal and clinker. Cobbles are of sub angular brick and concrete.	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Trial hole terminated at 2.20m. Excavation collapsed to 2.40m with standing water at 1.70m.

All dimensions in metres Scale 1:25.75	Client Engineer: Jon Coates	Method/Plant Used: JCB 3CX	Logged By: Darren Conner

GEOCORE

BOREHOLE LOG

AGS

Geocore Site Investigations Ltd
Yarna Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP09
Job No: 5A/16/58159	Date: 13-04-16	Ground Level (m): 53.49	Co-Ordinates (): E 620,386.1 N 137,408.3	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS / **STRATA**

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/ Backfill
0.10	ES1 PID	0.0ppm					MADE GROUND: Stiff grey slightly sandy gravelly clay with occasional cobbles. Gravel is of sub angular medium to coarse brick, sandstone, quartz, ash and concrete. Cobbles are of sub angular concrete and brick.	
0.50 0.50	ES2 PID B1 HV	0.0ppm 100kPa@0.50m				(0.90)		
				52.59		0.90		
1.00 1.00	ES3 PID B2 HV	0.0ppm 88kPa@1.00m				(0.55)	MADE GROUND: Stiff dark brown sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, concrete, quartz and coal.	
				52.04		1.45		
1.50 1.70	ES4 PID HV	3.2ppm 85kPa@1.70m				(0.45)	MADE GROUND: Stiff dark brown sandy slightly gravelly clay with abundant waste material. Gravel is of sub angular medium to coarse brick, coal, quartz and clinker. Waste material comprises of plastic bag, carpet, metal, wood and vinyl flooring.	
				51.59		1.90		
2.00 2.00	B3 + HV ES5 PID	88kPa@2.00m 0.0ppm				(0.50)	MADE GROUND: Stiff grey slightly sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal, ash and clinker.	
				51.09		2.40		
2.50	HV	100kPa@2.50m				(0.70)	Stiff grey slightly sandy CLAY.	
3.00 3.00	B4 HV ES6 PID	130+kPa@3.00m 0.0ppm		50.39		3.10		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Trial hole terminated at 3.10m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:23.75	Client Engineer: Jon Coates	Method/Plant Used: JCB 3CX	Logged By: Darren Conner

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Tristee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 491144

Location: Biggins Wood, Shepway, Folkestone, CT19 4AL	BOREHOLE No: **TP10**
Job No: SA/1658199 · Date: 11-04-16 · Ground Level (m): 55.10 · Co-Ordinates (): E 620,385.3 N 137,510.5	
Client: Waterman Infrastructure & Environment Ltd	Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
0.00-1.20	ES1-4 PID	0.0ppm > Composite					MADE GROUND Firm grey gravelly slightly sandy clay with many cobbles and waste material. Gravel is of sub angular medium to coarse coal, brick, sandstone and clinker. Cobbles are of sub angular brick, concrete and clinker. Waste material comprises of plastic, metal, wood and vinyl flooring.	
0.50	HV	95kPa@0.50m						
						(1.70)		
1.00	B1 HV	90kPa@1.00m						
1.50	HV	95kPa@1.50m						
				53.40		1.70		
						(0.20)	Stiff light grey slightly sandy CLAY.	
				53.20		1.90		
1.90	HV	100kPa@1.90m						

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Trial hole terminated at 1.90m.
Excavation remained open and dry on completion.

All dimensions in metres Scale 1:23.75	Client Engineer: Jon Crowe	Method/Plant Used: JCB 3CX	Logged By: Darren Comer

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirkdalham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP11
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58159	11-04-16	54.71	E 620,416.7 N 137,566.8	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.3ppm		54.56		0.15	MADE GROUND Dark brown clayey gravelly coarse sand. Gravel is of sub angular medium to coarse brick, coal, clinker and concrete.	
0.30 0.50	ES2 PID HV	0.0ppm 85kPa@0.50m					MADE GROUND Stiff light grey slightly sandy gravelly clay with occasional cobbles. Gravel is of sub angular medium to coarse brick, concrete, quartz, sandstone and coal. Cobbles are of sub angular brick and concrete.	
1.00 1.00	B1 HV ES3 PID	85kPa@1.00m 0.0ppm				(1.75)		
1.50 1.50	ES4 HV ES4 PID	99kPa@1.50m 0.0ppm						
				52.81		1.90		
2.00 2.00	B2 HV ES5 PID	116kPa@2.00m 0.0ppm					Stiff light grey slightly sandy slightly gravelly CLAY. Gravel is of sub rounded fine to medium sandstone, quartz and coal.	
2.50	HV	125kPa@2.50m				(1.10)		
				51.71		3.00		
3.00 3.00	B3 HV ES6 PID	120kPa@3.00m 0.0ppm						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Trial hole terminated at 3.00m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:33.33	Client Engineer Jon Coates	Method Plant Used JCB 3CX	Logged By Darren Conner

BOREHOLE LOG

GEOCORE

AGS

Geocore Site Investigations Ltd
Tristar Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location: Biggins Wood, Shepway, Folkestone, CT19 4AL

BOREHOLE No: **TP12**

Job No	Date	Ground Level (m)	Co-Ordinates ()
SA/16/58199	13-04-16	53.52	E 620,403.4 N 137,457.4

Client: Waterman Infrastructure & Environment Ltd

Sheet: 1 of 1

SAMPLES & TESTS: Depth	Type No	Test Result	Water	STRATA: Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/ Backfill
0.10 0.10	ES1 PID HV	0.0ppm 50kPa@0.10m		53.07		(0.45) 0.45	MADE GROUND: Firm dark brown very sandy slightly gravelly clay. Gravel is of angular medium to coarse brick, coal, ash and quartz.	
0.50 0.50	ES2 PID B1 HV	0.0ppm 110kPa@0.50m		52.92		(0.35) 1.00	Stiff grey/brown slightly sandy slightly gravelly CLAY. Gravel is of sub angular medium to coarse quartz, limestone and coal.	
1.00	HV	220kPa@1.00m		51.52		(1.00) 2.00	Stiff grey slightly sandy CLAY with occasional lithe nodules and shell fragments.	
1.50 1.50	ES3 PID B2 HV	0.0ppm 130+kPa@1.50m						
2.00	HV	130+kPa@2.00m						

Boring Progress and Water Observations: Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	Chiselling: From	To	Hours	Water Added: From	To	GENERAL REMARKS
											Trial hole terminated at 2.00m. Excavation remained open and dry on completion

All dimensions in metres
Scale 1:23.55

Client Engineer: Jon Coates

Method: Plant Used: JCB 3CX

Logged By: Darren Corner

BOREHOLE LOG

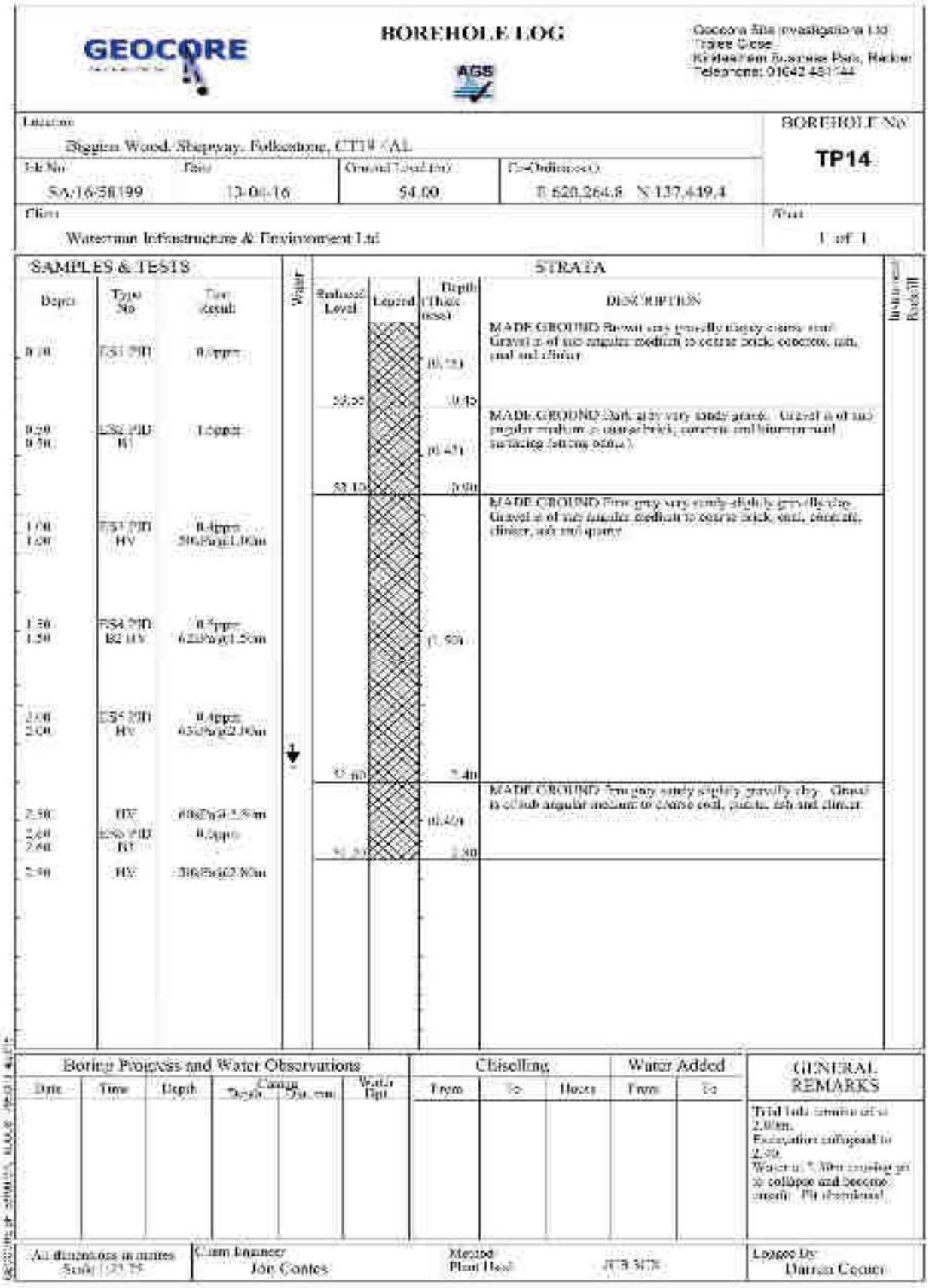
Geocore Site Investigations Ltd
Tribee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP13
Job No	Date	Ground Level (m)	Co-Ordinates ()	
SA/16/58199	19-04-16	53.84	E 620,324.9 N 137,452.0	
Client				Sheet
Waterman Infrastructure & Environment Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument / Backfill
Depth	Type / No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.10	ES1 PID	0.0ppm				(0.20)	MADE GROUND Firm grey brown slightly sandy clay.	
0.10	HV	50kPa@0.10m		53.64		0.20		
						(0.50)	MADE GROUND Dark brown very gravelly very clayey coarse sand. Gravel is of sub angular medium to coarse brick, coal, quartz, concrete and clinker.	
0.50	ES2 PID	0.0ppm		53.14		0.70		
0.80	ES3 PID	0.0ppm		52.94		(0.30) 0.90	MADE GROUND Grey very sandy gravel. Gravel is of sub angular to sub rounded medium coarse concrete and quartz.	
				52.84		1.00	MADE GROUND Concrete mass.	
1.50	ES4 PID	0.0ppm					MADE GROUND Dark grey very gravelly coarse sand. Gravel is of sub angular medium to coarse brick, coal, concrete, glass, pottery and metal.	
2.00	ES5 PID	0.0ppm				(2.20)		
2.00	B3							
2.50	ES6							
3.00	ES7							
				50.64		3.20		
						(0.40)	MADE GROUND Firm light grey mottled brown slightly sandy slightly gravelly clay. Gravel is of sub angular fine to medium coal, quartz and limestone.	
3.50	DS8 B4			50.24		3.60		
3.50	HV	60kPa@3.50m						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpth	From	To	Hours	From	To	Trial hole terminated at 3.60m. Excavation remained open and dry on completion. Concrete found at 0.90m. Second attempt breaker used to clear concrete. Pit completed.

All dimensions in metres Scale 1:25.75	Client Engineer Jon Coates	Method Plant Used JCB 3CX	Logged By Darren Coates


GEOCORE
BOREHOLE LOG
AGS
Geocore Site Investigation Ltd
Tribee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481744
Location
Biggins Wood, Shepway, Folkestone, CT19 4AL
BOREHOLE No
TP14
Job No
SA/16/58199
Date
13-06-16
Ground Level (m)
54.00
Co-Ordinates
E 620,264.8 N 137,449.4
Client
Waterman Infrastructure & Environment Ltd
Sheet
1 of 1
SAMPLES & TESTS
Depth
Type No
Test Result
Water
STRATA
Reduced Level
Legend
Depth (Thickness)
DESCRIPTION
Instrument Backfill
MADE GROUND Brown very gravelly clayey sand. Gravel is of sub angular medium to coarse brick, concrete, tile, coal and clinker.
54.00
0.45
MADE GROUND Dark grey very sandy gravel. Gravel is of sub angular medium to coarse brick, concrete and bitumen road surfacing (strong odour).
53.55
0.45
MADE GROUND Firm grey very sandy slightly gravelly clay. Gravel is of sub angular medium to coarse brick, coal, concrete, clinker, ash and quartz.
51.60
2.40
MADE GROUND Firm grey sandy slightly gravelly clay. Gravel is of sub angular medium to coarse coal, plastic, ash and clinker.
51.20
2.80
Boring Progress and Water Observations
Date
Time
Depth
Casing Depth
Casing Dia. mm
Water Depth
Chiselling
From
To
Hours
Water Added
From
To
GENERAL REMARKS
Trial hole termination at 2.80m.
Excavation collapsed to 2.20m.
Water at * After standing pit to collapse and become unsafe. Pit abandoned.
All dimensions in metres
Scale 1:25.25
Client Engineer
Joe Contes
Method
Plant Used
JCB 3CX
Logged By
Darren Cooke

GEOCORE

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP15
Job No: 5A/16/58199	Date: 11-04-16	Ground Level (m): 54.22	Co-Ordinates(): E 620,351.9 N 137,530.4	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/ Backfill
0.10	ES1 PID	0.0ppm		54.12		0.10	MADE GROUND Dark brown slightly sandy slightly gravelly clay with abundant roots. Gravel is of sub angular medium to coarse brick.	
0.20	HV	30kPa@0.20m					Stiff light grey mottled brown slightly sandy CLAY with occasional flint nodules and shell fragments.	
1.00	ES2 PID	0.0ppm				(1.90)		
1.20	HV	130+kPa@1.20m						
1.50	HV	130+kPa@1.50m						
				52.22		2.00		
2.00	ES3 PID	0.0ppm						
2.00	HV	130+kPa@2.00m						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Trial hole terminated at 2.00m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:25.75	Client Engineer: Joe Coates	Method Plant Used: JCB 3CX	Logged By: Duncan Cooper

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Trafalgar Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP16
Job No: SA/16/58199	Date: 11-04-16	Ground Level (m): 53.96	Co-Ordinates (): E 620,245.1 N 137,501.9	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/Backfill
0.10	ES1 PID	0.0ppm		53.76		(0.20) 0.20	MADE GROUND Dark brown gravelly slightly clayey coarse sand with occasional metal sheets. Gravel is of sub angular medium to coarse brick, sandstone, concrete and clinker	
0.50	HV	90kPa@0.50m					Stiff light grey mottled brown slightly sandy CLAY with occasional fine rootlets and shell fragments	
1.00 1.00	ES2 PID B1 HV	0.0ppm 100kPa@1.00m				(1.80)		
1.50	HV	130+kPa@1.50m						
2.00 2.00	ES3 PID B2 HV	0.0ppm 130+kPa@2.00m		51.96		2.00		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Trial hole terminated at 2.00m.
Excavation remained open and dry on completion.

All dimensions in metres Scale 1:25.75	Client Engineer: Jon Coates	Method/Plant Used: JCB 3CX	Logged By: Darren Cramer

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BOREHOLE LOG

AGS

Geocore Site Investigations Ltd
Trafalgar Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Shepway, Folkestone, CT19 4AL				TP17
Job No: SA/16/58199	Date: 12-04-16	Ground Level (m): 54.08	Co-Ordinates (): E 620,180.9 N 137,512.7	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument Backfill
0.15 0.15	ES1 PID HV	0 ppm 80kPa@0.15m		53.93		0.15	MADE GROUND: Firm grey slightly sandy slightly gravelly clay with many fine rootlets and some organic matter. Gravel is of sub angular medium coarse quartz.	
0.50	HV	95kPa@0.50m				(1.05)	Stiff light grey mottled brown slightly sandy CLAY with occasional roots.	
1.00 1.00	ES2 PID D1 HV	0 ppm 110kPa@1.00m		52.88		1.20		
1.50	HV	130+kPa@1.50m				(0.80)	Stiff light grey mottled brown slightly sandy CLAY with occasional fine rootlets and shell fragments.	
2.00 2.00	B2 HV ES3 PID	130+kPa@2.00m 0 ppm		52.08		2.00		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Trial pit terminated at 2.00m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:23.75	Client Engineer: Jon Coates	Method/Plant Used: JCB 3CX	Logged By: Darren Coates

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Tristar Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location: Biggins Wood, Shepway, Folkestone, CT19 4AL				BOREHOLE No. TP18
Job No: SA/16/58199	Date: 11-04-16	Ground Level (m): 54.90	Co-Ordinates (): E 620,395.5 N 137,552.8	
Client: Waterman Infrastructure & Environment Ltd				Sheet: 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-1.30 0.00-1.30 0.00-1.30	ES1 PID ES2 PID ES3 PID	Composite 0.0ppm Bituminous 2.0.0ppm bituminous 2.0.0ppm					MADE GROUND Brown gravelly coarse sand with many cobbles and boulders. Gravel is of sub angular medium to coarse brick, concrete, bituminous mud surfacing, clinker and ash. Cobbles and boulders are of sub angular concrete and brick.	
0.50	B1					(1.30)		
				53.70		1.30		
				53.60		1.30	Stiff light grey slightly sandy CLAY.	
1.30	HV	101kPa@1.30m						

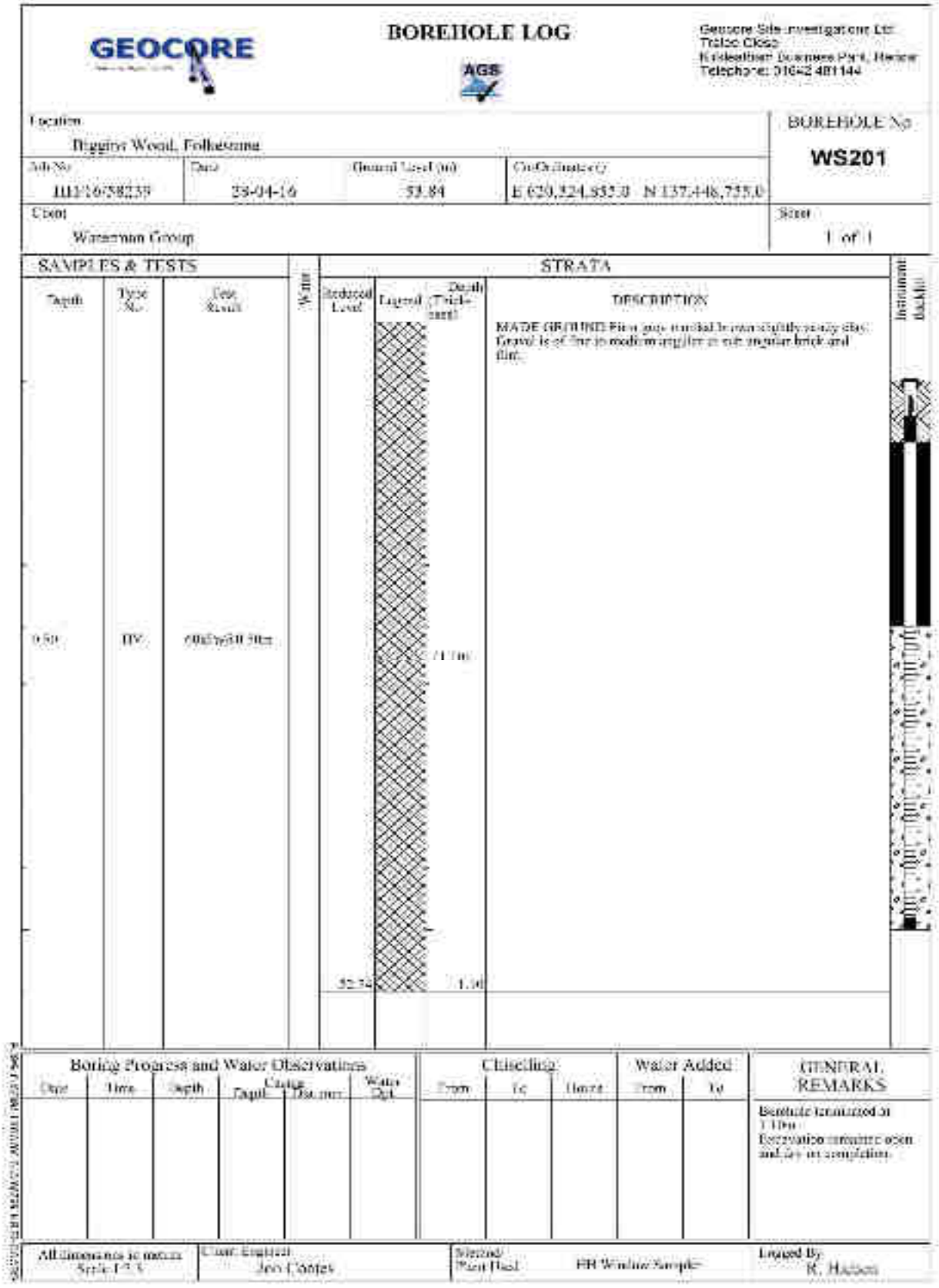
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	Trial hole terminated at 1.30m. Excavation remained open and dry on completion

All dimensions in metres Scale 1:23.75	Client Engineer: Jon Coates	Method: Plant Used: JCB 3CX	Logged By: Darren Corner


TP7


TP10


TP13


GEOCORE
BOREHOLE LOG
AGS
Geocore Site Investigations Ltd
Tristar Close
Kingsnorth Business Park, Hoo
Telephone: 01634 281144
Location
Biggins Wood, Folkestone
BOREHOLE No
WS201
Job No
JJJ/16/58239
Date
29-04-16
Ground Level (m)
53.84
Co-Ordinates
E 620,324.853.0 N 137,446,755.0
Client
Waterman Group
Sheet
1 of 1
SAMPLES & TESTS
Water
STRATA
Depth
Type No.
Test Result
Reduced Level
Legend
Depth (Thickness)
DESCRIPTION
Instrument Details
MADE GROUND: Firm grey mottled brown slightly sandy clay. Gravel is of flint in medium angular to sub angular brick and flint.
0.50
D
1.10
52.74
1.10
Boring Progress and Water Observations
Date
Time
Depth
Casing Depth
Casing Dia. (mm)
Water Depth
Chiselling
From
To
Hours
Water Added
From
To
GENERAL REMARKS
Borehole terminated at 1.10m
Excavation remained open and dry on completion
All dimensions in metres
Scale 1:25
Client Engineer
Jon Coates
Method
Plant Used
HR Window Sampler
Logged By
R. Hudson

GEOCORE

BOREHOLE LOG

Geocore Site Investigations Ltd
Trelao Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				**WS202**
Job No: HH/16/53239	Date: 23-04-16	Ground Level (m): 53.82	Co-Ordinates: E 620,544.615.0 N 137,425.233.0	
Client: Waterman Group				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
							MADE GROUND Firm grey mottled brown slightly sandy slightly gravelly clay. Gravel is of fine to medium angular brick and flint.
0.50	HV	60kPa@0.50m				(1.10)	
				52.72		1.10	

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Borehole terminated at 1.10m.
Excavation remained open and dry on completion.

All dimensions in metres Scale 1:2.5	Client Engineer: Jon Coates	Method/Plant Used: HE Window Sampler	Logged By: R. Hichen

BOREHOLE LOG

Geocore Site Investigations Ltd
Tweed Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS203
Job No	Date	Ground Level (m)	Co-Ordinates ()	
HH/16/58239	28-04-16	54.01	E 620,163.875.0 N 137,427,171.0	
Client				Sheet
Waterman Group				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Details
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
				53.61		(0.40) 0.40	MADE GROUND Firm grey mottled brown slightly sandy slightly gravelly clay. Gravel is of fine to medium angular to sub angular brick and flint.	
0.80	HV	86kPa@0.60m		53.21		(0.40) 0.80	MADE GROUND Firm, dark grey mottled brown sandy slightly gravelly clay. Gravel is of fine angular to sub rounded brick and flint.	
0.90	HV	62kPa@0.90m		52.91		(0.30) 1.10	MADE GROUND Firm grey/brown sandy slightly gravelly clay. Gravel is of fine to medium angular to sub angular brick, flint and chalk.	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Ont	From	To	Hours	From	To	Borehole terminated at 1.10m

All dimensions in metres Scale 1:25	Client Engineer Jon Coates	Method/ Plant Used Hit Window Sampler	Logged By R. Hichen

GEOCORE	BOREHOLE LOG	Geocore Site Investigations Ltd Trades Close Kirkleatham Business Park, Redcar Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS204
Job No: HIU16-58239	Date: 28-04-16	Ground Level (m): 53.94	Co-Ordinates (): E 620,135,359.0 N 137,461,786.0	
Client: Waterman Group				Sheet: 1 of 1

SAMPLES & TESTS				STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument/Backfill
							MADE GROUND Firm, grey mottled brown sandy slightly gravelly clay. Gravel is of fine to medium angular brick and flint.	
0.50	HV	50kPa@0.50m				(1.10)		
0.80	HV	[illegible]kPa@0.80m						
				52.84		1.10		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Borehole terminated at 1.10m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:7.5	Client Engineer: Jim Coates	Method/Plant Used: HR Window Sampler	Logged By: R. Hickson

GEOCORE

BOREHOLE LOG

AGS

Geocore Site Investigations Ltd
Tristao Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS205
Job No: HH/16/58239	Date: 28-04-16	Ground Level (m): 53.96	Co-Ordinates (): E 620,145,181.0 N 137,499,983.0	
Client: Waterman Group				Sheet: 1 of 1

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Instrument Backfill
							Firm, grey mottled brown slightly sandy CLAY with occasional rootlets.	
0.50	HV	52kPa@0.50m				(1.10)		
				52.86		1.10		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Borehole terminated at 1.10m.
Excavation remained open and dry on completion.

All dimensions in metres Scale 1:7.5	Client Engineer: Jon Coates	Method Plant Used: HH Window Sampler	Logged By: R. Hichen

GEOCORE 01 .. AUGUST 2012 ..

BOREHOLE LOG

GEOCORE

Geocore Site Investigations Ltd
Tinker Close
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS206
Job No	Date	Ground Level (m)	Co-Ordinates ()	
HH16/58239	28-09-16	53.90	E 629,345.126.0 N 137,505.390.0	
Client				Sheet
Watervan Group				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
							Firm light grey mottled brown slightly sandy CLAY.	
0.50	HV	90kPa@0.50m				(1.10)		
				52.80		1.10		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole terminated at 1.10m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:25	Client Engineer: Tom Coates	Method: Plant Used: HH Windows Sampler	Logged By: R. Hitchen

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirkstead [illegible] Business Park, [illegible]
Telephone: 01842 [illegible]

Location: Higgins Wood, Folkestone			BOREHOLE No **WS207**
Job No: IHL16/58239	Date: 28-04-16	Ground Level (m): 54.22	Co-Ordinates (): E 620,351,862.0 N 137,530,360.0
Client: Waterfront Group			Sheet: 1 of 1

SAMPLES & TESTS / **STRATA**

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
							Firm light grey mottled brown slightly sandy CLAY.
0.50	HV	60kPa at 0.50m				(1.10)	
				53.12		1.10	

Instrument/ Backfill

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Borehole terminated at 1.10m.

All dimensions in metres Scale [illegible]	Client Engineer: Jon Coates	Method/ Plant Used: HH Window Sampler	Logged By: R. Hichen

BOREHOLE LOG

Geocore Site Investigations Ltd
Tralee Close
Kirkham Business Park, Rucker
Telephone: 01843 251144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS208
Job No: HH/16/58239	Date: 28-04-18	Ground Level (m): 54.08	Co-Ordinates (): E 620,196.872.0 N 137,515.365.0	
Client: Waterman Group				Sheet: 1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
							MADE GROUND: Firm grey mottled brown slightly sandy slightly gravelly clay. Gravel is of fine to medium angular to sub angular brick, coal, and sandstone.
						(0.40)	
0.30	HV	90kPa@0.30m					
				53.68		0.40	
							Firm light brown slightly sandy slightly gravelly CLAY. Gravel is of sub rounded fine chalk.
0.60	HV	69kPa@0.60m				(0.40)	
				53.28		0.80	
							Firm light grey mottled brown slightly sandy CLAY.
0.90	HV	60kPa@0.90m				(0.30)	
				52.98		1.10	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Borehole terminated at 1.10m. Excavation remained open and dry on completion.

All dimensions in metres Scale 1:7.5	Client Engineer: Jon Coates	Method/Plant Used: HH Window Sampler	Logged By: R. Hidson

GEOCORE

BOREHOLE LOG

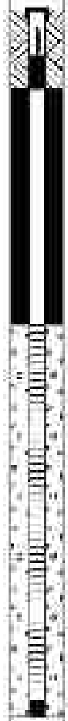
Geocore Site Investigations Ltd
Image Cases
Kirkleatham Business Park, Redcar
Telephone: 01642 481144

Location				BOREHOLE No
Biggins Wood, Folkestone				WS209
Job No	Date	Ground Level (m)	Co-Ordinates ()	
[illegible]	28-04-16	54.22	E 620,[illegible] N 137,[illegible]	
Client				Sheet
Watsonian Group				1 of 1

SAMPLES & TESTS / STRATA

Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION
							Firm light grey mottled brown slightly sandy CLAY.
0.80	HV	50kPa/40.5kPa				(1.30)	
				52.92		1.30	

Instrument/ Backfill



Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole terminated at 1.30m.

All dimensions in metres Scale 1:12.5	Client Engineer: Jon Coates	Method / Plant Used: HH Window Sampler	Logged By: R. Hickett

BOREHOLE LOG

GEOCORE

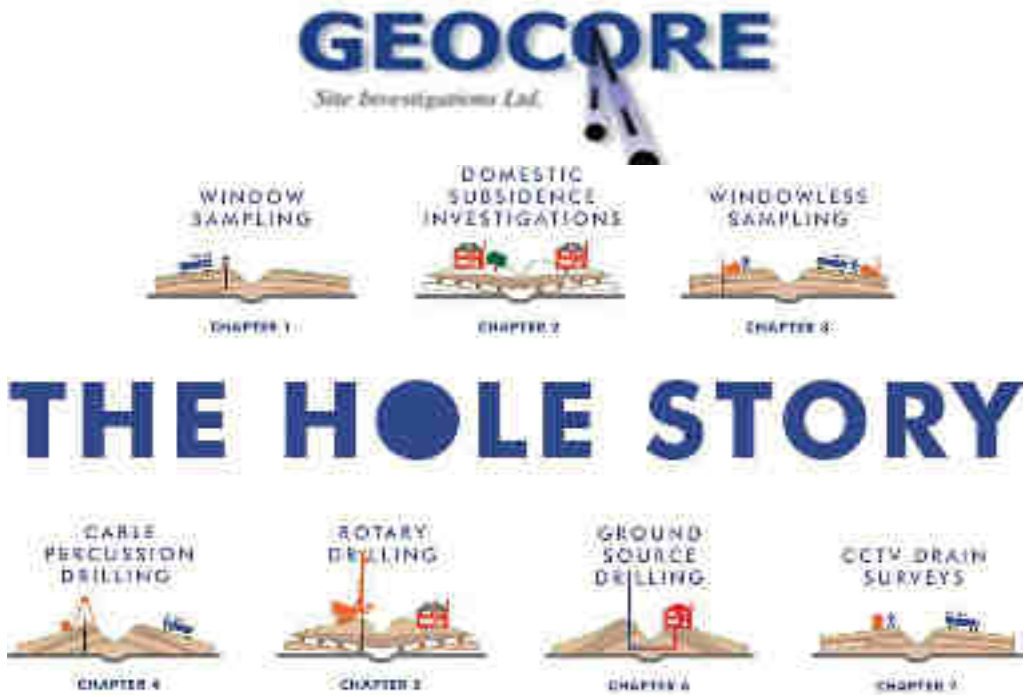
Geocore Site Investigations Ltd
Tralee Close
Kimbolton Business Park, Radcliffe
Telephone: 01942 481144

Location				BOREHOLE No
Higgins Wood, Folkestone				WS210
Job No	Date	Ground Level (m)	Co-Ordinates ()	
HH316/58239	28-04-16	55.52	E 620,401,721.0 N 137,436,277.0	
Client				Sheet
Waterman Group				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.50	HV	60kPa@0.50m				(1.10)	MADE GROUND Firm grey mottled brown slightly sandy slightly gravelly clay. Gravel is of fine to medium angular brick, flint and chalk	
				52.42		1.10		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	Borehole terminated at 1.10m. Excavation remained open and dry on completion.

All dimensions in metres. Scale 1:25	Client Engineer: Jon Coates	Method: Plant Used: HD Window Sampler	Logged By: R. Hichen


GEOCORE
Site Investigations Ltd.
WINDOW SAMPLING
DOMESTIC SUBSIDENCE INVESTIGATIONS
WINDOWLESS SAMPLING
THE HOLE STORY
CABLE PERCUSSION DRILLING
ROTARY DRILLING
GROUND SOURCE DRILLING
CCTV DRAIN SURVEYS

Hand Pit Log

Trialpit No
HP01
Sheet 1 of 1

Project Name:	Biggins Wood	Project No. WIE10619-100	Date: 25.05.16
Location:	Folkestone	Depth: 0.3m	Scale 1:25
Client:	Biggins Wood Homes		Logged: ALM

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.30	ES		0.10			MADE GROUND Firm light grey slightly clayey, slightly gravelly sand. Gravel is of angular to sub angular medium to coarse brick and quartz
				0.30			MADE GROUND Firm dark brown slightly clayey, slightly gravelly sand. Gravel is of sub angular medium to coarse brick, coal, quartz and pottery

1
2
3
4
5

Remarks:

Stability:

AGS

Hand Pit Log

Trialpit No
HP02
Sheet 1 of 1

Project Name: Biggins Wood	Project No. WIE10619-100		Date: 25.05.16
Location: Folkestone		Depth: 0.5m	Scale 1:25
Client: Biggins Wood Homes			Logged: ALM

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.30	ES		0.10			MADE GROUND Firm dark brown slightly sandy clay
	0.30 - 0.50	ES		0.30			MADE GROUND Medium to firm brown slightly sandy, gravelly clay. Gravel is of sub angular to angular medium to coarse brick, quartz, coal and pottery
				0.50			MADE GROUND Medium to firm light brown slightly gravelly, very clayey sand. Gravel is of sub angular medium to coarse brick, quartz and coal

1
2
3
4
5

Remarks:

Stability:

Appendix C Ground Gas Monitoring Results

- **Ground Gas Monitoring Equipment Used**
- **Ground Gas Monitoring Results**

Table C.1: Ground gas monitoring equipment list

Equipment	Description	Range/Accuracy
Gas Analyser	GFM430 (Serial No. 10205)	0 -100 % / ± 0.1 %
Photo Ionisation Detector	MiniRAE 2000 (serial No. 110-900772)	0.1-2000ppm ± 10% or ±2ppm, whichever is greater

ssure Condition				Falling			
Cold		Sunny	x	Overcast		Light rain	
		Slight Breeze		Strong breeze			
		Damp		Wet			

	BH101	
	0	l/hr
	-0.2	l/hr
	0	Pa
	0.68	m
iameter	1.65	50mm

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments: Negative flow. -6.5 l/hr at commencment of monitoring falling to -0.2 over 15 seconds before steadying.**	
<0.1	10.1	10.4	1.9	3	<1		
0.1	10.6	9.3	3.9	1	<1		
0.2	11.9	8.9	5.9	2	<1		
0.2	11.3	8.9	7	2	1		
0.3	11.8	8.8	8.5	2	<1		
0.4	12.1	8.7	9.2	4	<1		
0.9	12	9.3	22.1	4	<1		
1.2	10.4	10.8	28.7	4	<1		
1.3	8.7	12.1	30.5	5	<1		
1.3	7.5	13.4	29.3	3	<1		
1.3	12	8.7	30.5	5	1	**PID**	0.2

	BH102	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.77	m
iameter	5.9	50mm (ID)

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	5.5	14.2	<0.1	<1	<1		
<0.1	5.6	13.7	<0.1	<1	1		
<0.1	5.8	13.3	<0.1	1	<1		
<0.1	5.9	13.2	<0.1	<1	<1		
<0.1	6	13.1	<0.1	<1	<1		
<0.1	6.1	13	<0.1	<1	<1		
<0.1	6.2	12.5	<0.1	<1	<1		
<0.1	6.4	12.8	<0.1	<1	<1		
<0.1	6.3	12.7	<0.1	<1	<1		
<0.1	6.4	12.5	<0.1	1	1	**PID**	0.4

0.5	4.9	0.2	12.7	3	<1		
0.5	4.9	0.1	12.5	2	<1		
0.5	4.9	0.1	12.3	3	<1		
0.5	5	0.1	12.2	2	<1		
0.5	5.1	0.1	12.2	3	<1		
0.5	5.2	<0.1	13	3	<1		
0.5	5.4	<0.1	14.6	3	<1		
0.5	5.5	<0.1	16.1	3	<1		
0.5	5.5	<0.1	16.1	3	<1	**PID**	0.2

	BH104	
	0	l/hr
	<0.0	l/hr
	0	Pa
	4.62	m
iameter	5.1	50mm (ID)

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	3.7	14.3	<0.1	<1	<1		
<0.1	3.7	15.3	<0.1	<1	<1		
<0.1	3.6	15.6	<0.1	<1	<1		
<0.1	3.6	15.6	<0.1	<1	<1		
<0.1	3.5	15.6	<0.1	<1	<1		
<0.1	3.5	15.5	<0.1	<1	<1		
<0.1	3.5	15.3	<0.1	<1	<1		
<0.1	3.6	15.2	<0.1	<1	<1		
<0.1	3.7	14.7	<0.1	<1	<1		
<0.1	3.7	14.3	<0.1	<1	<1	**PID**	0.7

	BH105	
	0	l/hr
	<0.0	l/hr
	0	Pa
	dry	m
iameter	1.58	50mm (ID)

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	0.5	2.5	<0.1	<1	<1		
<0.1	0.5	1.5	<0.1	<1	<1		
<0.1	0.5	1	<0.1	<1	<1		
<0.1	0.5	1	<0.1	<1	<1		
<0.1	0.5	0.9	<0.1	<1	<1		
<0.1	0.5	0.8	<0.1	<1	<1		
<0.1	0.5	0.8	<0.1	<1	<1		
<0.1	0.5	0.9	<0.1	<1	<1		
<0.1	0.5	1.3	<0.1	<1	<1		
<0.1	0.5	0.8	<0.1	<1	<1	**PID**	0

	WS10	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.68	m
iameter	6	19mm

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
<0.1	5	14.7	<0.1	<1	<1	
<0.1	4.9	14.7	<0.1	<1	<1	

2.2	6.8	1.1	51.6	1	<1		
2.3	6.9	0.3	53.9	<1	<1		
2.4	6.9	0.1	55.9	2	<1		
2.5	6.9	0.1	58.6	2	<1		
2.7	6.9	<0.1	62.5	4	<1		
2.8	6.9	<0.1	65	3	<1		
2.9	6.9	<0.1	67	3	<1		
3	6.8	<0.1	68.3	3	<1		
3	6.8	<0.1	69.5	6	1		
3	6.9	<0.1	69.5	6	1	**PID**	0.2

		WS122					
		0	l/hr				
		<0.0	l/hr				
		0	Pa				
		dry	m				
iameter		0.9m	19mm				
CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
1.2	2.4	0.1	27.6	4	<1		
1.1	2.4	<0.1	26.1	3	<1		
1	2.2	<0.1	24.3	2	<1		
1	2.2	<0.1	23.3	2	<1		
0.9	2.2	<0.1	22.1	2	<1		
0.9	2.2	<0.1	21.2	2	<1		
0.8	2.1	<0.1	20	3	<1		
0.8	2	0.2	18.5	2	<1		
0.7	2	0.8	17.5	2	<1		
1.2	2	<0.1	27.6	4	<1	**PID**	0.3

		WS12					
		0	l/hr				
		<0.0	l/hr				
		0	Pa				
		dry	m				
iameter		1.1m	19mm				
CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
2.1	6.7	<0.1	25.6	2	<1		
1	6.8	<0.1	23.4	3	<1		
0.9	6.8	<0.1	21.2	4	<1		
0.9	6.9	<0.1	20.1	3	<1		
0.8	6.9	<0.1	18.6	3	<1		
0.7	6.9	<0.1	17.9	4	<1		
0.7	6.9	<0.1	17.3	3	<1		
0.7	6.9	<0.1	17.2	5	<1		
0.7	7	<0.1	17.2	4	<1		
0.7	7	<0.1	17.2	5	<1	**PID**	0.7

<0.1	6.7	1.3	<0.1	4	<1		
<0.1	6.8	1.3	<0.1	4	<1		
<0.1	6.9	1.2	<0.1	3	<1		
<0.1	6.9	1.1	<0.1	3	<1		
<0.1	7	1	<0.1	2	<1		
<0.1	7.1	0.8	<0.1	2	<1		
<0.1	7.3	0.6	<0.1	<1	<1		
<0.1	7.3	0.5	<0.1	<1	<1		
0.1	7.3	0.5	1	4	<1	**PID**	0.7

	WS201	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	0.5	21	<0.1	<1	<1		
<0.1	0.5	21.1	<0.1	<1	<1		
<0.1	0.5	21.2	<0.1	<1	<1		
<0.1	0.5	21.2	<0.1	<1	<1		
<0.1	0.5	21.2	<0.1	<1	<1		
<0.1	0.3	21.3	<0.1	<1	<1		
<0.1	0.2	21.4	<0.1	<1	<1		
<0.1	0.2	21.4	<0.1	<1	<1		
<0.1	0.2	21.4	<0.1	<1	<1		
<0.1	0.3	21	<0.1	<1	<1	**PID**	0.3

	WS202	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	1.9	18	<0.1	<1	<1		
<0.1	1.9	18.5	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.9	18.6	<0.1	<1	<1		
<0.1	1.8	18.6	<0.1	<1	1		
<0.1	1.9	18	<0.1	<1	1	**PID**	0.4

	WS203	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.55	m
iameter	1.00m	50mm

CH_4 (%)	**CO_2 (%)**	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
<0.1	0.3	21.4	<0.1	<1	<1	
<0.1	0.2	21.3	<0.1	<1	<1	

<0.1	0.8	20.8	<0.1	<1	<1		
<0.1	0.5	21.1	<0.1	<1	<1		
<0.1	0.4	21.1	<0.1	<1	<1		
<0.1	0.3	21.2	<0.1	<1	<1		
<0.1	0.2	21.2	<0.1	<1	<1		
<0.1	0.1	21.2	<0.1	<1	<1		
<0.1	0.1	21.2	<0.1	<1	<1		
<0.1	0.1	21.2	<0.1	<1	<1		
<0.1	0.1	21.2	<0.1	<1	<1		
<0.1	0.8	20.8	<0.1	<1	<1	**PID**	<0.1

	WS205	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.78	m
iameter	1.00m	50mm

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
<0.1	0.5	20.9	<0.1	<1	<1		
<0.1	0.5	20.8	<0.1	<1	<1		
<0.1	0.5	20.8	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1		
<0.1	0.5	20.7	<0.1	<1	<1	**PID**	<0.1

	WS206	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
<0.1	0.2	21.1	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	1	**PID**	<0.1

	WS207	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:
<0.1	0.5	19.5	<0.1	<1	<1	
<0.1	0.5	21.5	<0.1	<1	<1	

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
<0.1	0.2	21.1	<0.1	2	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	2	<1	**PID**	<0.1

	WS209	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
<0.1	0.3	20.9	<0.1	<1	<1		
<0.1	0.3	20.9	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.2	20.9	<0.1	<1	<1		
<0.1	0.2	21	<0.1	<1	<1		
<0.1	0.3	20.9	<0.1	<1	1	**PID**	<0.1

	WS210	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.00m	50mm

CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
<0.1	1.2	20.4	<0.1	<1	<1		
<0.1	1.2	20.2	<0.1	<1	<1		
<0.1	1.2	20.1	<0.1	<1	<1		
<0.1	1.3	20.1	<0.1	<1	<1		
<0.1	1.3	20.1	<0.1	<1	<1		
<0.1	1.4	20	<0.1	<1	<1		
<0.1	1.4	20	<0.1	<1	<1		
<0.1	1.4	20.1	<0.1	<1	<1		
<0.1	1.3	20.1	<0.1	1	<1		
<0.1	1.4	20.2	<0.1	1	<1	**PID**	0.1

ssure Condition			Falling			
	Sunny	x	Overcast		Light rain	
	Slight Breeze	x	Strong breeze			
	Damp	x	Wet			

	BH101	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.58	m
iameter	1.65	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	15	<0.1	<1	<1		
<0.1	14.2	<0.1	<1	<1		
<0.1	14.6	<0.1	<1	<1		
<0.1	14.3	<0.1	<1	<1		
<0.1	13.9	<0.1	<1	<1		
<0.1	13.6	<0.1	<1	<1		
<0.1	13.3	<0.1	<1	<1		
<0.1	13	<0.1	<1	<1		
<0.1	13	<0.1	<1	<1		
<0.1	13	<0.1	<1	<1		
<0.1	13	<0.1	<1	<1	**PID**	0.6

	BH102	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.82	m
iameter	5.9	50mm (ID)

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	16	<0.1	<1	<1		
<0.1	15.9	<0.1	<1	<1		
<0.1	15.6	<0.1	<1	<1		
<0.1	15.3	<0.1	<1	<1		
<0.1	14.8	<0.1	<1	<1		
<0.1	14.5	<0.1	<1	<1		
<0.1	14.4	<0.1	<1	<1		
<0.1	14.4	<0.1	<1	<1		
<0.1	14.4	<0.1	<1	<1		
<0.1	14.4	<0.1	<1	<1	**PID**	<0.1

1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18.1	<0.1	<1	<1		
1.5	18	<0.1	<1	<1		
1.5	18	<0.1	<1	<1	**PID**	0.2

	BH104	
	0	l/hr
	<0.0	l/hr
	0	Pa
	4.66	m
iameter	5.1	50mm (ID)

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.9	18.6	<0.1	<1	<1		
0.9	18.5	<0.1	<1	<1		
0.9	18.3	<0.1	<1	<1		
0.9	18.4	<0.1	<1	<1		
0.9	18.3	<0.1	<1	<1		
0.9	18.3	<0.1	<1	<1		
0.8	18.3	<0.1	<1	<1		
0.8	18.3	<0.1	<1	<1		
0.8	18.3	<0.1	<1	<1		
0.9	18.3	<0.1	<1	<1	**PID**	<0.1

	BH105	
	0	l/hr
	<0.0	l/hr
	0	Pa
	dry	m
iameter	1.58	50mm (ID)

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.7	0.7	<0.1	<1	<1		
0.7	0.2	<0.1	<1	<1		
0.7	<0.1	<0.1	1	1		
0.7	<0.1	<0.1	<1	<1		
0.7	<0.1	<0.1	1	<1		
0.7	<0.1	<0.1	1	<1		
0.7	<0.1	<0.1	<1	<1		
0.7	<0.1	<0.1	<1	<1		
0.7	<0.1	<0.1	<1	<1		
0.7	<0.1	<0.1	1	1	**PID**	0.8

	WS10	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.77	m
iameter	6	19mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
<0.1	16.8	<0.1	<1	<1	
<0.1	16.6	<0.1	<1	<1	

<0.1	17.8	<0.1	<1	<1		
<0.1	17.5	<0.1	<1	<1		
<0.1	17.3	<0.1	<1	<1		
<0.1	17.2	<0.1	<1	<1		
<0.1	16.9	<0.1	<1	<1		
<0.1	16.8	<0.1	<1	<1		
<0.1	16.7	<0.1	<1	<1		
<0.1	16.7	<0.1	<1	<1		
<0.1	16.7	<0.1	<1	1		
<0.1	16.7	<0.1	<1	1	**PID**	<0.1

	WS122	
	0	l/hr
	<0.0	l/hr
	0	Pa
	dry	m
iameter	0.9m	19mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	18.6	<0.1	<1	<1		
<0.1	18.3	<0.1	<1	<1		
<0.1	18.1	<0.1	<1	<1		
<0.1	18	<0.1	<1	<1		
<0.1	17.7	<0.1	<1	<1		
<0.1	17.6	<0.1	<1	<1		
<0.1	17.6	<0.1	<1	<1		
<0.1	17.6	<0.1	<1	<1		
<0.1	17.6	<0.1	<1	<1		
<0.1	17.6	<0.1	<1	<1	**PID**	<0.1

	WS12	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.1	m
iameter	1.1m	19mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	19.1	<0.1	<1	<1		
<0.1	19	<0.1	<1	<1		
<0.1	18.8	<0.1	<1	<1		
<0.1	18.5	<0.1	<1	<1		
<0.1	18.3	<0.1	<1	<1		
<0.1	18.1	<0.1	<1	<1		
<0.1	18.1	<0.1	<1	<1		
<0.1	18.1	<0.1	<1	<1		
<0.1	18	<0.1	<1	<1		
<0.1	18	<0.1	<1	<1	**PID**	0.8

	WS14*	
	0	l/hr
	<0.0	l/hr
	0	Pa
	2.99	m
iameter	5.4m	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
1.3	18.1	<0.1	<1	<1	
1.2	18.1	<0.1	<1	<1	

CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
0.6	19.5	<0.1	<1	<1		
0.5	19.4	<0.1	<1	<1		
0.5	19.3	<0.1	<1	1		
0.5	19.2	<0.1	<1	<1		
0.5	19.1	<0.1	<1	<1		
0.5	19.1	<0.1	<1	<1		
0.4	19.1	<0.1	<1	<1		
0.4	19.1	<0.1	<1	<1		
0.4	19.1	<0.1	<1	<1		
0.6	19.1	<0.1	<1	1	**PID**	0.4

	WS202	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.03	50mm

CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
0.7	19.1	<0.1	<1	<1		
0.7	19	<0.1	<1	<1		
0.7	18.9	<0.1	<1	<1		
0.7	18.8	<0.1	<1	<1		
0.7	18.7	<0.1	<1	<1		
0.7	18.6	<0.1	<1	<1		
0.7	18.6	<0.1	<1	<1		
0.7	18.6	<0.1	<1	<1		
0.7	18.6	<0.1	<1	<1		
0.7	18.6	<0.1	<1	<1	**PID**	<0.1

	WS203	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.48	m
iameter	1.00m	50mm

CO_2 (%)	O_2 (%)	LEL (%)	CO (ppm)	H_2S (ppm)	Comments:	
0.1	13.3	<0.1	<1	<1		
0.1	12.8	<0.1	<1	<1		
0.1	12.6	<0.1	<1	<1		
<0.1	12.5	<0.1	<1	<1		
<0.1	12.3	<0.1	<1	<1		
<0.1	12.3	<0.1	<1	<1		
<0.1	12.3	<0.1	<1	<1		
<0.1	12.3	<0.1	<1	<1		
<0.1	12.3	<0.1	<1	<1		
0.1	12.3	<0.1	<1	<1	**PID**	<0.1

0.2	11.2	<0.1	<1	<1		
0.2	11	<0.1	<1	<1		
0.1	10.8	<0.1	<1	<1		
0.1	10.7	<0.1	<1	<1		
0.1	10.7	<0.1	<1	<1		
0.1	10.7	<0.1	<1	<1		
0.1	10.7	<0.1	<1	<1		
0.1	10.7	<0.1	<1	<1		
0.2	10.7	<0.1	<1	<1	**PID**	0.6

	WS205	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.7	m
iameter	1.06	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.3	20.9	<0.1	<1	<1		
0.3	20.8	<0.1	<1	<1		
0.2	20.8	<0.1	<1	<1		
0.2	20.7	<0.1	<1	<1		
0.2	20.7	<0.1	<1	<1		
0.2	20.7	<0.1	<1	1		
0.2	20.7	<0.1	<1	1		
0.2	20.7	<0.1	<1	1		
0.2	20.7	<0.1	<1	1		
0.2	20.7	<0.1	<1	1	**PID**	<0.1

	WS206	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.3	m
iameter	1.05	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.4	7.2	<0.1	1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1		
0.4	7.2	<0.1	<1	<1	**PID**	<0.1

	WS207	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.07	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
<0.1	20.8	<0.1	<1	<1	
<0.1	20.9	<0.1	<1	<1	

0.4	8	<0.1	<1	<1		
0.4	7.9	<0.1	<1	<1		
0.3	7.9	<0.1	<1	<1		
0.3	7.9	<0.1	<1	<1		
0.3	7.9	<0.1	<1	<1		
0.3	7.9	<0.1	<1	<1		
0.3	7.9	<0.1	<1	1		
0.3	7.9	<0.1	<1	1		
0.3	7.9	<0.1	<1	<1		
0.4	7.9	<0.1	<1	1	**PID**	<0.1

	WS209	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.18	m
iameter	1.00m	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.6	2.9	<0.1	<1	<1	**PID error. No reading taken. Water above screen section of standpipe. Flow was 3.4l/hr at commencement of monitoring. Quickly fell to <0.0**	
0.5	3.1	<0.1	<1	<1		
0.5	3.3	<0.1	<1	1		
0.5	3.4	<0.1	<1	<1		
0.5	4	<0.1	<1	1		
0.5	4.5	<0.1	<1	<1		
0.5	5.2	<0.1	<1	1		
0.5	5.2	<0.1	<1	1		
0.5	5.2	<0.1	<1	<1		
0.5	2.9	<0.1	<1	1	**PID**	N/A

	WS210	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.07	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.4	20	<0.1	<1	<1		
0.4	19.9	<0.1	<1	<1		
0.4	19.8	<0.1	<1	<1		
0.4	19.7	<0.1	<1	<1		
0.4	19.5	<0.1	<1	<1		
0.4	19.4	<0.1	<1	<1		
0.4	19.4	<0.1	<1	<1		
0.4	19.4	<0.1	<1	<1		
0.4	19.4	<0.1	<1	<1		
0.4	19.4	<0.1	<1	<1	**PID**	<0.1

ssure Condition			Stable			
	Sunny		Overcast	x	Light rain	
	Slight Breeze	x	Strong breeze			
	Damp	x	Wet			
	Site is overgrown grassland. Flush borehole covers difficult to locate					

	BH101	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.74	m
iameter	1.6	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
17.7	2.3	<0.1	<1	<1		
17.7	2.2	<0.1	<1	<1		
17.7	2.1	<0.1	<1	<1		
17.8	2	<0.1	1	<1		
17.9	2	<0.1	<1	<1		
17.9	2.5	<0.1	1	1		
17.6	3	<0.1	<1	<1		
17.9	2	<0.1	1	1	**PID**	<0.1

	BH102	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.97	m
iameter	5.3	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
6.2	12.2	<0.1	<1	<1	**PID error**	
6.2	12.2	<0.1	<1	<1		
6.2	12	<0.1	<1	<1		
6.2	12	<0.1	<1	<1		
6.2	11.7	<0.1	<1	<1		
6.2	11.6	<0.1	<1	<1		
6.2	11.3	<0.1	<1	<1		
6.2	11.3	<0.1	<1	<1	**PID**	X

	BH103	
	0	l/hr
	<0.0	l/hr
	0	Pa
	2.33	m
iameter	3.46	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
3.5	11.7	<0.1	1	<1	**PID error**
3.4	11.4	<0.1	<1	<1	
3.4	11.3	<0.1	1	<1	
3.4	11.2	<0.1	1	<1	
3.3	11.2	<0.1	<1	<1	
3.3	11.1	<0.1	<1	<1	

8.3	0.4	4.3	3	<1		
8.3	0.3	5.2	1	<1		
8.5	0.3	5.9	1	<1		
8.6	0.3	6.5	1	<1		
8.6	0.2	6.8	<1	<1		
8.7	0.2	7.3	<1	<1		
8.7	0.2	7.3	3	0	**PID**	X

	BH105	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	1.58	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
2.8	1.1	<0.1	<1	<1		
2.9	1	<0.1	1	<1		
2.9	0.4	<0.1	2	1		
2.9	0.3	<0.1	2	<1		
2.9	0.3	<0.1	4	<1		
2.9	0.3	<0.1	1	<1		
3	0.2	<0.1	2	<1		
3	0.2	0	4	1	**PID**	<0.1

	WS10	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1.87	m
iameter	6.07	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
4.8	13	<0.1	<1	<1		
4.9	13.1	<0.1	1	<1		
4.9	13.1	<0.1	<1	<1		
5	13	<0.1	<1	1		
5.3	12.8	<0.1	<1	<1		
5.3	12.7	<0.1	2	<1		
5.5	12.6	<0.1	1	<1		
5.5	12.6	0	2	1	**PID**	X

	WS115	
	N/A	l/hr
	N/A	l/hr
	N/A	Pa
	N/A	m
iameter	N/A	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
N/A	N/A	N/A	N/A	N/A	**Monitoring well silted up and bung inaccessible**	
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
0	0	0	0	0	**PID**	X

4.2	0.5	<0.1	<1	<1		
3.7	0	<0.1	<1	<1		
3.6	0	<0.1	<1	<1		
3.4	0.2	<0.1	<1	<1		
3.5	0.3	<0.1	<1	<1		
3.5	0.5	<0.1	<1	<1		
4.4	<0.1	<0.1	<1	<1	**PID**	X

	WS12	
	N/A	l/hr
	N/A	l/hr
	N/A	Pa
	N/A	m
iameter	N/A	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
N/A	N/A	N/A	N/A	N/A	**Overgrown grassland. Borehole not located**	
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
N/A	N/A	N/A	N/A	N/A		
0	0	0	0	0	**PID**	N/A

	WS14*	
	0	l/hr
	<0.0	l/hr
	0	Pa
	2.2	m
iameter	2.99	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
7.3	0.4	1.9	1	<1	**PID error**	
7.3	0.1	2.2	<1	<1		
7.4	0	2.3	1	<1		
7.4	0	2.4	1	<1		
7.3	0	2.2	<1	<1		
7.4	0	1.7	<1	<1		
7.4	0	1.6	<1	<1		
7.4	<0.1	2.4	1	<1	**PID**	X

	WS201	
	0	l/hr
	<0.0	l/hr
	0	Pa
	Dry	m
iameter	0.75	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
0.4	19.4	<0.1	<1	<1	**PID error**	
0.4	20.1	<0.1	<1	<1		
0.3	20.3	<0.1	<1	<1		
0.3	20.4	<0.1	<1	<1		
0.2	20.6	<0.1	<1	<1		
0.2	20.7	<0.1	<1	<1		
0.2	20.6	<0.1	1	<1		
0.4	19.4	<0.1	1	<1	**PID**	X

4.5	14.2	<0.1	<1	<1		
4.6	14	<0.1	<1	<1		
4.6	13.9	<0.1	<1	<1		
4.7	13.8	<0.1	1	<1		
4.9	13.7	<0.1	<1	<1		
4.9	13.7	<0.1	2	<1		
4.9	13.7	<0.1	2	<1	**PID**	X

	WS203	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.83	m
iameter	1.06	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
11.4	10.2	<0.1	<1	<1		
11.5	9.6	<0.1	<1	<1		
11.6	9.5	<0.1	<1	<1		
11.8	9.3	<0.1	<1	<1		
12.1	9.2	<0.1	<1	<1		
12.6	8.9	<0.1	<1	<1		
13.1	8.7	<0.1	<1	<1		
13.1	8.7	<0.1	<1	<1	**PID**	<0.1

	WS204	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.85	m
iameter	1.04	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
<0.1	21.1	<0.1	<1	<1	**PID error**	
<0.1	21.1	<0.1	<1	<1		
<0.1	21	<0.1	<1	<1		
<0.1	21	<0.1	<1	<1		
<0.1	20.9	<0.1	<1	1		
<0.1	20.9	<0.1	1	<1		
<0.1	20.9	<0.1	<1	<1		
<0.1	20.9	<0.1	1	1	**PID**	X

	WS205	
		l/hr
	<0.0	l/hr
	0	Pa
	0.89	m
iameter	1.06	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
1.3	20.1	<0.1	<1	<1	**PID error**	
1.3	20.1	<0.1	<1	<1		
1.4	20.1	<0.1	<1	<1		
1.4	20.1	<0.1	<1	<1		
1.5	20.1	<0.1	<1	<1		
1.5	20	<0.1	<1	<1		
1.5	20	<0.1	<1	<1		
1.5	20	<0.1	<1	<1	**PID**	X

1.4	17.9	<0.1	3	<1	**quickly to 0**	
1.3	18.2	<0.1	<1	<1		
1.2	18.5	<0.1	<1	<1		
1.1	18.6	<0.1	1	<1		
1	18.8	<0.1	1	<1		
1	18.9	<0.1	1	<1		
1.6	15.1	<0.1	3	<1	**PID**	<0.1

	WS207	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.58	m
iameter	1.65	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
1.7	19.1	<0.1	<1	<1		
1.8	19	<0.1	1	<1		
1.8	19	<0.1	2	1		
1.8	18.9	<0.1	1	<1		
1.9	18.9	<0.1	1	<1		
1.9	18.8	<0.1	1	<1		
1.9	18.8	<0.1	2	<1		
1.9	18.8	<0.1	2	1	**PID**	<0.1

	WS208	
	0	l/hr
	<0.0	l/hr
	0	Pa
	1	m
iameter	1.02	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**	
1	19.2	<0.1	<1	<1	**PID error**	
1	19.2	<0.1	<1	<1		
1	19.2	<0.1	<1	<1		
1.1	19.2	<0.1	<1	<1		
1	19.2	<0.1	<1	<1		
1.1	19.2	<0.1	<1	<1		
1.1	19.2	<0.1	<1	<1		
1.1	19.2	<0.1	<1	<1	**PID**	X

	WS209	
	0	l/hr
	<0.0	l/hr
	0	Pa
	0.57	m
iameter	1.09	50mm

CO_2 (%)	**O_2 (%)**	**LEL (%)**	**CO (ppm)**	**H_2S (ppm)**	**Comments:**
<0.1	20.8	<0.1	1	<1	
<0.1	20.7	<0.1	1	<1	
<0.1	20.7	<0.1	<1	<1	
<0.1	20.7	<0.1	2	1	
<0.1	20.7	<0.1	2	<1	
<0.1	20.8	<0.1	2	<1	
<0.1	20.8	<0.1	2	<1	

3.3	18.1	<0.1	<1	<1		
3.3	18.1	<0.1	<1	<1		
3.4	18	<0.1	<1	<1		
3.5	17.9	<0.1	<1	<1		
3.6	17.9	<0.1	<1	<1		
3.6	17.9	<0.1	<1	<1		
3.6	17.6	<0.1	<1	<1	**PID**	X

Appendix D Environmental Laboratory Analysis

- **Soils Analysis**
- **Water Analysis**

Our Ref: EFS/163043M (Ver. 3)
Your Ref:

May 16, 2016

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

Telephone: 01283 554400
Facsimile: 01283 554422

Jon Coates
Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

For the attention of Jon Coates

Dear Jon Coates

Sample Analysis - Biggins Wood

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

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

The samples will be kept until the agreed date when they will be discarded. Please call 01283 554463 for an extension of this date.
Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

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

Yours sincerely

for ESG

S Stone
Project Co-ordinator
01283 554463

TEST REPORT

1252

Report No. EFS/163043M (Ver. 3)

Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

Site: Biggins Wood

The 19 samples described in this report were registered for analysis by ESG on 18-Apr-2016. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 16-May-2016

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 ESG.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of PAH (MS-SIM) (80) Results (Pages 5 to 23)
Table of PCB Congener Results (Pages 24 to 25)
Table of SVOC Results (Page 26)
Table of GRO Results (Page 27)
Table of TPH (Si) banding (std) (Page 28)
Table of TPH Interpretations (Page 29)
GC-FID Chromatograms (Pages 30 to 71)
Table of VOC (HSA) Results (Page 72)
Table of WAC Analysis Results (Pages 73 to 74)
Subcontracted Analysis Reports (Pages 75 to 79)
The accreditation status of subcontracted analysis is displayed on the appended subcontracted analysis reports.
Analytical and Deviating Sample Overview (Pages 80 to 83)
Table of Additional Report Notes (Page 84)
Table of Method Descriptions (Pages 85 to 86)
Table of Report Notes (Page 87)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of ESG :
Declan Burns

Managing Director
Multi-Sector Services

Date of Issue: 16-May-2016

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

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	mg/kg
Method Codes :			AMMAR	ELESULP	GROHSA	GROHSA	ICPACIDS	ICPBOR	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPWSS
Method Reporting Limits :			0.5	20	0.2	0.2	20	0.5	0.3	0.2	1.2	1.6	0.7	0.5	2	0.5	16	10
Accreditation Code:			UM	UM		UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Exchange.Ammonium AR**	**Elemental Sulphur**	**GRO (AA) by HSA GC-FID**	**GRO (C6-C8)**	**SO4-- (acid sol)**	**Boron (H20 Soluble)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**SO4-- (H2O sol) mg/l**
1613050	TP1 0.1	12-Apr-16			Req	<0.3		2.1	12.3	0.41	33.0	31.7	1250	<0.51	28.7	0.6	195.0	
1613051	TP2 0.1	12-Apr-16	4.9	<21	Req	<0.3	645	2.0	11.5	0.4	34.2	33.5	158	<0.53	31.1	<0.5	154	76
1613052	TP3 0.5	12-Apr-16						1.4	9.2	<0.21	23.9	20.3	54.5	<0.52	22.1	<0.5	69.1	
1613053	TP4 0.1	12-Apr-16			Req	<0.3		2.3	17.1	0.64	31.9	96.1	313.6	<0.56	39.2	0.8	301	
1613054	TP5 2.0	12-Apr-16	11.8	694		<0.3	6180	3.0	18.0	0.80	36.3	100.9	749.6	<0.6	44.3	1.0	227.7	1680
1613055	TP6 0.5	13-Apr-16			Req	<0.3		1.4	17.0	0.49	28.7	91.7	251.6	<0.55	33.7	0.6	216.9	
1613056	TP7 0.1	12-Apr-16			Req	<0.3		2.4	7.0	0.2	36.3	14.9	24	<0.5	40.1	<0.5	47	
1613057	TP8 0.5	13-Apr-16			Req	<0.2		2.6	14.9	0.32	31.8	50.0	143.7	<0.5	33.3	0.6	127.1	
1613058	TP9 1.5	13-Apr-16				<0.3		4.0	14.8	0.54	29.5	75.0	227.0	<0.52	28.4	0.8	164	
1613059	TP10 Composite	11-Apr-16	<0.7	<22		<0.3	2170	2.3	18.5	0.51	35.8	106	189	<0.54	52.3	0.8	225.6	138
1613060	TP18 Composite	11-Apr-16				<0.2		1.9	9.7	0.26	72.3	14.1	22.9	<0.51	17.2	0.8	33.9	
1613061	TP18 Biggins 1 (NVM)	11-Apr-16																
1613062	TP11 0.1	11-Apr-16			Req	<0.4		4.4	6	<0.24	32.8	18.2	26.2	<0.6	45.8	<0.6	64.4	
1613063	TP12 0.1	12-Apr-16			Req	<0.3		3.3	16.1	0.26	42.5	37.0	123	<0.51	33.9	<0.5	96.3	
1613064	TP13 0.5	13-Apr-16			Req	<0.3		3	14.1	0.4	41.0	49.9	218.7	<0.53	35.4	0.8	181.5	
1613065	TP14 0.5	13-Apr-16			Req	<0.2		3.5	17.5	0.47	33	55.2	206.9	<0.51	34.5	0.8	173.4	
1613066	TP15 1.0	11-Apr-16				<0.3		2.9	4.9	0.5	20.9	15	63.7	<0.5	13.1	0.9	35.5	
1613067	TP16 0.1	11-Apr-16			Req	<0.2		1.7	12	0.64	29.4	33	146.3	0.52	27.7	<0.5	137.8	
1613068	TP17 0.1	12-Apr-16			Req	<0.3		3.0	10.4	0.27	35.7	17.2	65.1	<0.51	28.1	0.5	68.0	

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Client Name **Waterman Infrastructure & Environment Ltd**

Contact Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**16-May-2016**
Report Number	**EFS/163043M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Units :			pH Units			mg/kg	%	mg/kg	mg/kg	µg/kg	Mol/kg	% M/M	mg/kg	mg/l	mg/kg	mg/kg	%	µg/kg
Method Codes :			PHSOIL	Sub020	Sub020	SVOCMSUS	TMSS	TPHFIDUS	TPHUSSI	VOCHSAS	ANC	FOCS	ICPMSS	KONECL	KONECR	KoneNO3	LOI(%MM)	PCBUSECDAR
Method Reporting Limits :							0.2	10	20		0.04	0.04	0.6	1	0.1	0.4	0.2	
Accreditation Code:			UM	U	U		U	N			N	N	N	N	N	N	N	
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**pH units (AR)**	**^Asbestos (screen).**	**^Asbestos ID & Quan**	**SVOC by GCMS (AR)**	**Tot.Moisture @ 105C**	**TPH Band (>C10-C40)**	**TPH by GCFID (AR/Si)**	**VOC HSA-GCMS**	**Acid Neut. Capacity**	**S.O.M. % (Calc)**	**Vanadium (MS)**	**Chloride:(2:1)**	**Chromium vi:**	**Nitrate 2:1 mg/kg**	**L.O.I. % @ 450C**	**PCB-7 Congeners Analysis**
1613050	TP1 0.1	12-Apr-16	8.5	NAIIS			24.3		Req			6.10	56.8		<0.1			
1613051	TP2 0.1	12-Apr-16	7.9	AM	NAIIS		26.3		Req			3.10	45	36	<0.1	<0.4		
1613052	TP3 0.5	12-Apr-16	8.0	NAIIS			19.8						31.1		<0.1			
1613053	TP4 0.1	12-Apr-16	8.2	NAIIS			22.4		Req			8.15	55.7		<0.1			
1613054	TP5 2.0	12-Apr-16	7.9	NAIIS			36.5	1370			5.16	7.06	55.8	403	<0.1	<0.5	11.6	Req
1613055	TP6 0.5	13-Apr-16	8.5	NAIIS			21.1		Req			8.05	49.8		0.2			
1613056	TP7 0.1	12-Apr-16	8.7	NAIIS			24.3		Req			0.97	55.7		<0.1			
1613057	TP8 0.5	13-Apr-16	8.4	NAIIS			18.1		Req			6.09	54.5		<0.1			
1613058	TP9 1.5	13-Apr-16	8.2	NAIIS			22.2					13.0	51.8		<0.1			
1613059	TP10 Composite	11-Apr-16	8.4	NAIIS			27.1	<14			3.27	12.1	61.6	58	<0.1	1.2	10.1	Req
1613060	TP18 Composite	11-Apr-16	8.6	NAIIS			10.7					3.36	206		<0.1			
1613061	TP18 Biggins 1 (NVM)	11-Apr-16					0.5 §											
1613062	TP11 0.1	11-Apr-16	7.8	NAIIS			45.9		Req			17.7	44.4		<0.1			Req
1613063	TP12 0.1	12-Apr-16	8.3	NAIIS			26.7		Req			6.33	72.4		<0.1			
1613064	TP13 0.5	13-Apr-16	8.2	NAIIS			21.9		Req			7.26	62.6		<0.1			
1613065	TP14 0.5	13-Apr-16	9.0	NAIIS		Req	9.2		Req	Req		2.80	63.3		<0.1		3.7	
1613066	TP15 1.0	11-Apr-16	8.5				22.0					0.65	41.6		<0.1			
1613067	TP16 0.1	11-Apr-16	8.5	NAIIS			18.5		Req			3.34	40.8		<0.1			
1613068	TP17 0.1	12-Apr-16	7.7	NAIIS			33.3		Req			5.69	67		<0.1			

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Contact Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**16-May-2016**
Report Number	**EFS/163043M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Units :			mg/kg	KJ/kg	mg/kg	mg/kg	% M/M	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg			
Method Codes :			SFAS	Sub022	TPHFID-SCU	TPHFIDUS	WSLM59	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	PAHMSUS			
Method Reporting Limits :			0.5	100	10	10	0.04	10	10	10	30	20	20	10				
Accreditation Code:			N	N	N		N	UM	UM	UM	UM	N	UM	UM				
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Sulphide as S (AR)**	**^Gross CV**	**TPH by GCFID (AR) SCU**	**TPH Interpretation.(Waste Guidance)**	**Total Organic Carbon**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**	**MTBE**	**m/p Xylenes**	**o Xylene**	**PAH (17) by GCMS**			
1613050	TP1 0.1	12-Apr-16			102		3.54								Req			
1613051	TP2 0.1	12-Apr-16	1.1		95		1.80								Req			
1613052	TP3 0.5	12-Apr-16													Req			
1613053	TP4 0.1	12-Apr-16			195		4.73								Req			
1613054	TP5 2.0	12-Apr-16	11.5	1910	482		4.10	<16	<16	<16	<47	<31	<31	<16	Req			
1613055	TP6 0.5	13-Apr-16			234		4.67								Req			
1613056	TP7 0.1	12-Apr-16			16		0.56								Req			
1613057	TP8 0.5	13-Apr-16			153		3.53								Req			
1613058	TP9 1.5	13-Apr-16			113		7.55								Req			
1613059	TP10 Composite	11-Apr-16	<0.7		27		6.99	<14	<14	<14	<41	<27	<27	<14	Req			
1613060	TP18 Composite	11-Apr-16			800		1.95								Req			
1613061	TP18 Biggins 1 (NVM)	11-Apr-16			1670	Req									Req §			
1613062	TP11 0.1	11-Apr-16			46		10.27								Req			
1613063	TP12 0.1	12-Apr-16			48		3.67								Req			
1613064	TP13 0.5	13-Apr-16			492		4.21								Req			
1613065	TP14 0.5	13-Apr-16		912	2780	Req	1.62								Req			
1613066	TP15 1.0	11-Apr-16			<13		0.38								Req			
1613067	TP16 0.1	11-Apr-16			313		1.93								Req			
1613068	TP17 0.1	12-Apr-16			31		3.30								Req			

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Contact Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**16-May-2016**
Report Number	**EFS/163043M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP1 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613050	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8*	5.19	0.40	98	N
Anthracene	120-12-7	5.24	0.12	96	U
Fluoranthene	206-44-0	6.43	1.53	98	UM
Pyrene	129-00-0	6.69	1.33	97	UM
Benzo[a]anthracene	56-55-3	8.31	0.91	92	UM
Chrysene	218-01-9	8.36	0.95	98	UM
Benzo[b]fluoranthene	205-99-2	9.80	1.23	95	UM
Benzo[k]fluoranthene	207-08-9	9.84	0.46	94	UM
Benzo[a]pyrene	50-32-8	10.21	0.91	98	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	0.67	95	UM
Dibenzo[a,h]anthracene	53-70-3	11.61	0.10	69	UM
Benzo[g,h,i]perylene	191-24-2	11.85	0.59	98	UM
Coronene	191-07-1 *	13.57	0.16	83	N
Total (USEPA16) PAHs	-	-	< 9.67	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	92
Acenaphthene-d10	92
Phenanthrene-d10	93
Chrysene-d12	91
Perylene-d12	99

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	104
Terphenyl-d14	83

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP2 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613051	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	3.98	0.19	97	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8*	5.19	1.37	98	N
Anthracene	120-12-7	5.24	0.42	98	U
Fluoranthene	206-44-0	6.43	4.44	99	UM
Pyrene	129-00-0	6.69	3.81	96	UM
Benzo[a]anthracene	56-55-3	8.31	2.35	92	UM
Chrysene	218-01-9	8.36	2.28	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	3.15	97	UM
Benzo[k]fluoranthene	207-08-9	9.83	1.10	96	UM
Benzo[a]pyrene	50-32-8	10.22	2.42	99	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	1.87	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.61	0.33	86	UM
Benzo[g,h,i]perylene	191-24-2	11.85	1.57	99	UM
Coronene	191-07-1 *	13.57	0.37	82	N
Total (USEPA16) PAHs	-	-	< 25.60	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	95
Acenaphthene-d10	94
Phenanthrene-d10	98
Chrysene-d12	111
Perylene-d12	127

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP3 0.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613052	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.15	95	**UM**
Acenaphthylene	208-96-8	3.98	1.55	99	U
Acenaphthene	83-32-9	4.09	0.42	91	UM
Fluorene	86-73-7	4.43	2.10	96	UM
Phenanthrene	85-01-8*	5.19	21.00	99	N
Anthracene	120-12-7	5.24	5.54	97	U
Fluoranthene	206-44-0	6.43	23.40	98	UM
Pyrene	129-00-0	6.69	18.80	97	UM
Benzo[a]anthracene	56-55-3	8.31	9.83	94	UM
Chrysene	218-01-9	8.36	8.44	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	8.07	98	UM
Benzo[k]fluoranthene	207-08-9	9.83	3.00	96	UM
Benzo[a]pyrene	50-32-8	10.21	6.27	97	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	3.42	97	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	0.77	87	UM
Benzo[g,h,i]perylene	191-24-2	11.85	2.52	99	UM
Coronene	191-07-1 *	13.57	0.51	73	N
Total (USEPA16) PAHs	-	-	115.55	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	97
Acenaphthene-d10	96
Phenanthrene-d10	99
Chrysene-d12	110
Perylene-d12	120

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP4 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613053	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.10	96	**UM**
Acenaphthylene	208-96-8	3.98	0.58	99	U
Acenaphthene	83-32-9	4.09	0.14	99	UM
Fluorene	86-73-7	4.43	0.14	89	UM
Phenanthrene	85-01-8*	5.19	2.82	99	N
Anthracene	120-12-7	5.24	0.81	97	U
Fluoranthene	206-44-0	6.43	9.50	99	UM
Pyrene	129-00-0	6.69	8.52	97	UM
Benzo[a]anthracene	56-55-3	8.31	5.45	92	UM
Chrysene	218-01-9	8.36	5.39	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	7.90	96	UM
Benzo[k]fluoranthene	207-08-9	9.83	3.14	95	UM
Benzo[a]pyrene	50-32-8	10.22	6.04	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	4.69	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	0.81	94	UM
Benzo[g,h,i]perylene	191-24-2	11.85	4.10	99	UM
Coronene	191-07-1 *	13.57	0.88	55	N
Total (USEPA16) PAHs	-	-	60.19	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	94
Phenanthrene-d10	96
Chrysene-d12	102
Perylene-d12	115

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	81

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP5 2.0	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613054	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.95	0.14	98	**UM**
Acenaphthylene	208-96-8	3.98	0.30	99	U
Acenaphthene	83-32-9	4.09	0.76	95	UM
Fluorene	86-73-7	4.43	1.07	93	UM
Phenanthrene	85-01-8*	5.19	4.28	99	N
Anthracene	120-12-7	5.24	1.43	94	U
Fluoranthene	206-44-0	6.43	8.17	99	UM
Pyrene	129-00-0	6.69	6.50	96	UM
Benzo[a]anthracene	56-55-3	8.31	3.28	94	UM
Chrysene	218-01-9	8.36	3.40	98	UM
Benzo[b]fluoranthene	205-99-2	9.80	4.22	81	UM
Benzo[k]fluoranthene	207-08-9	9.83	1.67	89	UM
Benzo[a]pyrene	50-32-8	10.22	3.00	97	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	2.24	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	0.44	65	UM
Benzo[g,h,i]perylene	191-24-2	11.85	1.86	98	UM
Coronene	191-07-1 *	13.57	0.41	64	N
Total (USEPA16) PAHs	-	-	42.93	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	95
Phenanthrene-d10	97
Chrysene-d12	101
Perylene-d12	111

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP6 0.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613055	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.16	96	**UM**
Acenaphthylene	208-96-8	3.98	0.70	98	U
Acenaphthene	83-32-9	4.09	0.30	95	UM
Fluorene	86-73-7	4.43	0.24	91	UM
Phenanthrene	85-01-8*	5.19	6.58	99	N
Anthracene	120-12-7	5.24	1.96	98	U
Fluoranthene	206-44-0	6.43	18.40	98	UM
Pyrene	129-00-0	6.69	15.70	97	UM
Benzo[a]anthracene	56-55-3	8.31	9.80	95	UM
Chrysene	218-01-9	8.36	9.15	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	12.31	98	UM
Benzo[k]fluoranthene	207-08-9	9.83	5.17	96	UM
Benzo[a]pyrene	50-32-8	10.22	9.62	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	7.71	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	1.60	90	UM
Benzo[g,h,i]perylene	191-24-2	11.85	6.16	99	UM
Coronene	191-07-1 *	13.57	1.51	74	N
Total (USEPA16) PAHs	-	-	105.56	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	95
Acenaphthene-d10	96
Phenanthrene-d10	99
Chrysene-d12	119
Perylene-d12	142

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP7 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613056	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8*	-	< 0.11	-	N
Anthracene	120-12-7	-	< 0.11	-	U
Fluoranthene	206-44-0	-	< 0.11	-	UM
Pyrene	129-00-0	-	< 0.11	-	UM
Benzo[a]anthracene	56-55-3	-	< 0.11	-	UM
Chrysene	218-01-9	-	< 0.11	-	UM
Benzo[b]fluoranthene	205-99-2	-	< 0.11	-	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.11	-	UM
Benzo[a]pyrene	50-32-8	-	< 0.11	-	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.11	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.11	-	UM
Coronene	191-07-1 *	-	< 0.11	-	N
Total (USEPA16) PAHs	-	-	< 1.69	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	98
Acenaphthene-d10	96
Phenanthrene-d10	97
Chrysene-d12	91
Perylene-d12	90

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	83

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP8 0.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613057	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.17	98	**UM**
Acenaphthylene	208-96-8	3.98	0.90	100	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	4.43	0.15	87	UM
Phenanthrene	85-01-8*	5.19	2.66	99	N
Anthracene	120-12-7	5.24	2.22	97	U
Fluoranthene	206-44-0	6.43	11.55	99	UM
Pyrene	129-00-0	6.69	10.28	97	UM
Benzo[a]anthracene	56-55-3	8.31	7.14	96	UM
Chrysene	218-01-9	8.36	7.29	98	UM
Benzo[b]fluoranthene	205-99-2	9.80	10.00	M	UM
Benzo[k]fluoranthene	207-08-9	9.83	4.16	92	UM
Benzo[a]pyrene	50-32-8	10.22	8.57	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	6.83	98	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	1.18	91	UM
Benzo[g,h,i]perylene	191-24-2	11.85	5.70	99	UM
Coronene	191-07-1 *	13.57	1.38	81	N
Total (USEPA16) PAHs	-	-	< 78.86	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	96
Phenanthrene-d10	99
Chrysene-d12	115
Perylene-d12	135

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP9 1.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613058	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.28	97	**UM**
Acenaphthylene	208-96-8	3.98	0.40	97	U
Acenaphthene	83-32-9	4.09	0.18	98	UM
Fluorene	86-73-7	4.43	0.19	94	UM
Phenanthrene	85-01-8*	5.19	2.12	99	N
Anthracene	120-12-7	5.24	0.76	98	U
Fluoranthene	206-44-0	6.43	5.95	98	UM
Pyrene	129-00-0	6.69	5.36	97	UM
Benzo[a]anthracene	56-55-3	8.31	3.50	93	UM
Chrysene	218-01-9	8.36	3.39	98	UM
Benzo[b]fluoranthene	205-99-2	9.80	5.31	98	UM
Benzo[k]fluoranthene	207-08-9	9.83	1.72	97	UM
Benzo[a]pyrene	50-32-8	10.21	4.15	95	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	3.52	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	0.59	92	UM
Benzo[g,h,i]perylene	191-24-2	11.85	3.02	99	UM
Coronene	191-07-1 *	13.57	0.73	91	N
Total (USEPA16) PAHs	-	-	40.42	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	98
Acenaphthene-d10	96
Phenanthrene-d10	101
Chrysene-d12	116
Perylene-d12	132

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP10 Composite	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613059	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8*	-	< 0.11	-	N
Anthracene	120-12-7	-	< 0.11	-	U
Fluoranthene	206-44-0	6.43	0.18	100	UM
Pyrene	129-00-0	6.70	0.15	96	UM
Benzo[a]anthracene	56-55-3	8.31	0.16	96	UM
Chrysene	218-01-9	8.36	0.10	95	UM
Benzo[b]fluoranthene	205-99-2	9.80	0.18	64	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.11	-	UM
Benzo[a]pyrene	50-32-8	10.22	0.10	90	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.11	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.11	-	UM
Coronene	191-07-1 *	-	< 0.11	-	N
Total (USEPA16) PAHs	-	-	< 2.04	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	95
Phenanthrene-d10	96
Chrysene-d12	107
Perylene-d12	112

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	104
Terphenyl-d14	85

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP18 Composite	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613060	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.09	-	**UM**
Acenaphthylene	208-96-8	3.98	0.17	97	U
Acenaphthene	83-32-9	-	< 0.09	-	UM
Fluorene	86-73-7	-	< 0.09	-	UM
Phenanthrene	85-01-8*	5.19	0.20	100	N
Anthracene	120-12-7	5.24	0.10	96	U
Fluoranthene	206-44-0	6.43	0.80	99	UM
Pyrene	129-00-0	6.69	0.76	96	UM
Benzo[a]anthracene	56-55-3	8.31	0.59	93	UM
Chrysene	218-01-9	8.36	0.63	95	UM
Benzo[b]fluoranthene	205-99-2	9.80	0.91	75	UM
Benzo[k]fluoranthene	207-08-9	9.84	0.31	76	UM
Benzo[a]pyrene	50-32-8	10.22	0.68	98	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	0.69	97	UM
Dibenzo[a,h]anthracene	53-70-3	11.61	0.13	59	UM
Benzo[g,h,i]perylene	191-24-2	11.85	0.84	98	UM
Coronene	191-07-1 *	13.58	0.20	58	N
Total (USEPA16) PAHs	-	-	< 7.11	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	93
Acenaphthene-d10	93
Phenanthrene-d10	94
Chrysene-d12	100
Perylene-d12	121

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	80

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP18 Biggins 1 (NVM)	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613061	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	5.0	**Ext Method:**	Ultrasonic

Accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.40	-	**N**
Acenaphthylene	208-96-8	-	< 0.40	-	N
Acenaphthene	83-32-9	-	< 0.40	-	N
Fluorene	86-73-7	-	< 0.40	-	N
Phenanthrene	85-01-8	-	< 0.40	-	N
Anthracene	120-12-7	-	< 0.40	-	N
Fluoranthene	206-44-0	-	< 0.40	-	N
Pyrene	129-00-0	-	< 0.40	-	N
Benzo[a]anthracene	56-55-3	-	< 0.40	-	N
Chrysene	218-01-9	-	< 0.40	-	N
Benzo[b]fluoranthene	205-99-2	-	< 0.40	-	N
Benzo[k]fluoranthene	207-08-9	-	< 0.40	-	N
Benzo[a]pyrene	50-32-8	-	< 0.40	-	N
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.40	-	N
Dibenzo[a,h]anthracene	53-70-3	-	< 0.40	-	N
Benzo[g,h,i]perylene	191-24-2	-	< 0.40	-	N
Coronene	191-07-1	-	< 0.40	-	N
Total (USEPA16) PAHs	-	-	< 6.40	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	96
Phenanthrene-d10	97
Chrysene-d12	109
Perylene-d12	126

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	83

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP11 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613062	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.15	-	**UM**
Acenaphthylene	208-96-8	-	< 0.15	-	U
Acenaphthene	83-32-9	-	< 0.15	-	UM
Fluorene	86-73-7	-	< 0.15	-	UM
Phenanthrene	85-01-8*	5.19	0.22	97	N
Anthracene	120-12-7	-	< 0.15	-	U
Fluoranthene	206-44-0	6.43	0.79	96	UM
Pyrene	129-00-0	6.69	0.72	96	UM
Benzo[a]anthracene	56-55-3	8.31	0.72	95	UM
Chrysene	218-01-9	8.36	0.72	98	UM
Benzo[b]fluoranthene	205-99-2	9.80	1.15	96	UM
Benzo[k]fluoranthene	207-08-9	9.84	0.35	97	UM
Benzo[a]pyrene	50-32-8	10.22	0.83	94	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	0.67	83	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.15	-	UM
Benzo[g,h,i]perylene	191-24-2	11.85	0.59	90	UM
Coronene	191-07-1 *	13.57	0.17	59	N
Total (USEPA16) PAHs	-	-	< 7.65	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	99
Acenaphthene-d10	98
Phenanthrene-d10	100
Chrysene-d12	107
Perylene-d12	119

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	101
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP12 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613063	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8*	5.19	0.38	99	N
Anthracene	120-12-7	5.24	0.15	97	U
Fluoranthene	206-44-0	6.43	1.17	100	UM
Pyrene	129-00-0	6.70	1.01	97	UM
Benzo[a]anthracene	56-55-3	8.31	0.63	96	UM
Chrysene	218-01-9	8.36	0.70	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	0.98	90	UM
Benzo[k]fluoranthene	207-08-9	9.84	0.33	88	UM
Benzo[a]pyrene	50-32-8	10.22	0.70	97	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	0.56	92	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	11.85	0.52	86	UM
Coronene	191-07-1 *	13.57	0.12	78	N
Total (USEPA16) PAHs	-	-	< 7.67	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	97
Acenaphthene-d10	97
Phenanthrene-d10	98
Chrysene-d12	105
Perylene-d12	116

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP13 0.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613064	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	0.24	96	**UM**
Acenaphthylene	208-96-8	3.98	0.92	99	U
Acenaphthene	83-32-9	4.09	0.14	98	UM
Fluorene	86-73-7	4.43	0.17	93	UM
Phenanthrene	85-01-8*	5.19	2.74	99	N
Anthracene	120-12-7	5.24	2.96	98	U
Fluoranthene	206-44-0	6.43	12.65	98	UM
Pyrene	129-00-0	6.69	11.41	97	UM
Benzo[a]anthracene	56-55-3	8.31	8.48	96	UM
Chrysene	218-01-9	8.36	8.60	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	12.28	98	UM
Benzo[k]fluoranthene	207-08-9	9.84	4.05	97	UM
Benzo[a]pyrene	50-32-8	10.22	9.63	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	7.58	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	1.37	92	UM
Benzo[g,h,i]perylene	191-24-2	11.85	6.36	99	UM
Coronene	191-07-1 *	13.57	1.59	97	N
Total (USEPA16) PAHs	-	-	89.58	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	98
Acenaphthene-d10	96
Phenanthrene-d10	99
Chrysene-d12	115
Perylene-d12	135

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP14 0.5	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613065	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	2.94	40.50	99	**UM**
Acenaphthylene	208-96-8	3.98	8.16	86	U
Acenaphthene	83-32-9D	4.09	56.40	95	UM
Fluorene	86-73-7	4.43	41.10	96	UM
Phenanthrene	85-01-8*D	5.20	106.90	99	N
Anthracene	120-12-7	5.24	35.10	94	U
Fluoranthene	206-44-0D	6.43	106.20	98	UM
Pyrene	129-00-0D	6.70	87.80	95	UM
Benzo[a]anthracene	56-55-3	8.32	41.00	96	UM
Chrysene	218-01-9	8.37	39.80	99	UM
Benzo[b]fluoranthene	205-99-2D	9.81	62.30	98	UM
Benzo[k]fluoranthene	207-08-9	9.84	17.30	96	UM
Benzo[a]pyrene	50-32-8	10.23	41.30	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.58	31.60	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.61	6.22	91	UM
Benzo[g,h,i]perylene	191-24-2	11.86	25.40	100	UM
Coronene	191-07-1 *	13.59	6.60	61	N
Total (USEPA16) PAHs	-	-	753.69	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	102
Acenaphthene-d10	102
Phenanthrene-d10	104
Chrysene-d12	115
Perylene-d12	121

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	96
Terphenyl-d14	83

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP15 1.0	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613066	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.10	-	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	-	< 0.10	-	UM
Phenanthrene	85-01-8*	-	< 0.10	-	N
Anthracene	120-12-7	-	< 0.10	-	U
Fluoranthene	206-44-0	-	< 0.10	-	UM
Pyrene	129-00-0	-	< 0.10	-	UM
Benzo[a]anthracene	56-55-3	-	< 0.10	-	UM
Chrysene	218-01-9	-	< 0.10	-	UM
Benzo[b]fluoranthene	205-99-2	-	< 0.10	-	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.10	-	UM
Benzo[a]pyrene	50-32-8	-	< 0.10	-	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.10	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.10	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.10	-	UM
Coronene	191-07-1 *	-	< 0.10	-	N
Total (USEPA16) PAHs	-	-	< 1.64	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	100
Acenaphthene-d10	100
Phenanthrene-d10	104
Chrysene-d12	116
Perylene-d12	126

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	101
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP16 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613067	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.10	-	**UM**
Acenaphthylene	208-96-8	3.98	0.43	99	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	-	< 0.10	-	UM
Phenanthrene	85-01-8*	5.19	2.54	99	N
Anthracene	120-12-7	5.24	0.76	95	U
Fluoranthene	206-44-0	6.43	9.20	98	UM
Pyrene	129-00-0	6.70	7.87	96	UM
Benzo[a]anthracene	56-55-3	8.31	4.50	93	UM
Chrysene	218-01-9	8.36	4.52	99	UM
Benzo[b]fluoranthene	205-99-2	9.80	6.06	95	UM
Benzo[k]fluoranthene	207-08-9	9.84	1.94	94	UM
Benzo[a]pyrene	50-32-8	10.22	4.67	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	3.75	99	UM
Dibenzo[a,h]anthracene	53-70-3	11.60	0.69	89	UM
Benzo[g,h,i]perylene	191-24-2	11.85	3.17	100	UM
Coronene	191-07-1 *	13.57	0.76	88	N
Total (USEPA16) PAHs	-	-	< 50.40	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	96
Acenaphthene-d10	97
Phenanthrene-d10	102
Chrysene-d12	124
Perylene-d12	148

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	TP17 0.1	**Job Number:**	S16_3043M
LIMS ID Number:	CL1613068	**Date Booked in:**	18-Apr-16
QC Batch Number:	160468	**Date Extracted:**	20-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Apr-16
Directory:	2016PAHMS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.12	-	**UM**
Acenaphthylene	208-96-8	-	< 0.12	-	U
Acenaphthene	83-32-9	-	< 0.12	-	UM
Fluorene	86-73-7	-	< 0.12	-	UM
Phenanthrene	85-01-8*	-	< 0.12	-	N
Anthracene	120-12-7	-	< 0.12	-	U
Fluoranthene	206-44-0	6.43	0.22	89	UM
Pyrene	129-00-0	6.69	0.19	88	UM
Benzo[a]anthracene	56-55-3	8.31	0.16	92	UM
Chrysene	218-01-9	8.36	0.10	93	UM
Benzo[b]fluoranthene	205-99-2	9.80	0.21	76	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.12	-	UM
Benzo[a]pyrene	50-32-8	10.22	0.16	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	11.57	0.13	83	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.12	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.12	-	UM
Coronene	191-07-1 *	-	< 0.12	-	N
Total (USEPA16) PAHs	-	-	< 2.32	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	95
Acenaphthene-d10	95
Phenanthrene-d10	96
Chrysene-d12	106
Perylene-d12	117

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	84

Concentrations are reported on a dry weight basis.

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.

Polychlorinated Biphenyls (congeners)

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood	**Matrix:**	SOIL
Job Number:	S16_3043M	**Date Booked in:**	18-Apr-16
QC Batch Number:	160464	**Date Extracted:**	19-Apr-16
Directory:	0419PCB.GC8	**Date Analysed:**	21-Apr-16
Method:	Ultrasonic		
Accreditation code:	N		

			Concentration, (µg/kg)						
	Sample ID	**Customer ID**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB153**	**PCB138**	**PCB180**
*	CL1613054	TP5 2.0	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9
*	CL1613059	TP10 Composite	<6.9	<6.9	<6.9	<6.9	<6.9	<6.9	<6.9

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Polychlorinated Biphenyls (congeners)

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood	**Matrix:**	SOIL
Job Number:	S16_3043M	**Date Booked in:**	18-Apr-16
QC Batch Number:	160509	**Date Extracted:**	29-Apr-16
Directory:	0429PCB.GC8	**Date Analysed:**	03-May-16
Method:	Ultrasonic		
Accreditation code:	N		

			Concentration, (µg/kg)						
	Sample ID	**Customer ID**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB153**	**PCB138**	**PCB180**
*	CL1613062	TP11 0.1	<9.2	<9.2	<9.2	<9.2	<9.2	<9.2	<9.2

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Semi-Volatile Organic Compounds

Accredited?: Yes

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood			**Matrix:**	Soil	**QC Batch Number:**	87
Sample Details:	TP14 0.5	**Date Booked in:**	18-Apr-16	**Ext Method:**	Ultrasonic	**Multiplier:**	10
LIMS ID Number:	CL1613065	**Date Extracted:**	21-Apr-16	**Operator:**	SO/RP	**Dilution Factor:**	50
Job Number:	S16_3043M	**Date Analysed:**	22-Apr-16	**Directory/Quant File:**	042116_MS16\	**GPC (Y/N)**	N

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Phenol	108-95-2	-	< 6.0	-	U
bis(2-Chloroethyl)ether	111-44-4	-	< 6.0	-	U
2-Chlorophenol	95-57-8	-	< 6.0	-	U
1,3-Dichlorobenzene	541-73-1	-	< 6.0	-	U
1,4-Dichlorobenzene	106-46-7	-	< 6.0	-	U
Benzyl alcohol	100-51-6	-	< 28.0	-	U
1,2-Dichlorobenzene	95-50-1	-	< 6.0	-	U
2-Methylphenol	95-48-7	-	< 6.0	-	U
bis(2-Chloroisopropyl)ether	108-60-1	-	< 28.0	-	U
Hexachloroethane	67-72-1	-	< 6.0	-	U
N-Nitroso-di-n-propylamine	621-64-7*	-	< 50.0	-	N
3- & 4-Methylphenol	108-39-4/106-44-5	-	< 6.0	-	U
Nitrobenzene	98-95-3	-	< 28.0	-	U
Isophorone	78-59-1*	-	< 6.0	-	N
2-Nitrophenol	88-75-5	-	< 6.0	-	U
2,4-Dimethylphenol	105-67-9	-	< 6.0	-	U
Benzoic Acid	65-85-0*	-	< 28.0	-	N
bis(2-Chloroethoxy)methane	111-91-1	-	< 6.0	-	U
2,4-Dichlorophenol	120-83-2	-	< 6.0	-	U
1,2,4-Trichlorobenzene	120-82-1*	-	< 6.0	-	N
Naphthalene	91-20-3	3.93	29.3	96	U
4-Chlorophenol	106-48-9	-	< 28.0	-	U
4-Chloroaniline	106-47-8*	-	< 28.0	-	N
Hexachlorobutadiene	87-68-3*	-	< 6.0	-	N
4-Chloro-3-methylphenol	59-50-7	-	< 6.0	-	U
2-Methylnaphthalene	91-57-6	4.35	18.3	98	U
1-Methylnaphthalene	90-12-0	4.41	17.3	99	U
Hexachlorocyclopentadiene	77-47-4*	-	< 6.0	-	N
2,4,6-Trichlorophenol	88-06-2	-	< 6.0	-	U
2,4,5-Trichlorophenol	95-95-4	-	< 6.0	-	U
2-Chloronaphthalene	91-58-7	-	< 6.0	-	U
Biphenyl	92-52-4	-	< 6.0	-	U
Diphenyl ether	101-84-8	-	< 6.0	-	U
2-Nitroaniline	88-74-4*	-	< 28.0	-	N
Acenaphthylene	208-96-8	4.91	5.9	97	U
Dimethylphthalate	131-11-3	-	< 6.0	-	U
2,6-Dinitrotoluene	606-20-2	-	< 28.0	-	U
Acenaphthene	83-32-9	5.02	39.3	99	U
3-Nitroaniline	99-09-2*	-	< 798.0	-	N

Target Compounds	CAS #	R.T.	Concentration mg/kg	% Fit	Accr. code
2,4-Dinitrophenol	51-28-5*	-	< 28.0	-	N
Dibenzofuran	132-64-9	5.13	22.4	80	U
4-Nitrophenol	100-02-7*	-	< 28.0	-	N
2,4-Dinitrotoluene	121-14-2	-	< 11.0	-	U
Fluorene	86-73-7	5.34	32.3	95	U
Diethylphthalate	84-66-2	-	< 6.0	-	U
4-Chlorophenyl-phenylether	7005-72-3	-	< 6.0	-	U
4,6-Dinitro-2-methylphenol	534-52-1*	-	< 11.0	-	N
4-Nitroaniline	100-01-6*	-	< 33.0	-	N
N-Nitrosodiphenylamine	86-30-6*	-	< 6.0	-	N
4-Bromophenyl-phenylether	101-55-3	-	< 6.0	-	U
Hexachlorobenzene	118-74-1	-	< 6.0	-	U
Pentachlorophenol	87-86-5*	-	< 28.0	-	N
Phenanthrene	85-01-8	5.95	72.4	99	U
Anthracene	120-12-7*	5.98	29.4	95	N
Di-n-butylphthalate	84-74-2	-	< 6.0	-	U
Fluoranthene	206-44-0	6.79	59.6	92	U
Pyrene	129-00-0	6.99	53.0	93	U
Butylbenzylphthalate	85-68-7	-	< 11.0	-	U
Benzo[a]anthracene	56-55-3	8.33	30.2	97	U
Chrysene	218-01-9	8.38	32.9	96	U
3,3'-Dichlorobenzidine	91-94-1*	-	< 28.0	-	N
bis(2-Ethylhexyl)phthalate	117-81-7	-	< 11.0	-	U
Di-n-octylphthalate	117-84-0	-	< 11.0	-	U
Benzo[b]fluoranthene	205-99-2	10.10	36.7	98	U
Benzo[k]fluoranthene	207-08-9	10.14	15.0	98	U
Benzo[a]pyrene	50-32-8	10.71	33.3	97	U
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 28.0	-	U
Dibenzo[a,h]anthracene	53-70-3	-	< 28.0	-	U
Benzo[g,h,i]perylene	191-24-2	-	< 28.0	-	U
Coronene	191-07-1*	-	< 17.0	-	N

Internal Standards	% Area
1,4-Dichlorobenzene-d4	78
Naphthalene-d8	80
Acenaphthene-d10	85
Phenanthrene-d10	87
Chrysene-d12	117
Perylene-d12	138

Surrogates	% Rec
2-Fluorophenol	91
Phenol-d5	74
Nitrobenzene-d5	94
2-Fluorobiphenyl	104
2,4,6-Tribromophenol	105
Terphenyl-d14	104

This analysis was conducted on an 'As Received' basis.

Concentrations are reported on a dry weight basis.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Gasoline Range Organics
(BTEX and Aliphatic Carbon Ranges)

Customer and Site Details: Waterman Infrastructure & Environment Ltd : Biggins Wood
Job Number: S16_3043
Directory: E:\TES\DATA\2016\0421HSA_GC9\042116 2016-04-21 10-53-08\125B2501.D
Method: Headspace GCFID
Accreditation Code: UM

Matrix: Soil
Date Booked in: 18-Apr-16
Date extracted: 21-Apr-16
Date Analysed: 21-Apr-16, 18:0

*** Sample data with an asterisk are not UKAS accredited.**

		Concentration, (mg/kg) - as dry weight.					Aliphatics				
Sample ID	**Client ID**	**Benzene**	**Toluene**	**Ethyl benzene**	**m/p-Xylene**	**o-Xylene**	**C5 - C6**	**>C6 - C7**	**>C7 - C8**	**>C8 - C10**	**Total GRO**
CL1613050	TP1 0.1	<0.013	<0.013	<0.013	<0.013	<0.013	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613051	TP2 0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613053	TP4 0.1	<0.013	<0.013	<0.013	<0.013	<0.013	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613055	TP6 0.5	<0.013	<0.013	<0.013	<0.013	<0.013	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613056	TP7 0.1	<0.013	<0.013	<0.013	<0.013	<0.013	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613057	TP8 0.5	<0.012	<0.012	<0.012	<0.012	<0.012	<0.2	<0.2	<0.2	<0.2	<0.2
CL1613062	TP11 0.1	<0.018	<0.018	<0.018	<0.018	<0.018	<0.4	<0.4	<0.4	<0.4	<0.4
CL1613063	TP12 0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613064	TP13 0.5	<0.013	<0.013	<0.013	<0.013	<0.013	<0.3	<0.3	<0.3	<0.3	<0.3
CL1613065	TP14 0.5	<0.011	<0.011	<0.011	<0.011	<0.011	<0.2	<0.2	<0.2	<0.2	<0.2
CL1613067	TP16 0.1	<0.012	<0.012	<0.012	<0.012	<0.012	<0.2	<0.2	<0.2	<0.2	<0.2
CL1613068	TP17 0.1	<0.015	<0.015	<0.015	<0.015	<0.015	<0.3	<0.3	<0.3	<0.3	<0.3

Note: Benzene elutes between C6 and C7, toluene elutes between C7 and C8, ethyl benzene and the xylenes elute between C8 and C9.
Each BTEX compound is deducted from the appropriate band to give the aliphatic fractions, however aromatic compounds may still be contributing to these fractions

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

ALIPHATIC / AROMATIC FRACTION BY GC/FID

Customer and Site Details: Waterman Infrastructure & Environment Ltd : Biggins Wood
Job Number: S16_3043M
QC Batch Number: 160470
Directory: D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\070B2501.D
Method: Ultra Sonic

Separation: Silica gel
Eluents: Hexane, DCM

Matrix: Soil
Date Booked ir 18-Apr-16
Date Extracted 20-Apr-16
Date Analysed 21-Apr-16, 17:12:10

This sample data is not MCERTS accredited.
*** This sample data is not ISO17025 accredited.**

		Concentration, (mg/kg) - as dry weight.											
		>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35		>C8 - C40	
Sample ID	Client ID	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics
CL1613050	TP1 0.1	<5.34	<5	<5.34	<5	<5.34	<5	<5.34	6.04	<11.69	18	<26.7	29.5
CL1613051	TP2 0.1	<5.54	<5	<5.54	<5	<5.54	5.75	<5.54	13.2	26.1	61.6	35.5	92.1
CL1613053	TP4 0.1	<5.23	<5	<5.23	<5	<5.23	7	5.84	25.3	31.2	131	43.2	187
CL1613055	TP6 0.5	<5.2	<5	<5.2	<5	<5.2	8	13	51.6	56	247	76.8	345
CL1613056	TP7 0.1	<5.34	<5	<5.34	<5	<5.34	<5	<5.34	<5	<11.69	<11.57	<26.7	<26
CL1613057	TP8 0.5	<4.93	<5	<4.93	<5	<4.93	<5	<4.93	17.7	12.8	112.9	<24.7	147
CL1613062	TP11 0.1	<7.47	<7	<7.47	<7	<7.47	10.52	<7.47	10.3	<16.36	38.3	<37.3	68.2
CL1613063	TP12 0.1	<5.48	<5	<5.48	<5	<5.48	<5	<5.48	<5	<12.0	15.6	<27.4	<27
CL1613064	TP13 0.5	<5.17	<5	<5.17	<5	<5.17	<5	<5.17	20.4	16.9	123.8	<25.9	163
* CL1613065	TP14 0.5	<4.43	<4	<4.43	31.4	41	222	78.4	446	659	1570	949	2690
CL1613067	TP16 0.1	<5.01	<5	<5.01	<5	<5.01	<5	<5.01	23.7	34.2	135	42.7	189
CL1613068	TP17 0.1	<6.03	<6	<6.03	<6	<6.03	6	<6.03	<6	<13.2	<13.13	<30.1	<30

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Interpretation of GC/FID Chromatographic Data

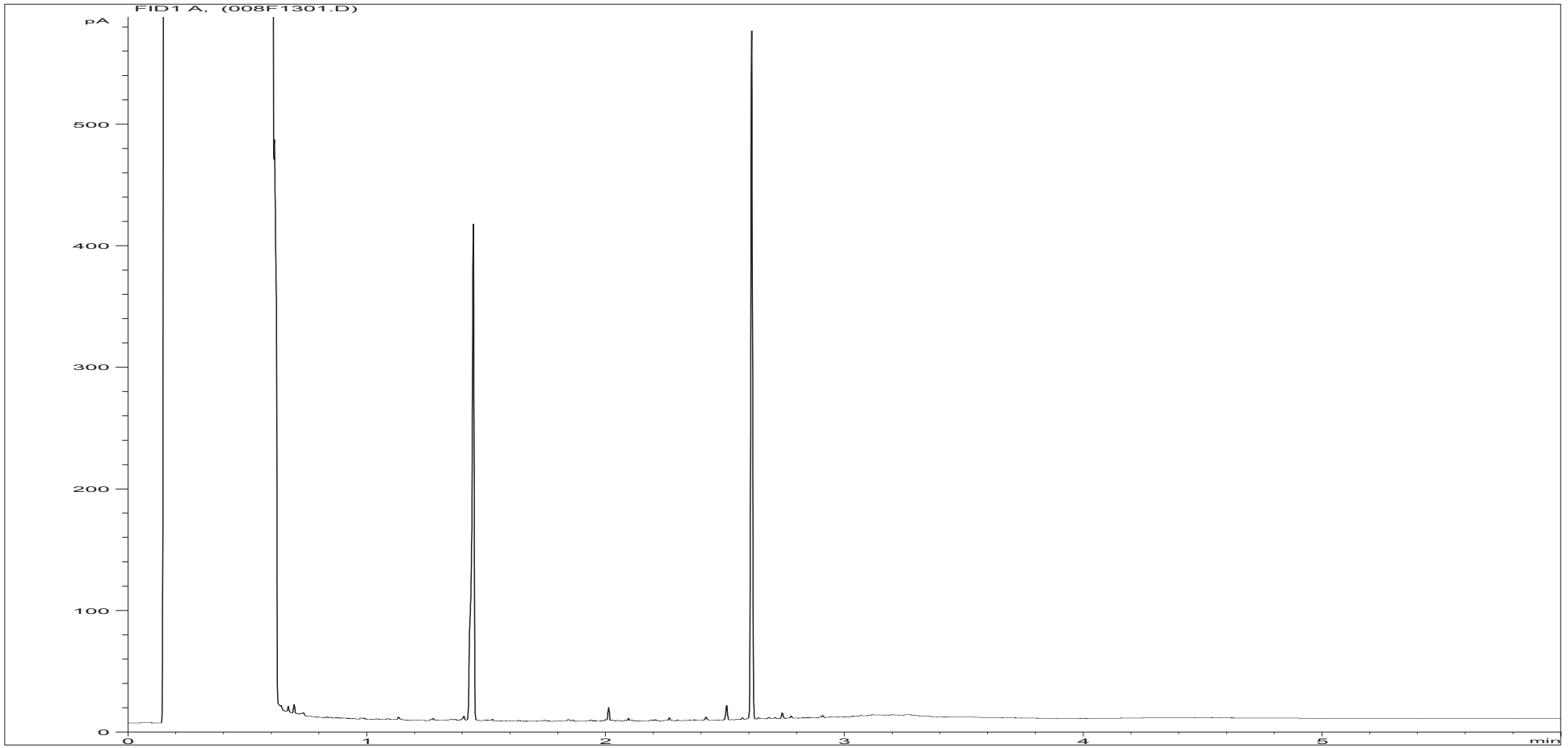
Client:	Waterman Infrastructure & Environment Ltd
Site:	Biggins Wood
Report Number:	S16_3043
Date:	13/05/2016M

Assessment Type	Waste Guidance
Assessor:	T Taylor
Analysis:	TPH by GCFID (AR)

Sample ID	Client Description	Interpretation
CL/1613061	TP18 Biggins 1 (NVM)	The sample trace displayed a hump of unresolved complex material (UCM) predominately from c18 to beyond c40. Trace level of PAHs are present. The trace was most similar to mineral oil.
CL/1613065	TP14 0.5	The sample trace displayed a hump of unresolved complex material (UCM) predominately from c18 to beyond c40. The trace was most similar to mineral oil. PAHs can be seen with significant peaks between C14-C22, which has been confirmed with GC/MS anaylsis.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

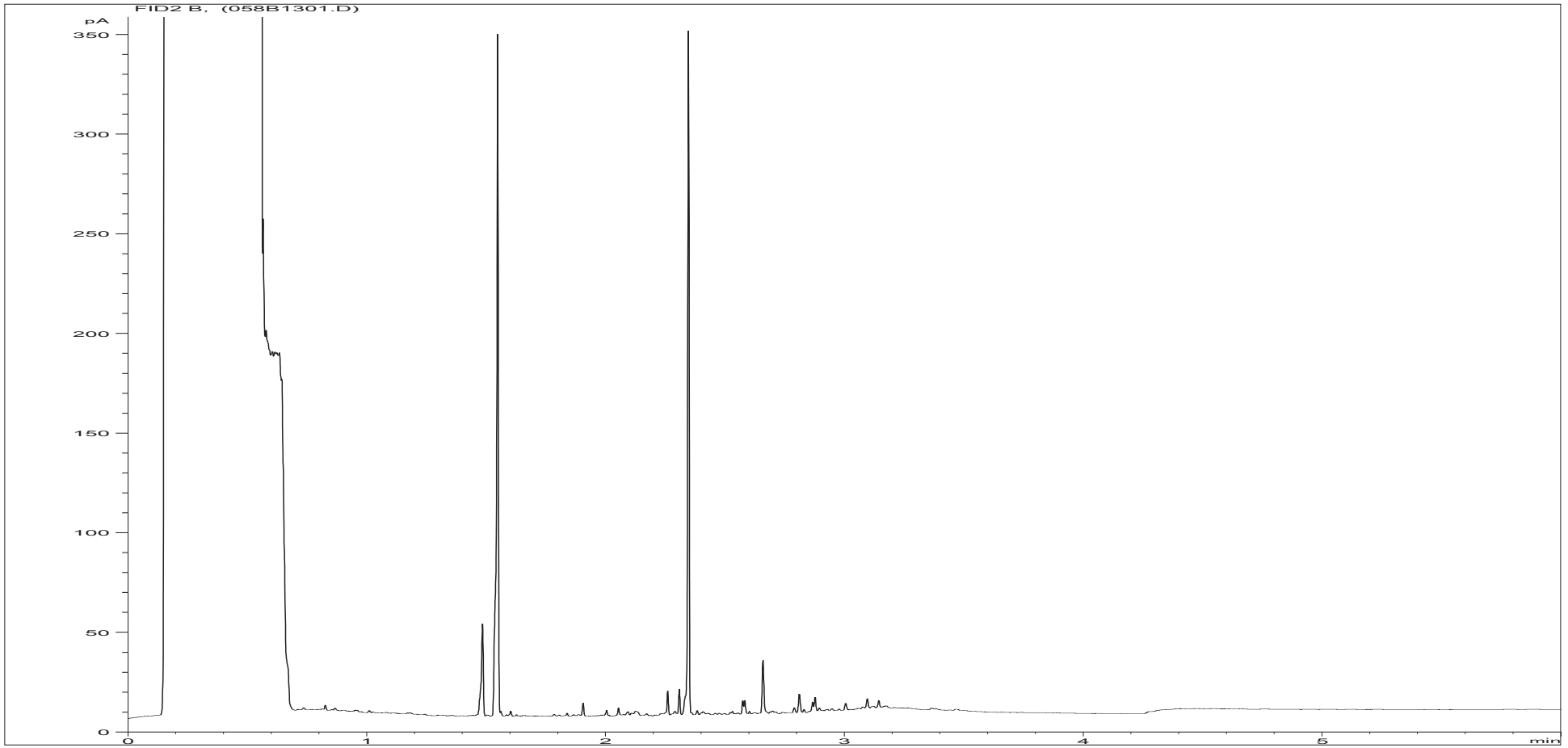
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613050ALI	**Job Number:**	S16_3043M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP1 0.1
Acquisition Date/Time:	21-Apr-16, 14:28:37		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\008F1301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

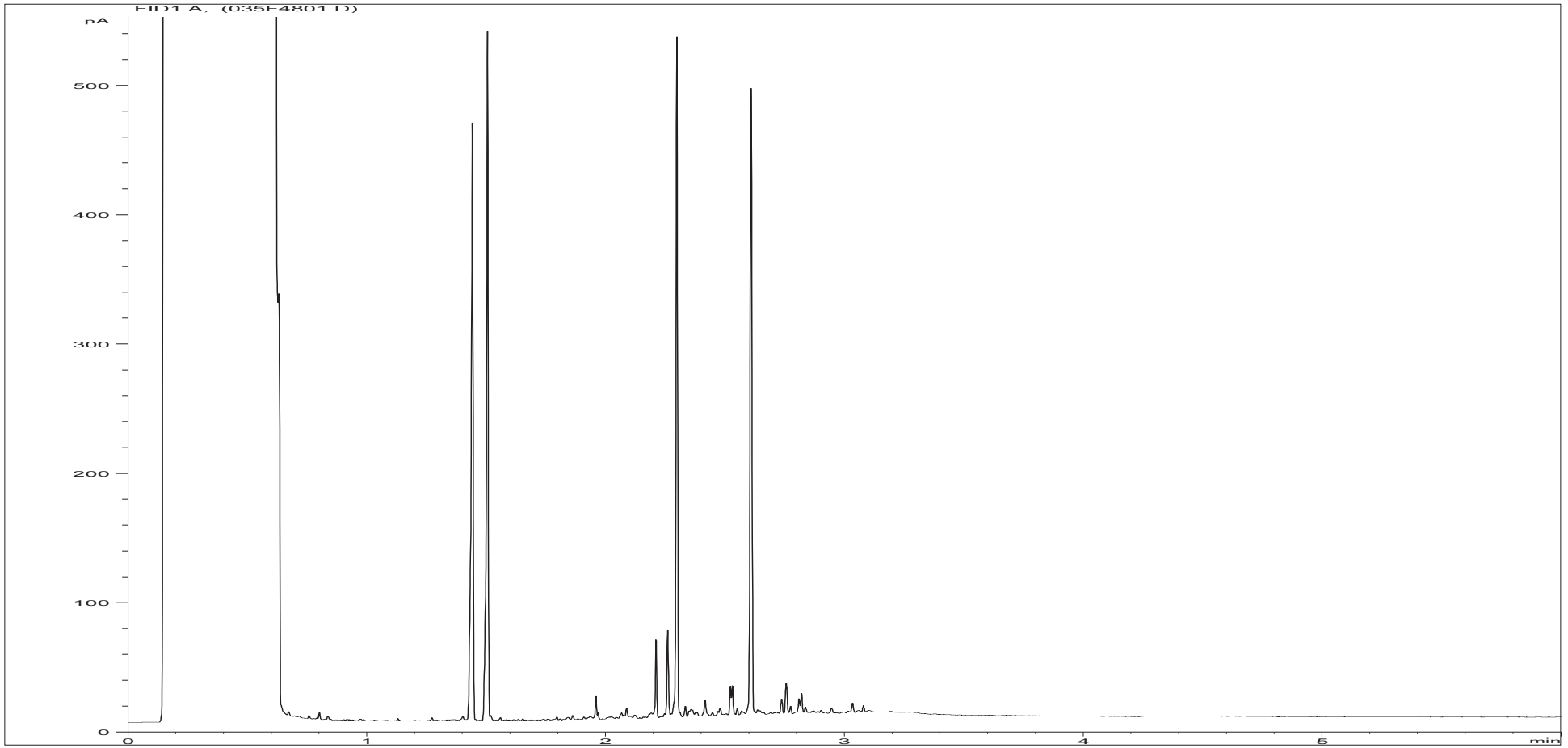
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613050ARO	**Job Number:**	S16_3043M
Multiplier:	12.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP1 0.1
Acquisition Date/Time:	21-Apr-16, 14:28:37		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\058B1301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

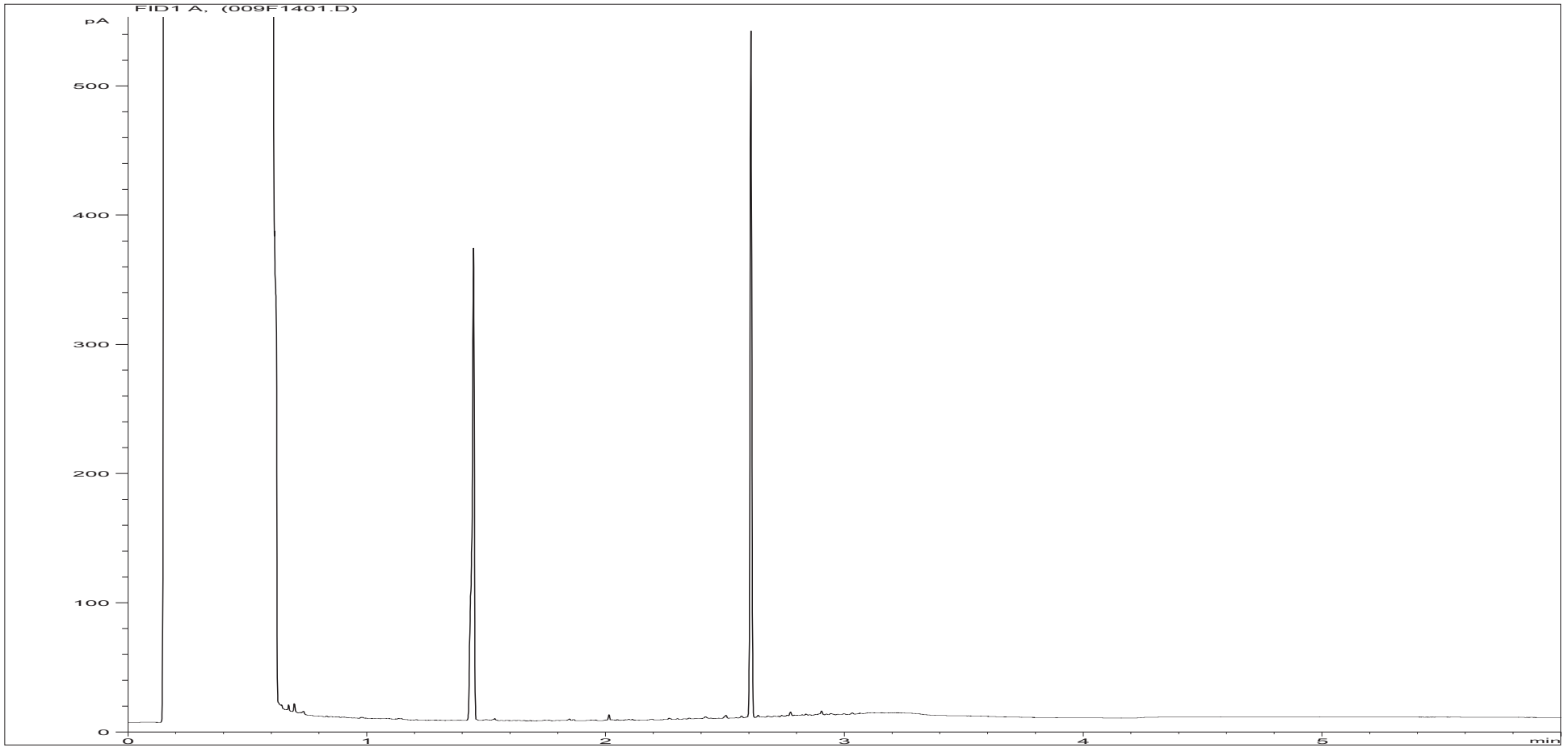
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613050SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP1 0.1
Acquisition Date/Time:	29-Apr-16, 02:06:43		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\035F4801.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

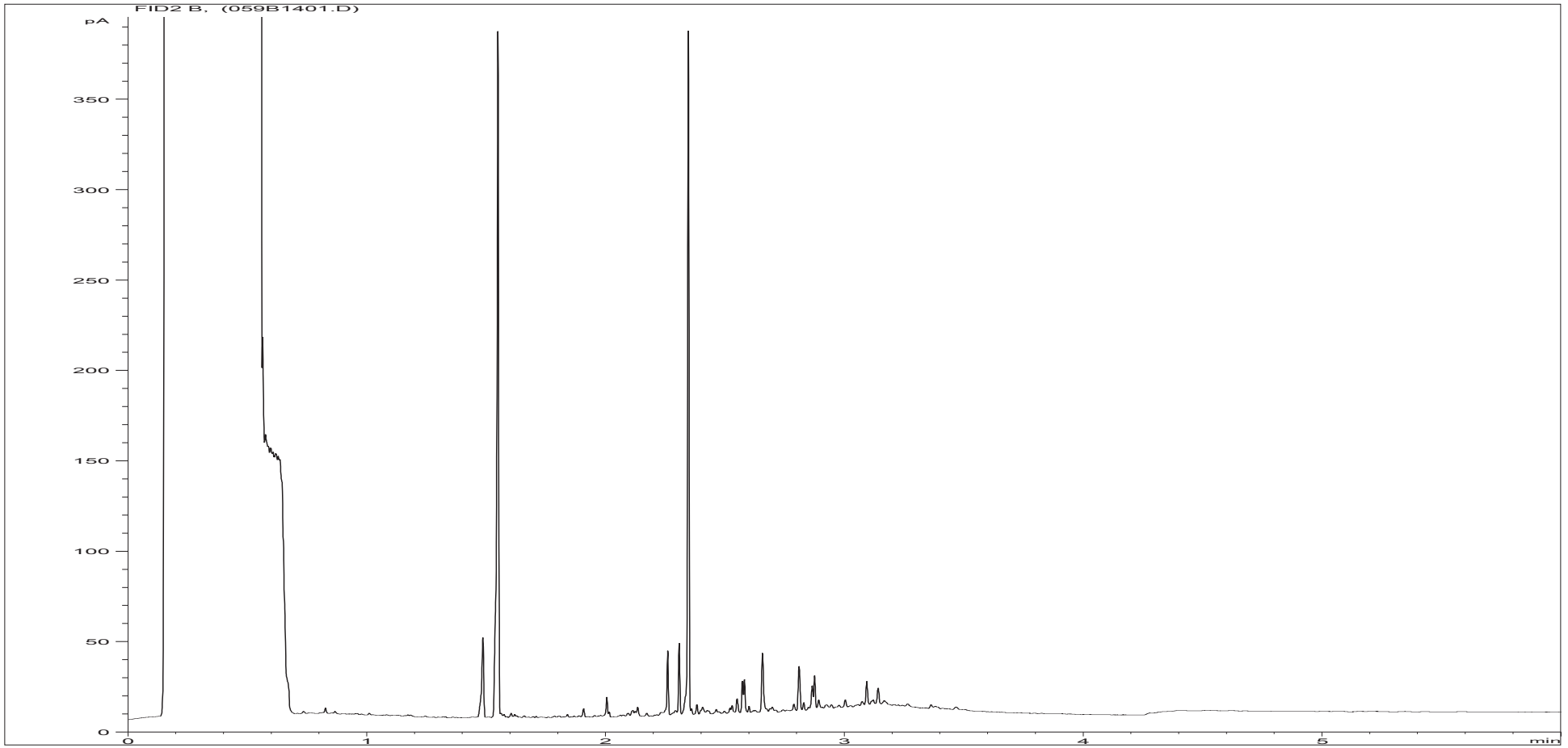
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613051ALI	**Job Number:**	S16_3043M
Multiplier:	16.32	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP2 0.1
Acquisition Date/Time:	21-Apr-16, 14:42:15		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\009F1401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

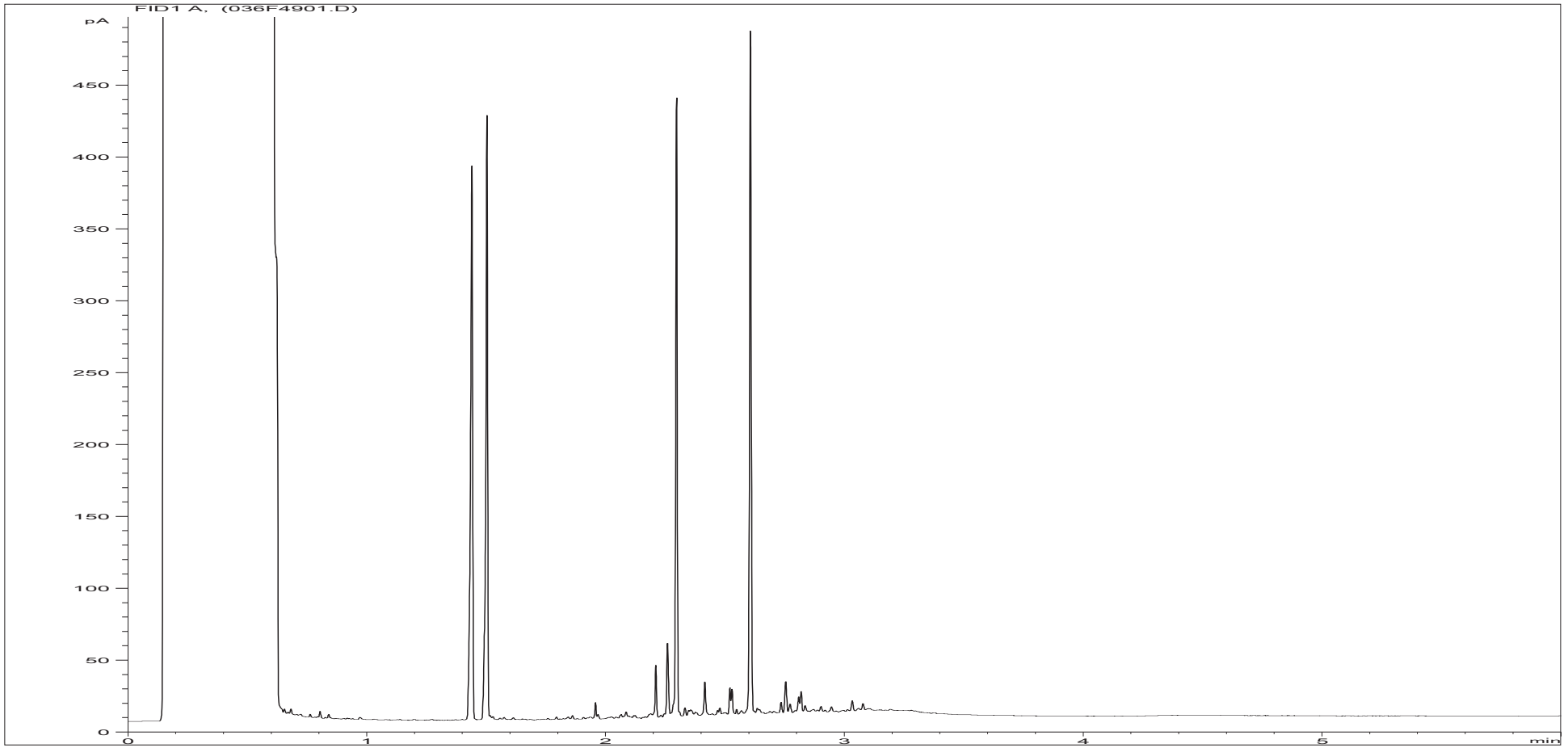
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613051ARO	**Job Number:**	S16_3043M
Multiplier:	12.76	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP2 0.1
Acquisition Date/Time:	21-Apr-16, 14:42:15		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\059B1401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

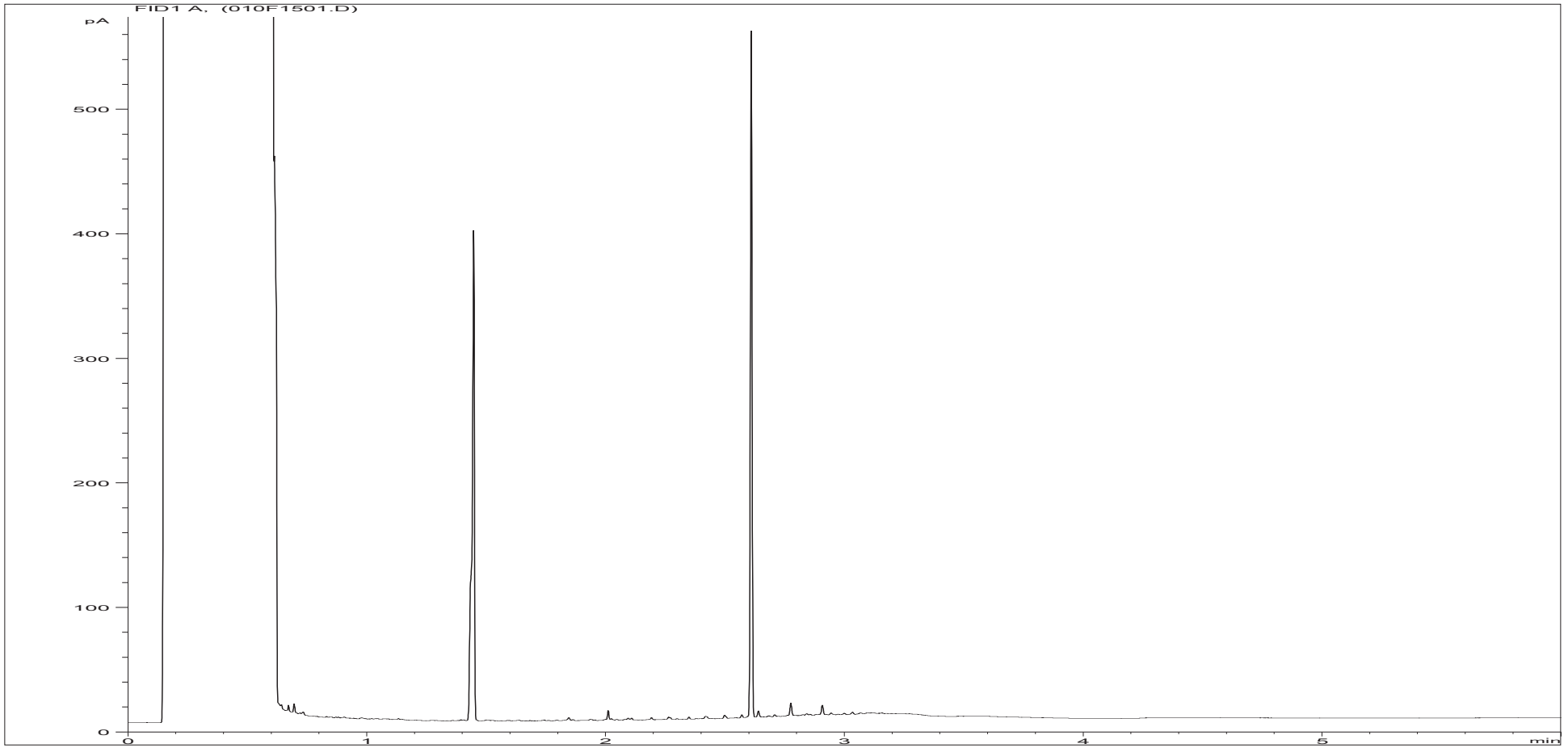
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613051SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP2 0.1
Acquisition Date/Time:	29-Apr-16, 02:20:00		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\036F4901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

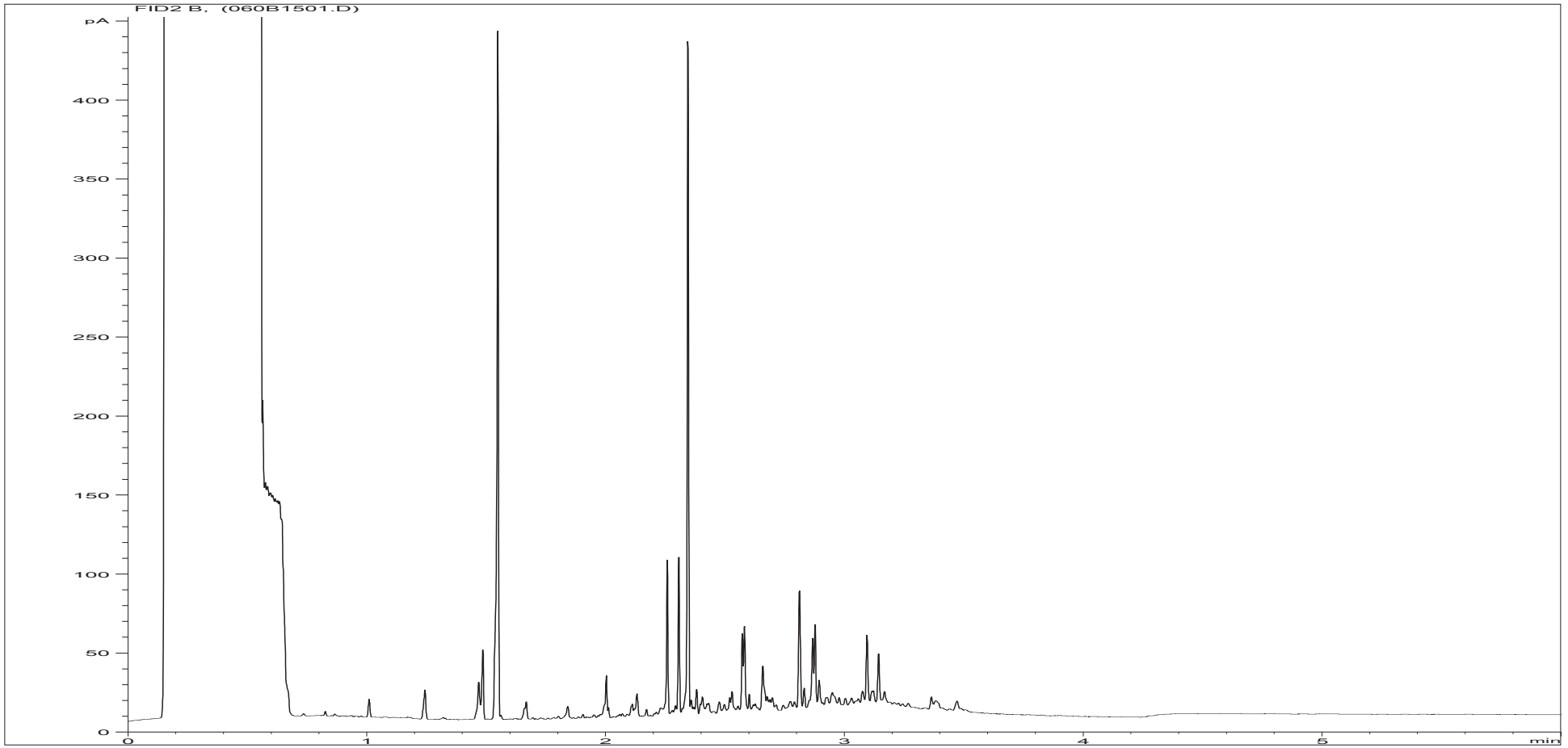
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613053ALI	**Job Number:**	S16_3043M
Multiplier:	16.24	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP4 0.1
Acquisition Date/Time:	21-Apr-16, 14:55:48		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\010F1501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

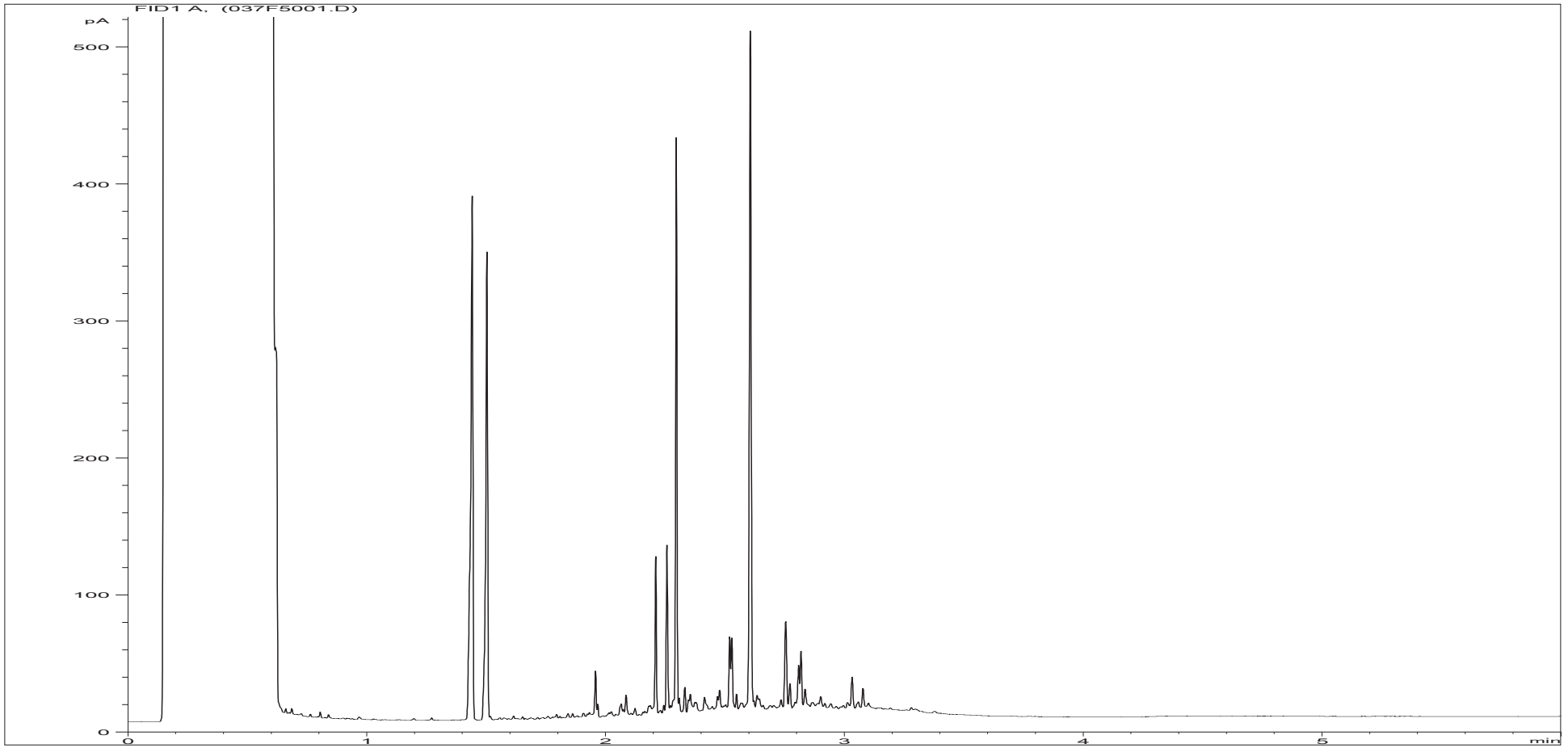
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613053ARO	**Job Number:**	S16_3043M
Multiplier:	12.08	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP4 0.1
Acquisition Date/Time:	21-Apr-16, 14:55:48		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\060B1501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

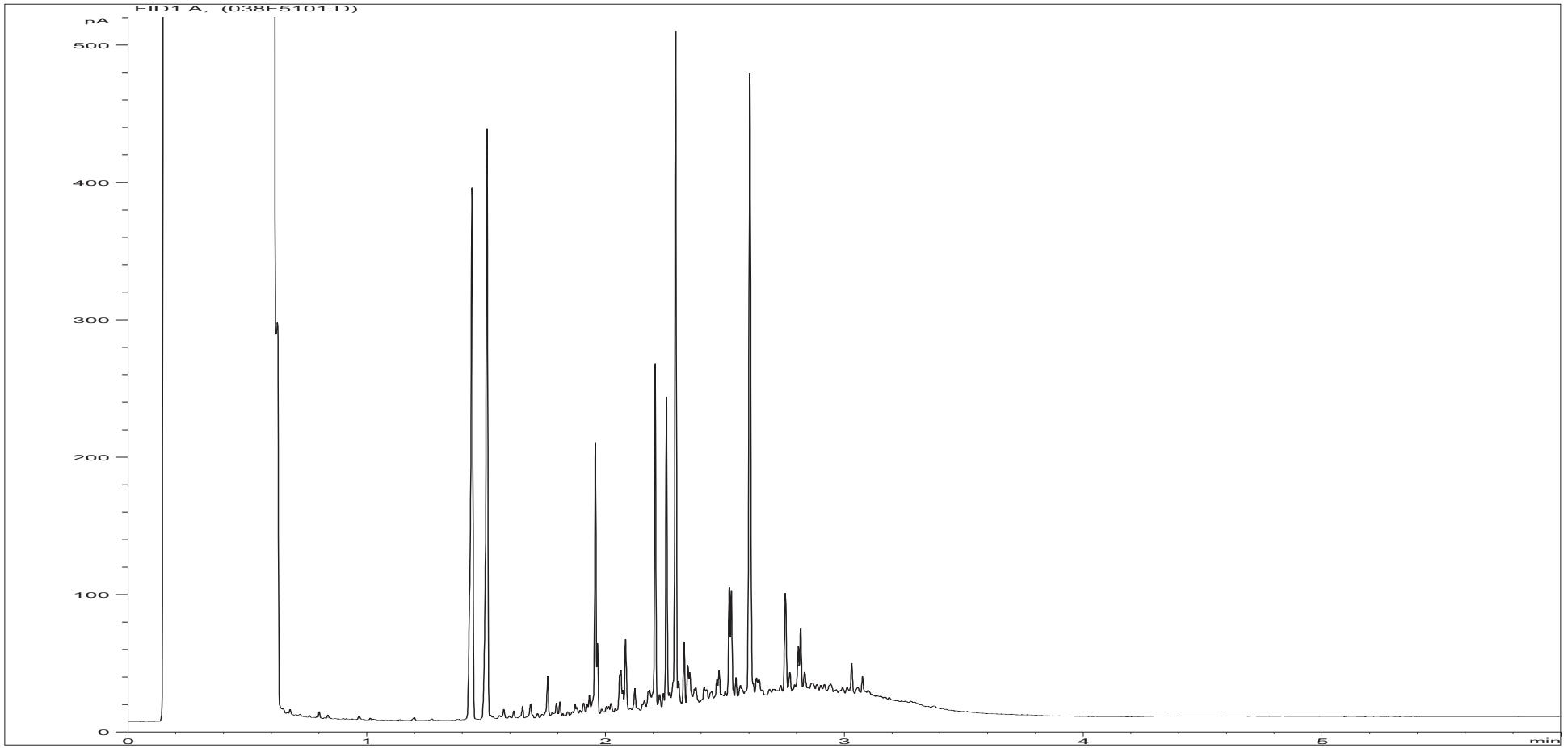
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613053SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP4 0.1
Acquisition Date/Time:	29-Apr-16, 02:33:15		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\037F5001.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

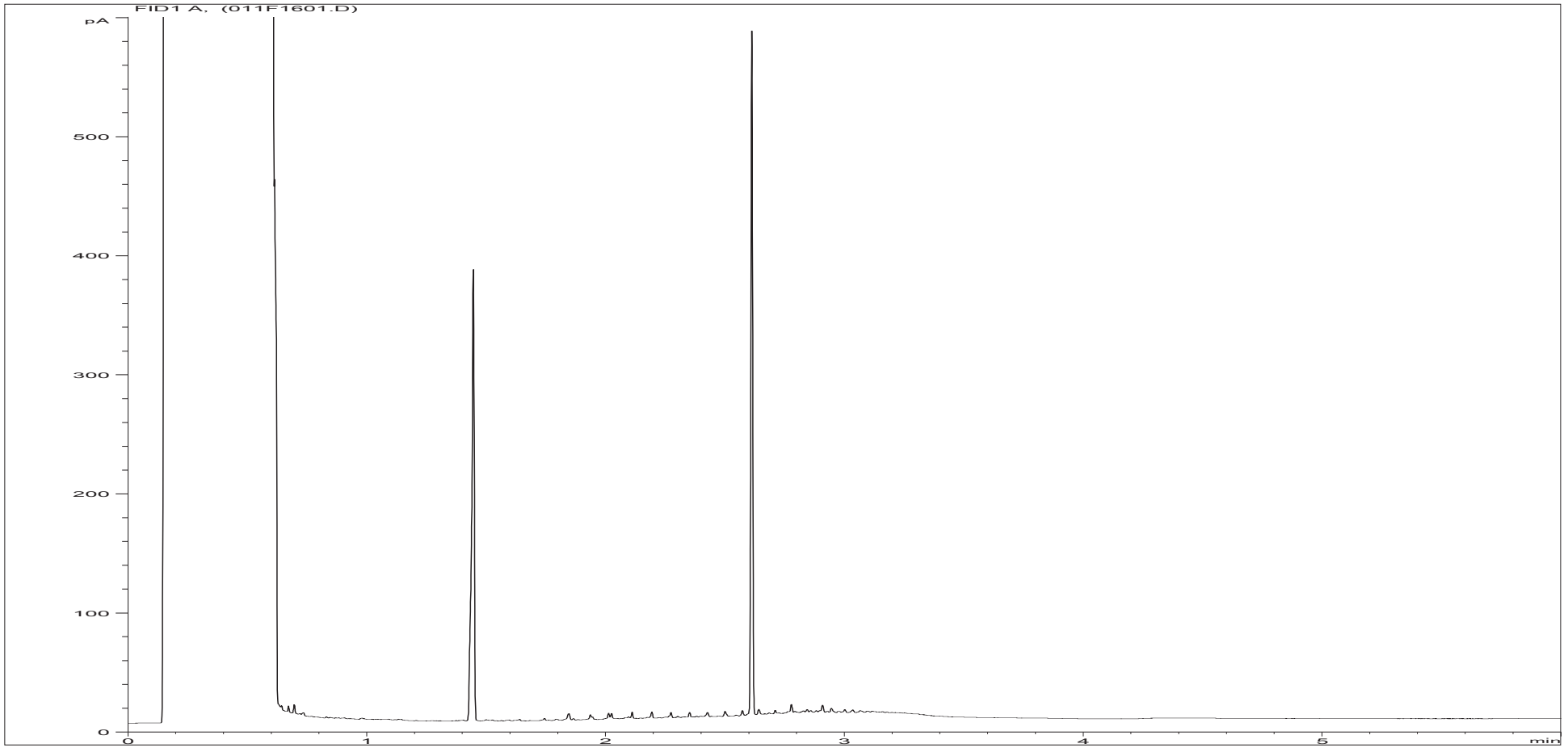
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613054SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP5 2.0
Acquisition Date/Time:	29-Apr-16, 02:46:27		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\038F5101.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

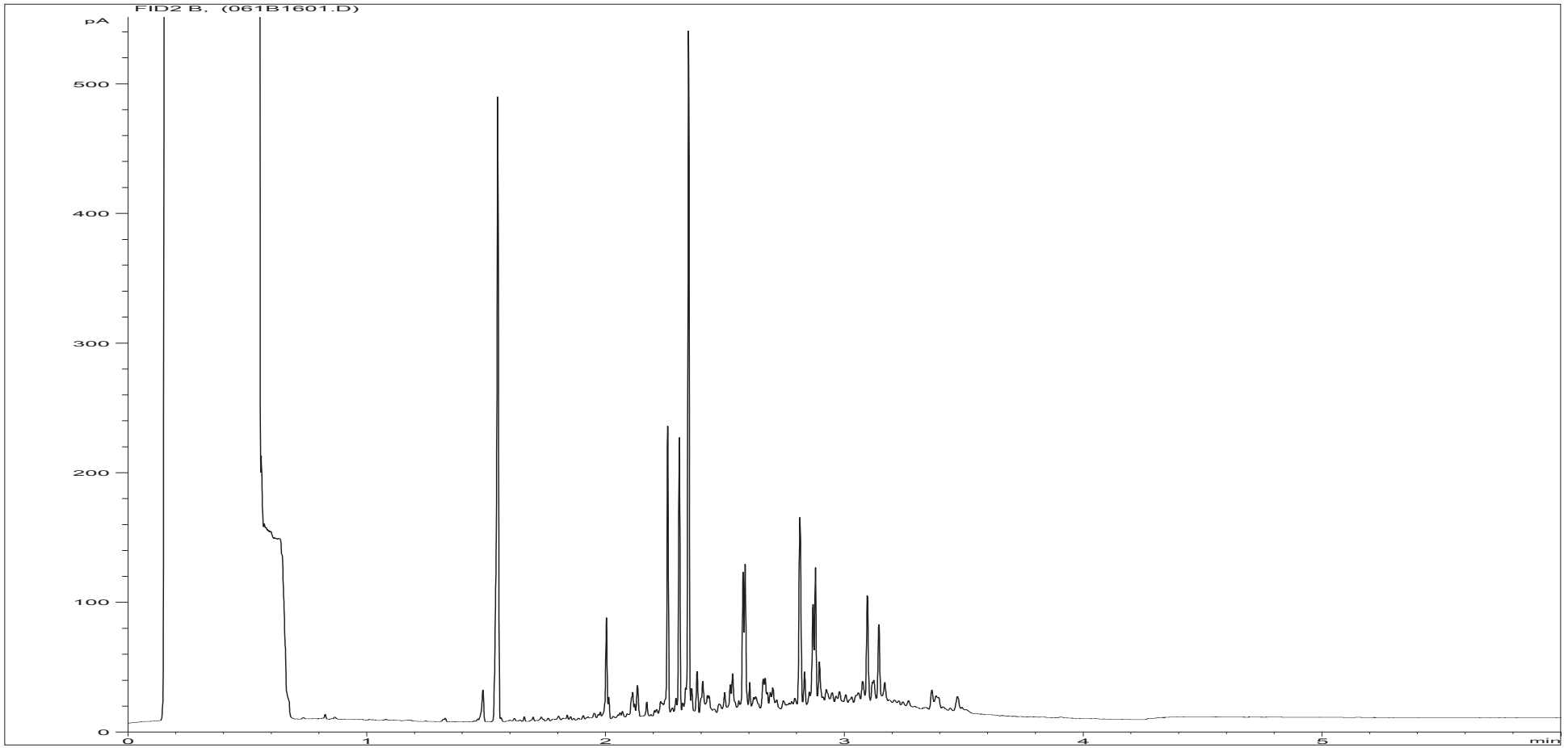
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613055ALI	**Job Number:**	S16_3043M
Multiplier:	16.4	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP6 0.5
Acquisition Date/Time:	21-Apr-16, 15:09:29		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\011F1601.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

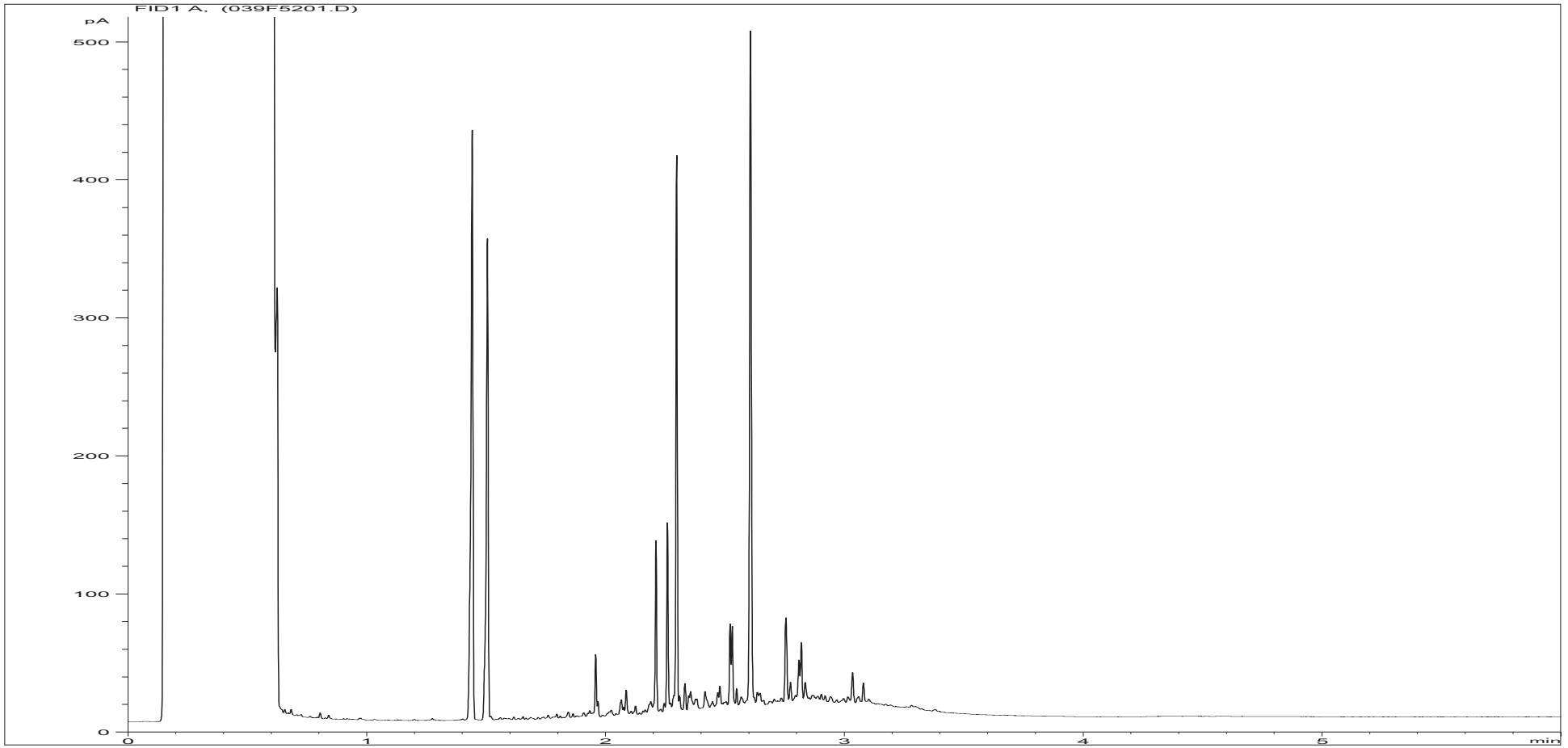
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613055ARO	**Job Number:**	S16_3043M
Multiplier:	12.32	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP6 0.5
Acquisition Date/Time:	21-Apr-16, 15:09:29		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\061B1601.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

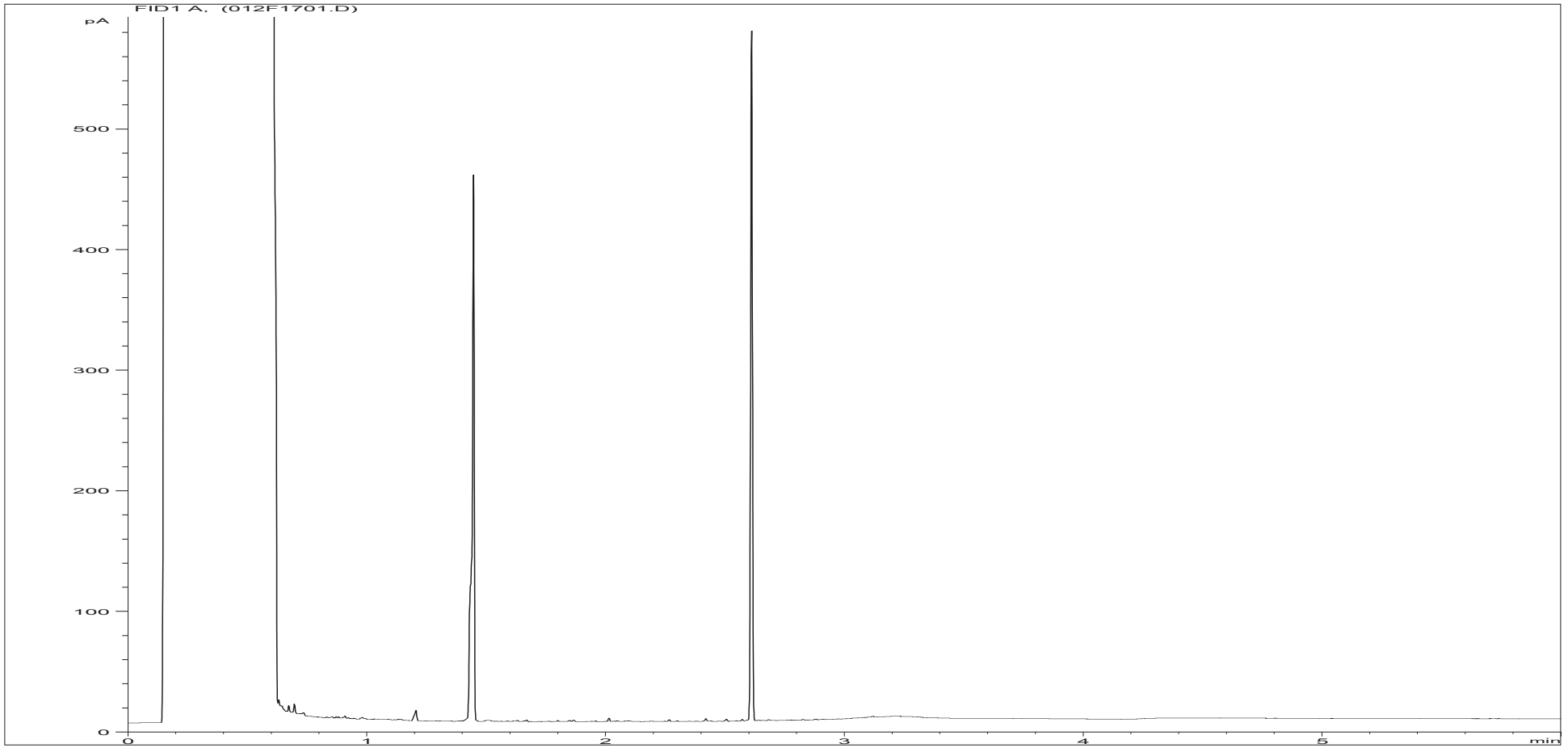
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613055SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP6 0.5
Acquisition Date/Time:	29-Apr-16, 02:59:50		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\039F5201.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

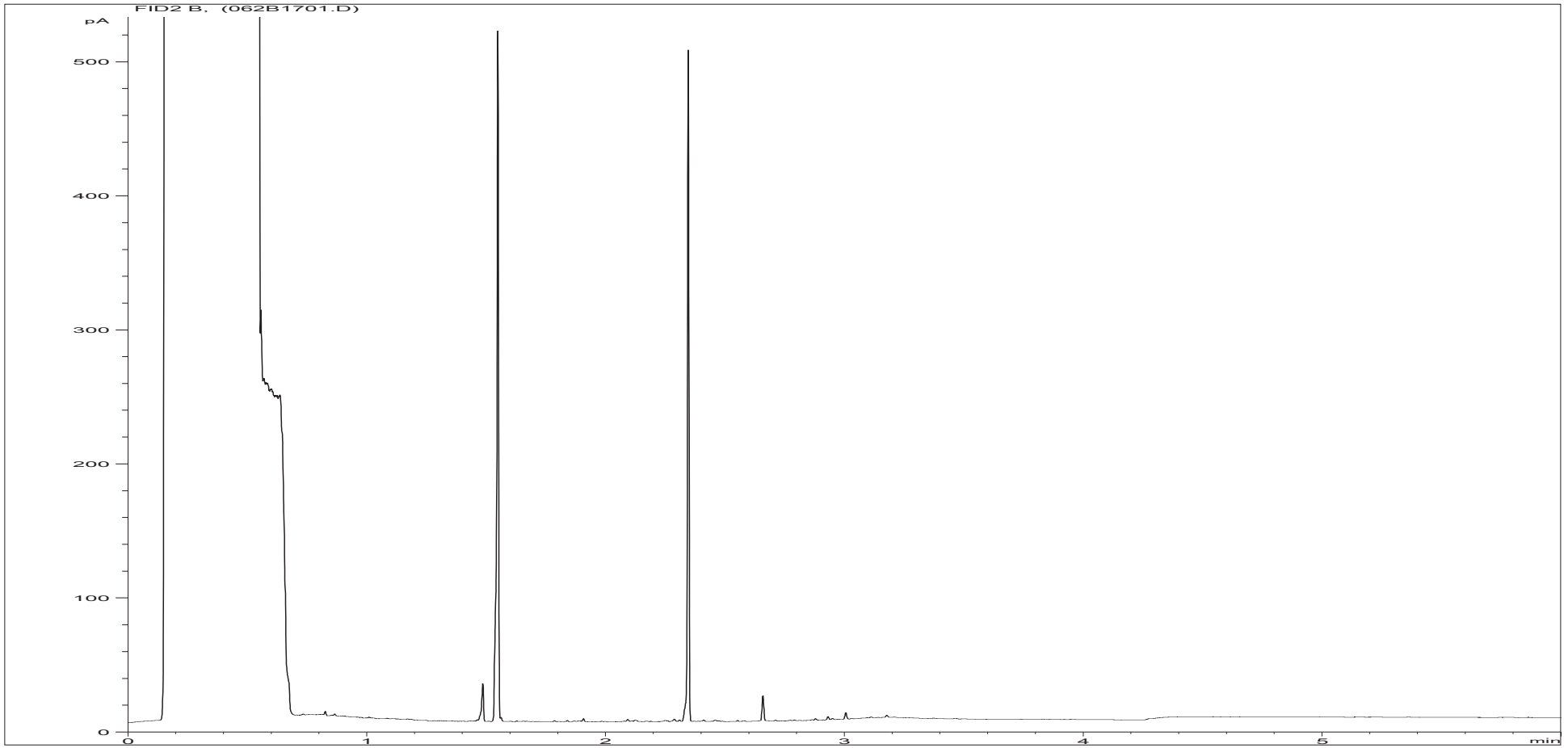
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613056ALI	**Job Number:**	S16_3043M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP7 0.1
Acquisition Date/Time:	21-Apr-16, 15:23:13		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\012F1701.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

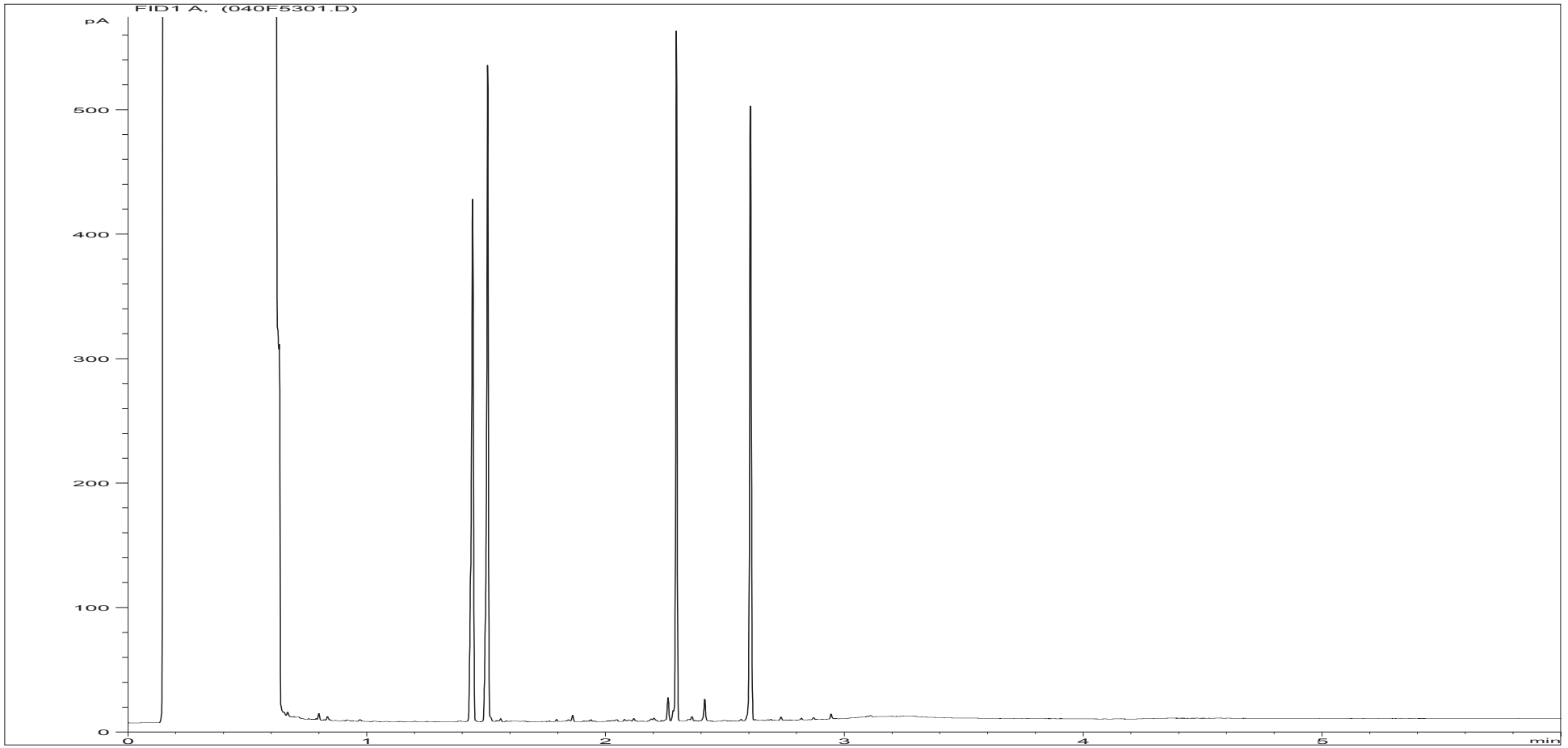
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613056ARO	**Job Number:**	S16_3043M
Multiplier:	12.24	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP7 0.1
Acquisition Date/Time:	21-Apr-16, 15:23:13		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\062B1701.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

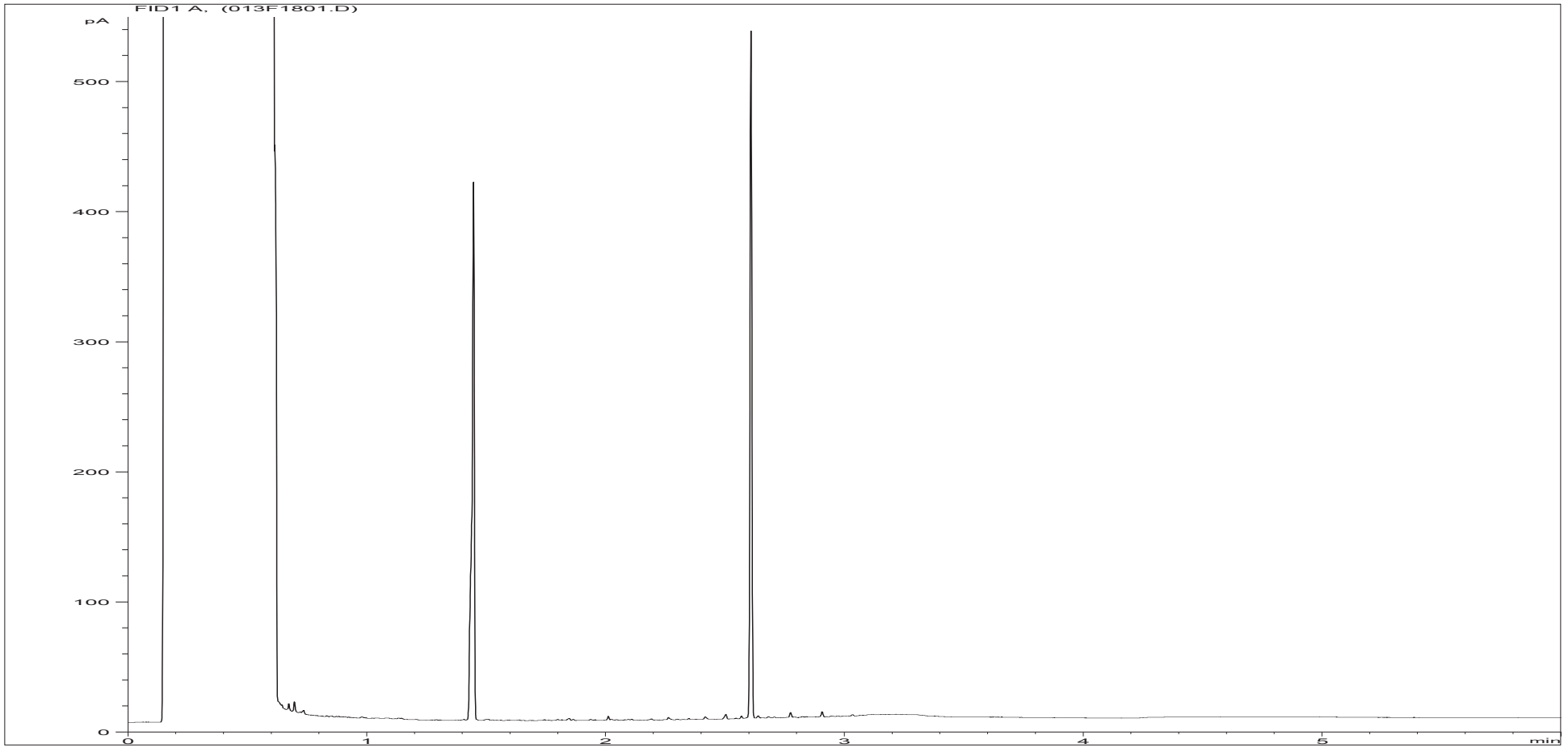
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613056SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP7 0.1
Acquisition Date/Time:	29-Apr-16, 03:13:01		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\040F5301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

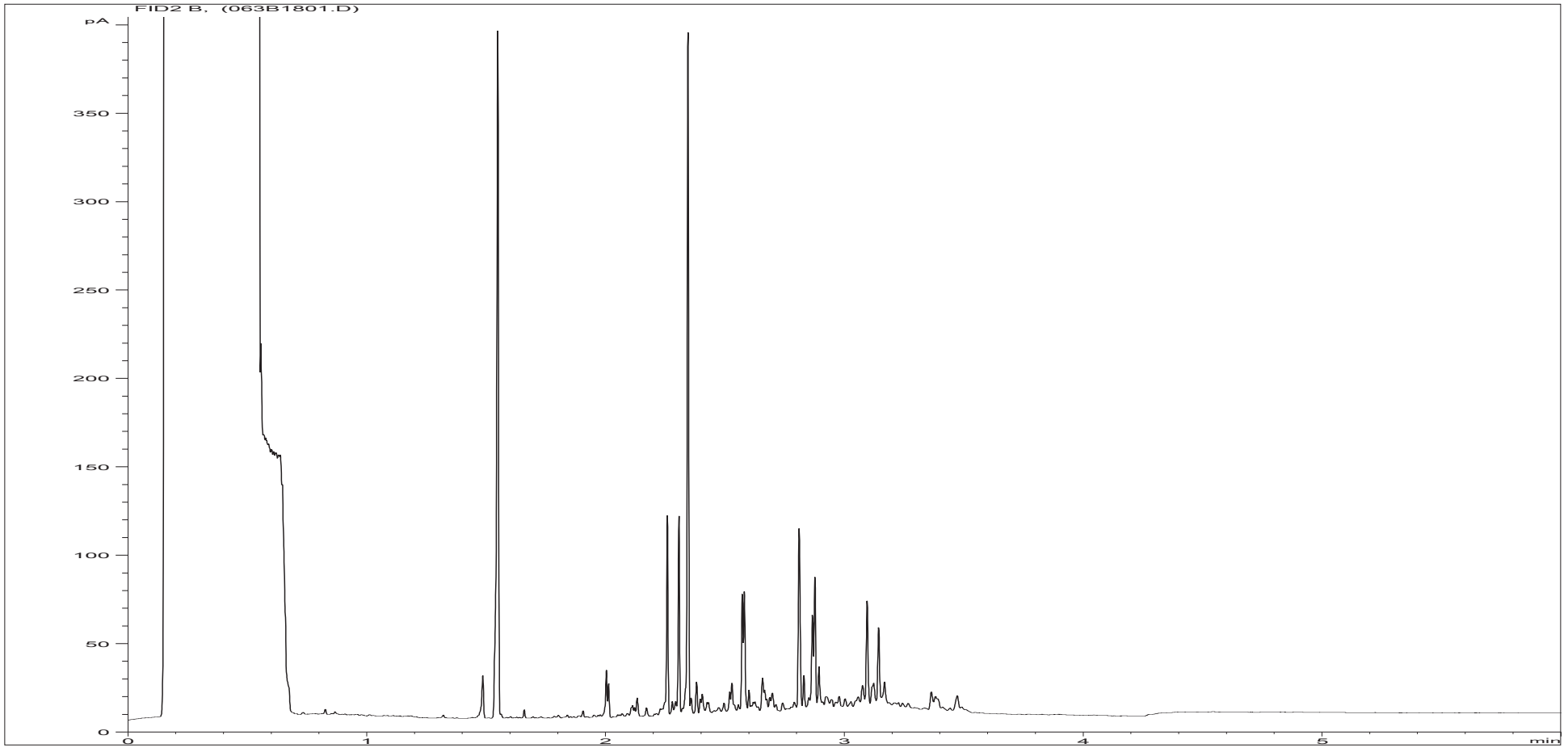
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613057ALI	**Job Number:**	S16_3043M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP8 0.5
Acquisition Date/Time:	21-Apr-16, 15:36:47		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\013F1801.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

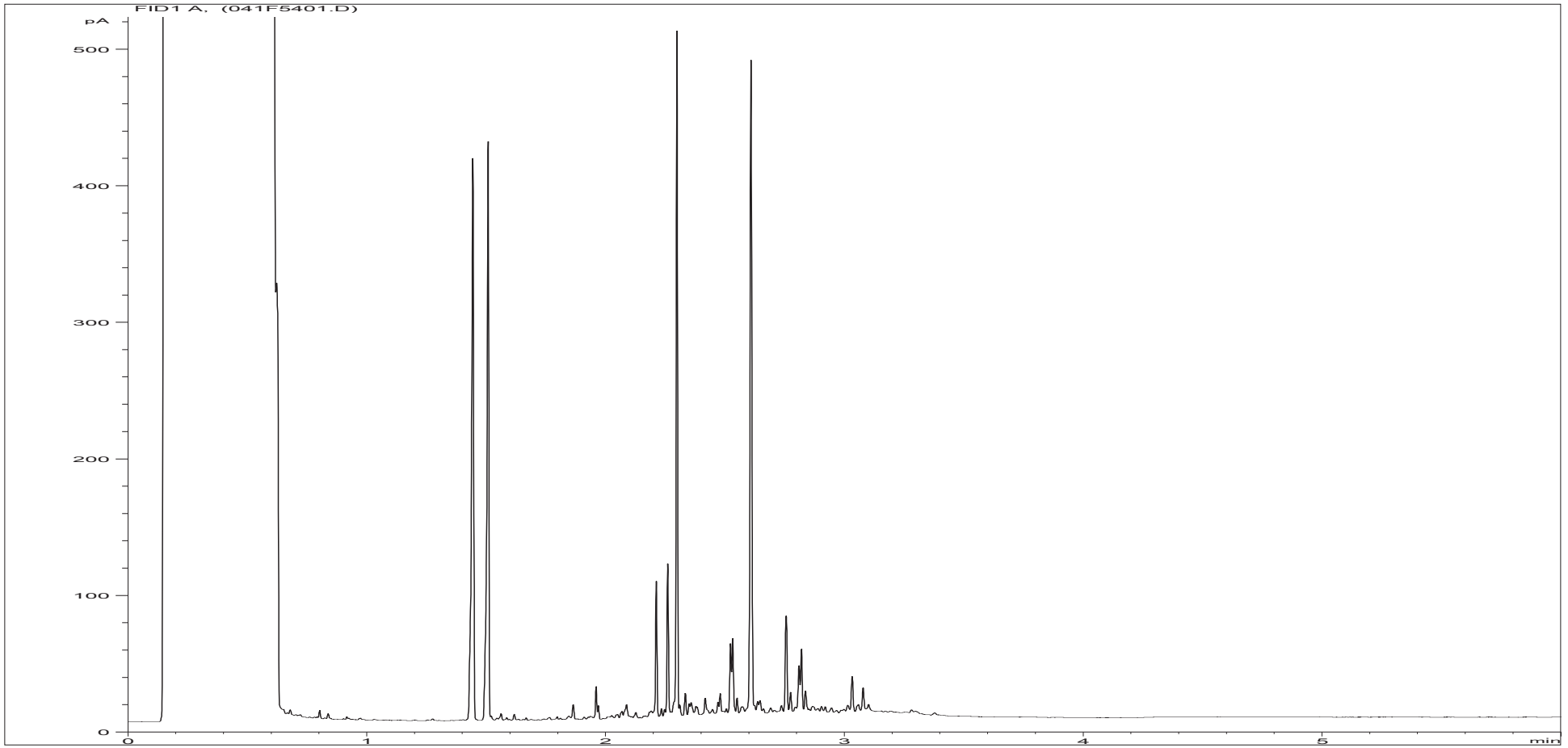
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613057ARO	**Job Number:**	S16_3043M
Multiplier:	11.46	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP8 0.5
Acquisition Date/Time:	21-Apr-16, 15:36:47		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\063B1801.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

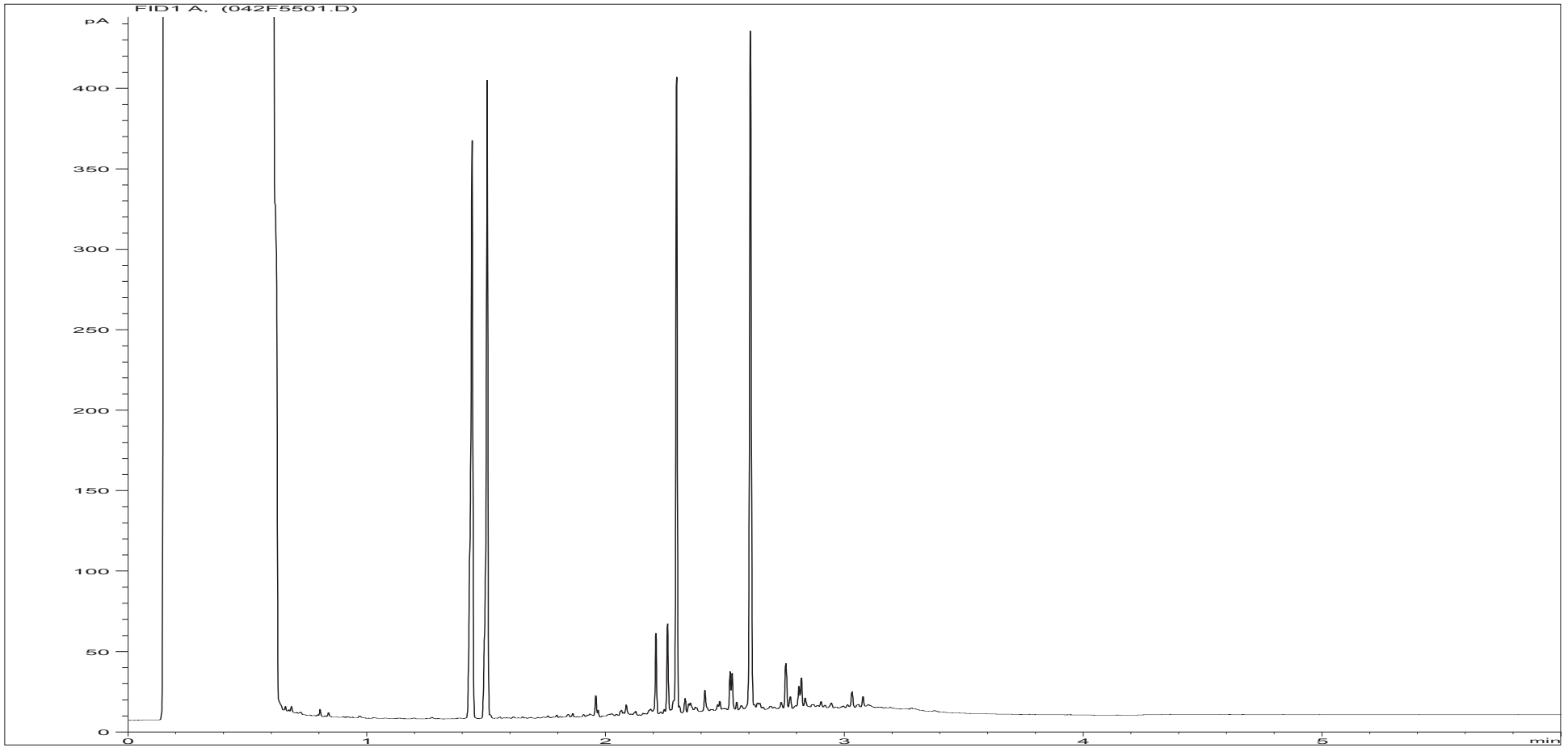
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613057SCU	**Job Number:**	S16_3043M
Multiplier:	16.32	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP8 0.5
Acquisition Date/Time:	29-Apr-16, 03:26:11		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\041F5401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

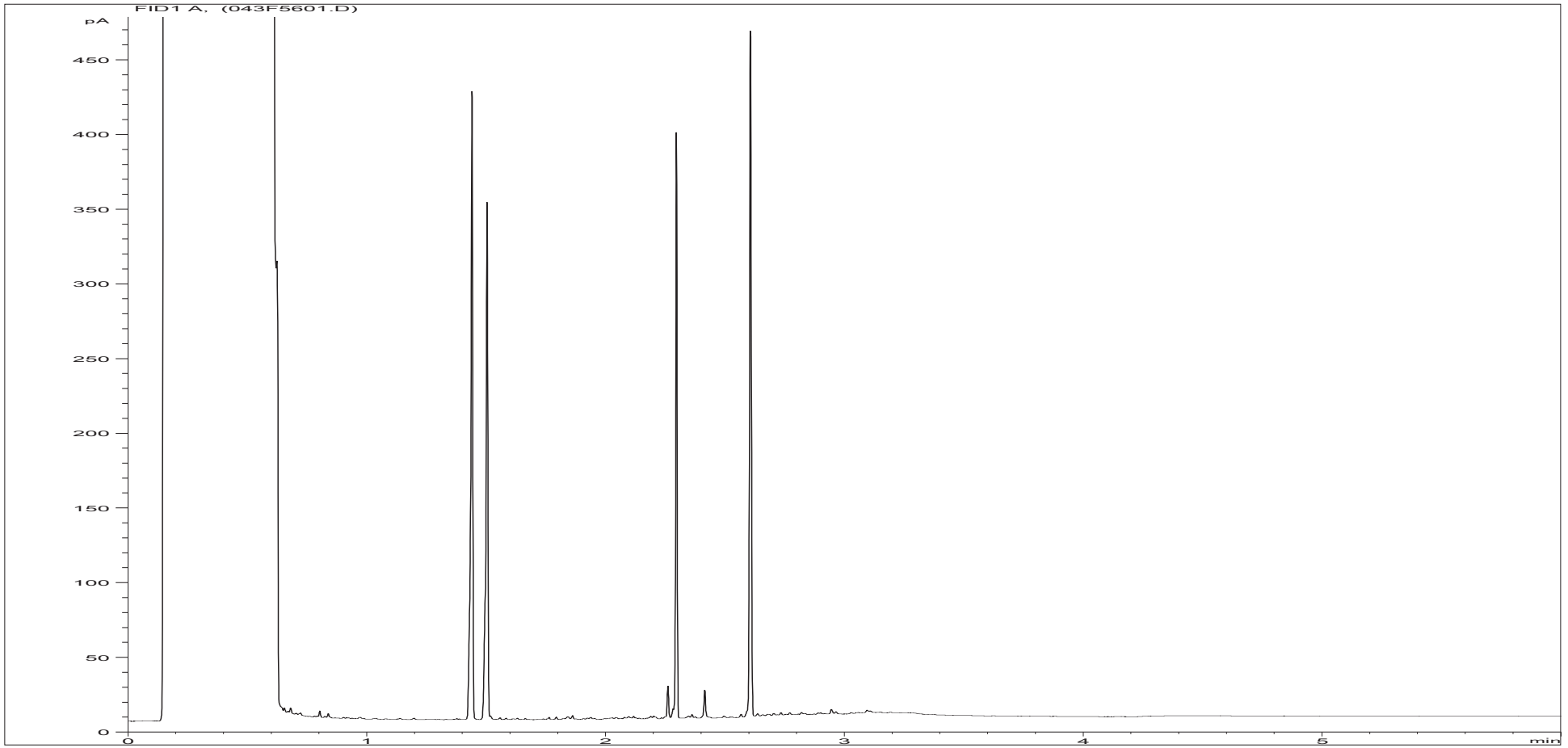
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613058SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP9 1.5
Acquisition Date/Time:	29-Apr-16, 03:39:39		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\042F5501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

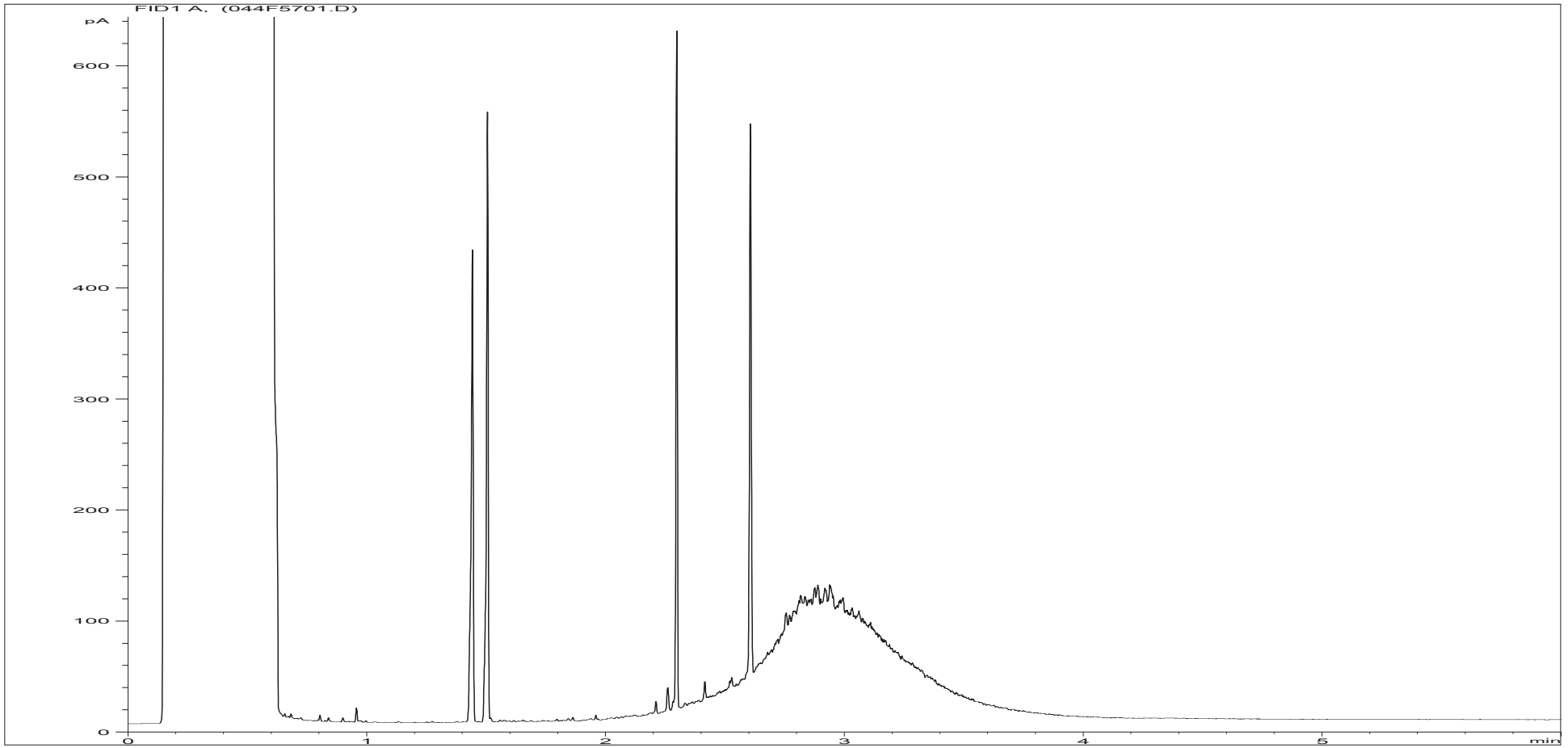
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613059SCU	**Job Number:**	S16_3043M
Multiplier:	16.48	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP10 Composite
Acquisition Date/Time:	29-Apr-16, 03:52:53		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\043F5601.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

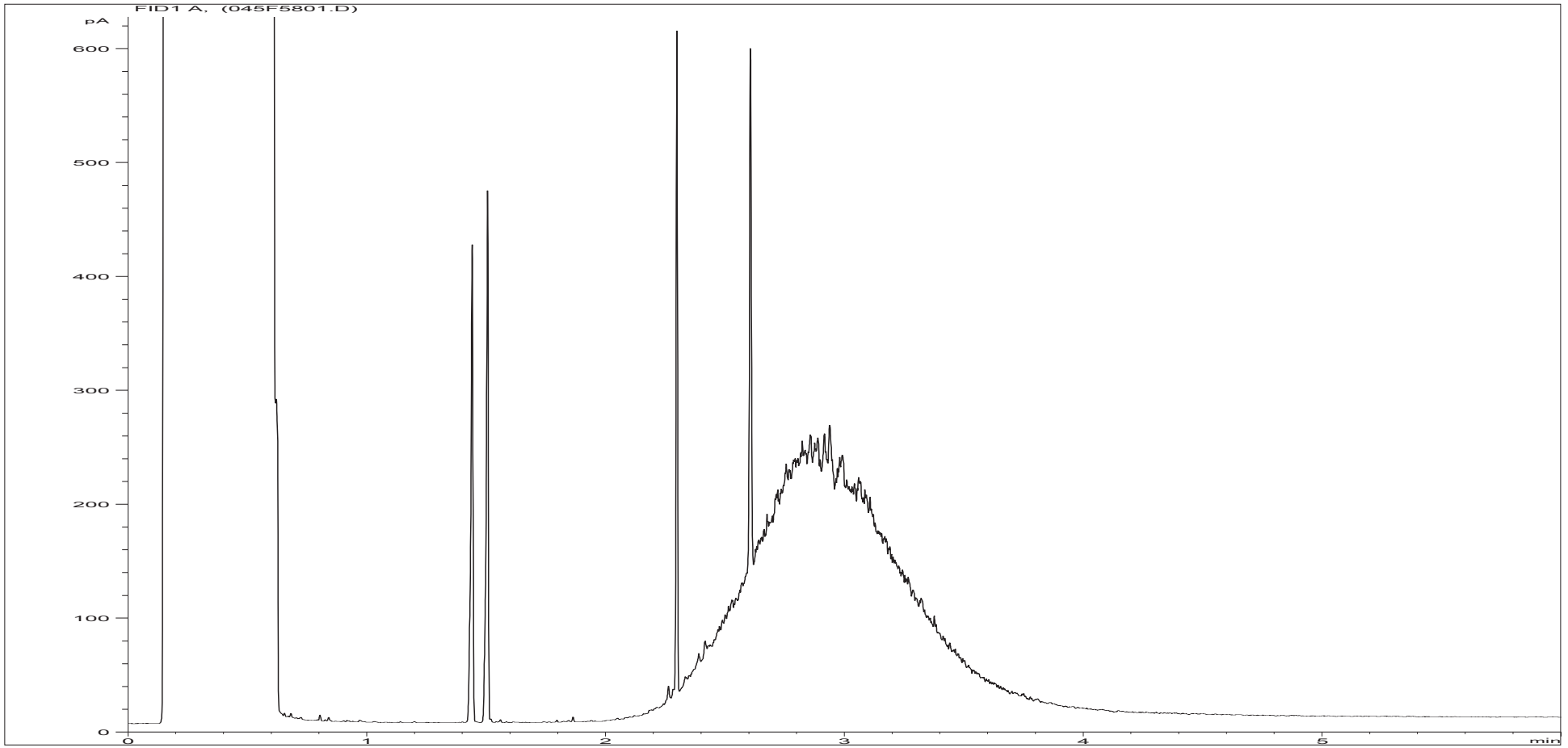
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613060SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP18 Composite
Acquisition Date/Time:	29-Apr-16, 04:06:12		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\044F5701.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

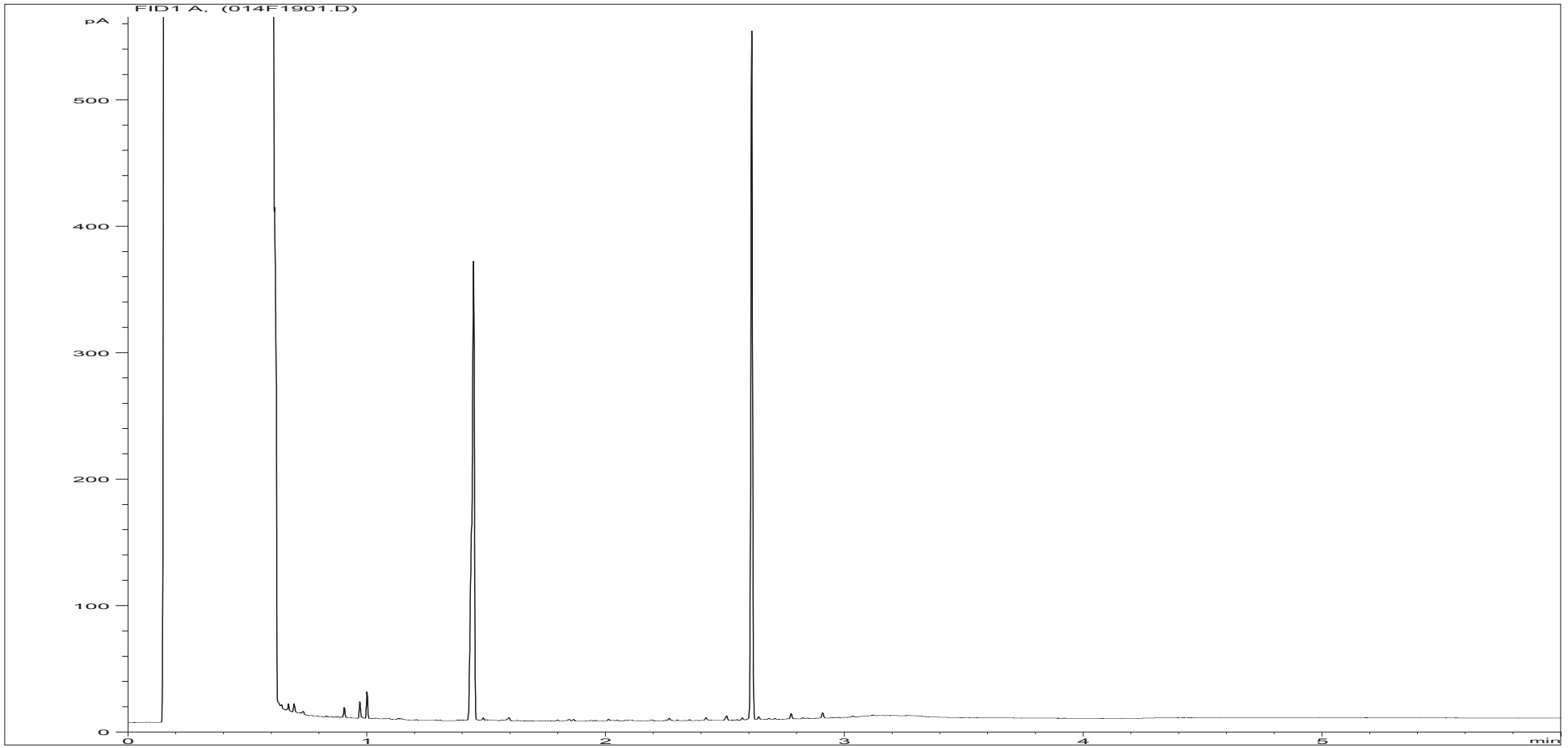
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613061SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP18 Biggins 1 (NVM)
Acquisition Date/Time:	29-Apr-16, 04:19:28		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\045F5801.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

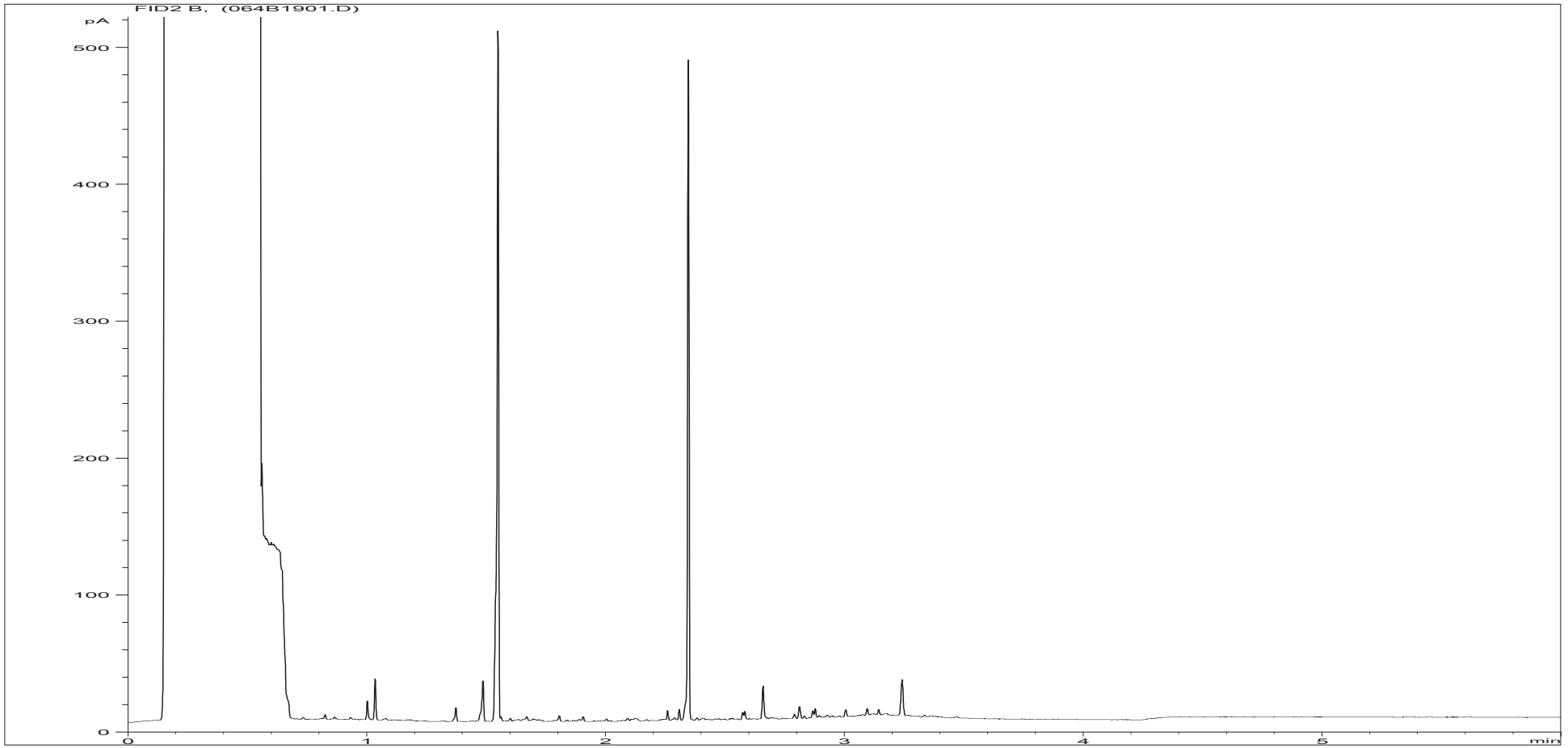
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613062ALI	**Job Number:**	S16_3043M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP11 0.1
Acquisition Date/Time:	21-Apr-16, 15:50:20		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\014F1901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

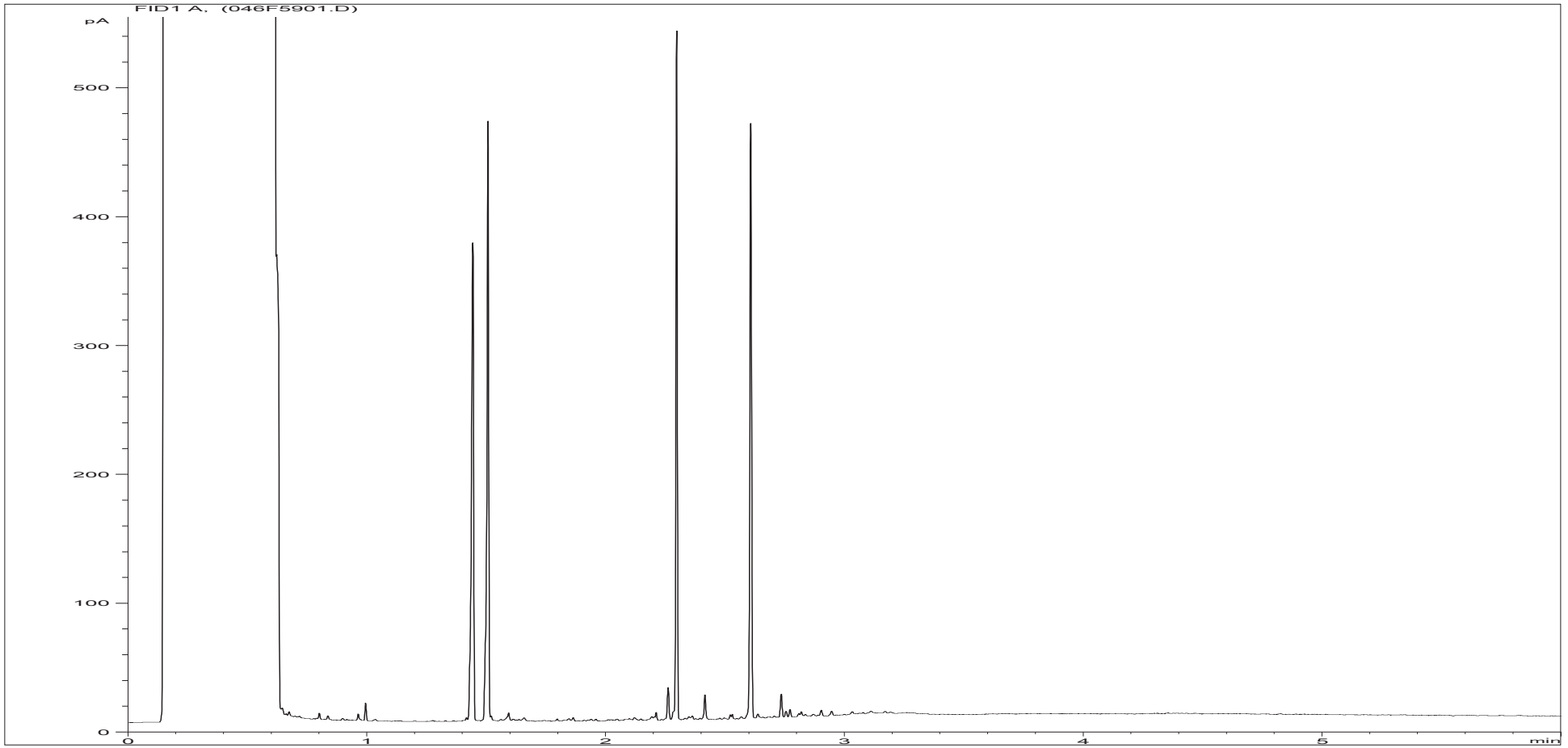
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613062ARO	**Job Number:**	S16_3043M
Multiplier:	11.68	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP11 0.1
Acquisition Date/Time:	21-Apr-16, 15:50:20		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\064B1901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

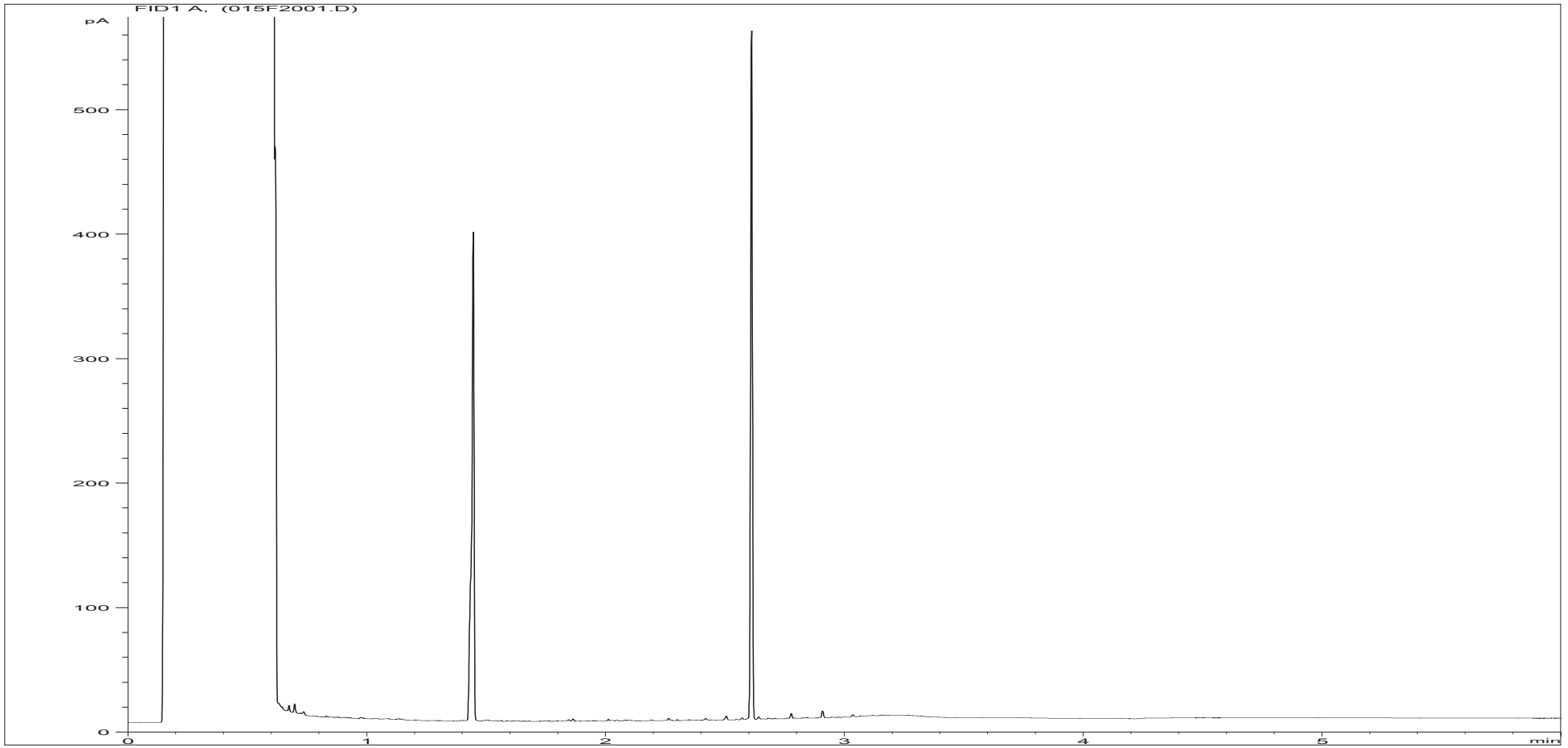
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613062SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP11 0.1
Acquisition Date/Time:	29-Apr-16, 04:32:42		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\046F5901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

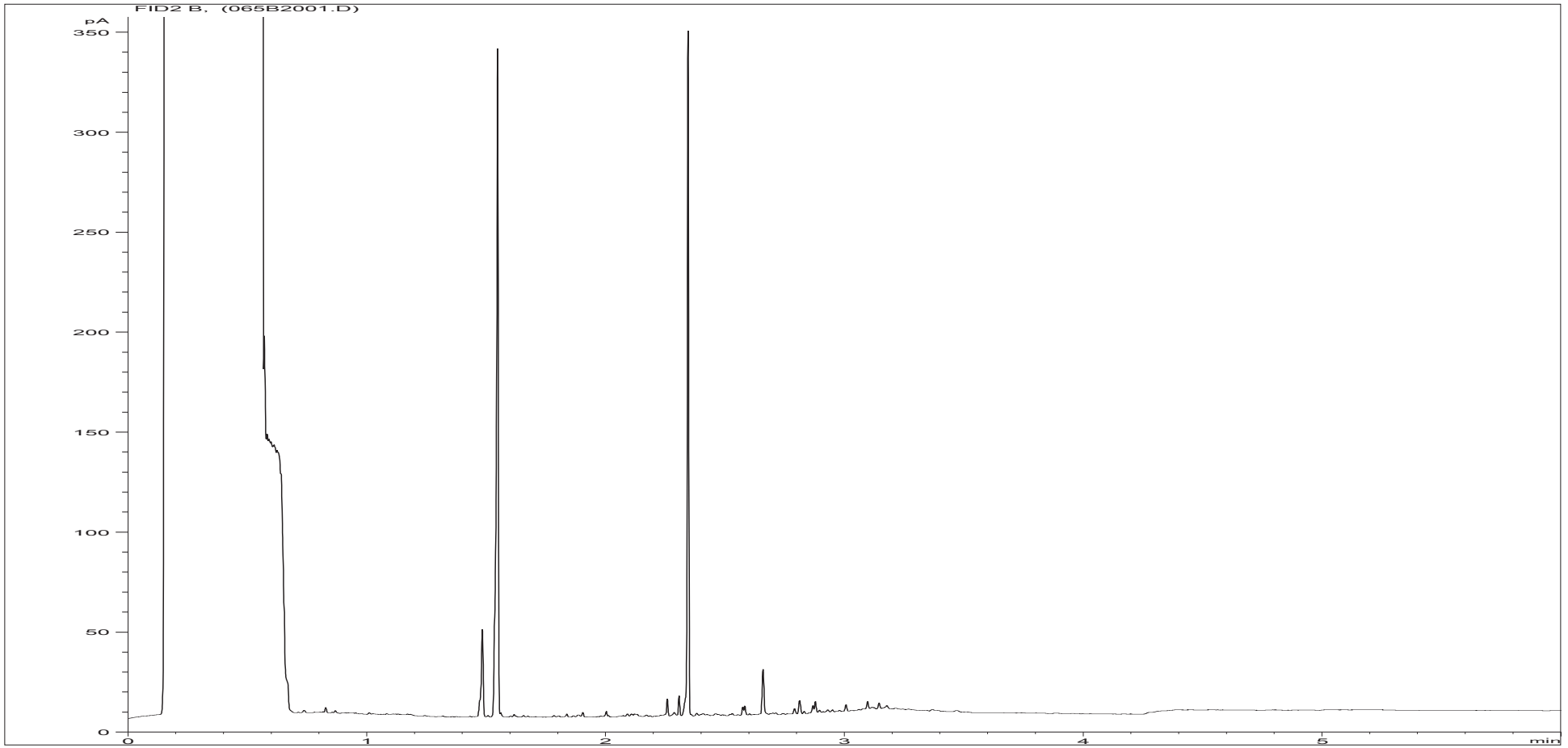
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613063ALI	**Job Number:**	S16_3043M
Multiplier:	16.08	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP12 0.1
Acquisition Date/Time:	21-Apr-16, 16:03:58		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\015F2001.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

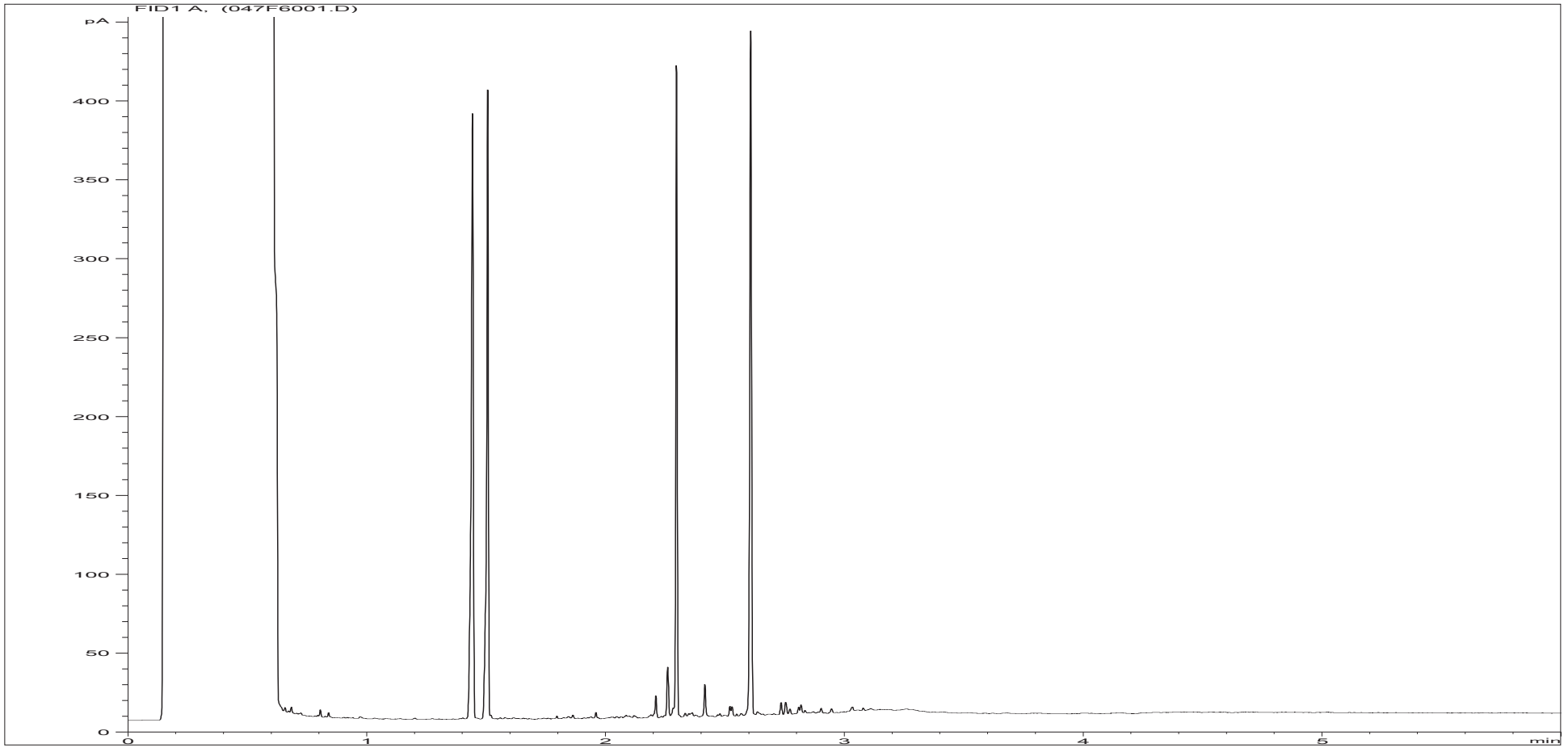
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613063ARO	**Job Number:**	S16_3043M
Multiplier:	12	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP12 0.1
Acquisition Date/Time:	21-Apr-16, 16:03:58		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\065B2001.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

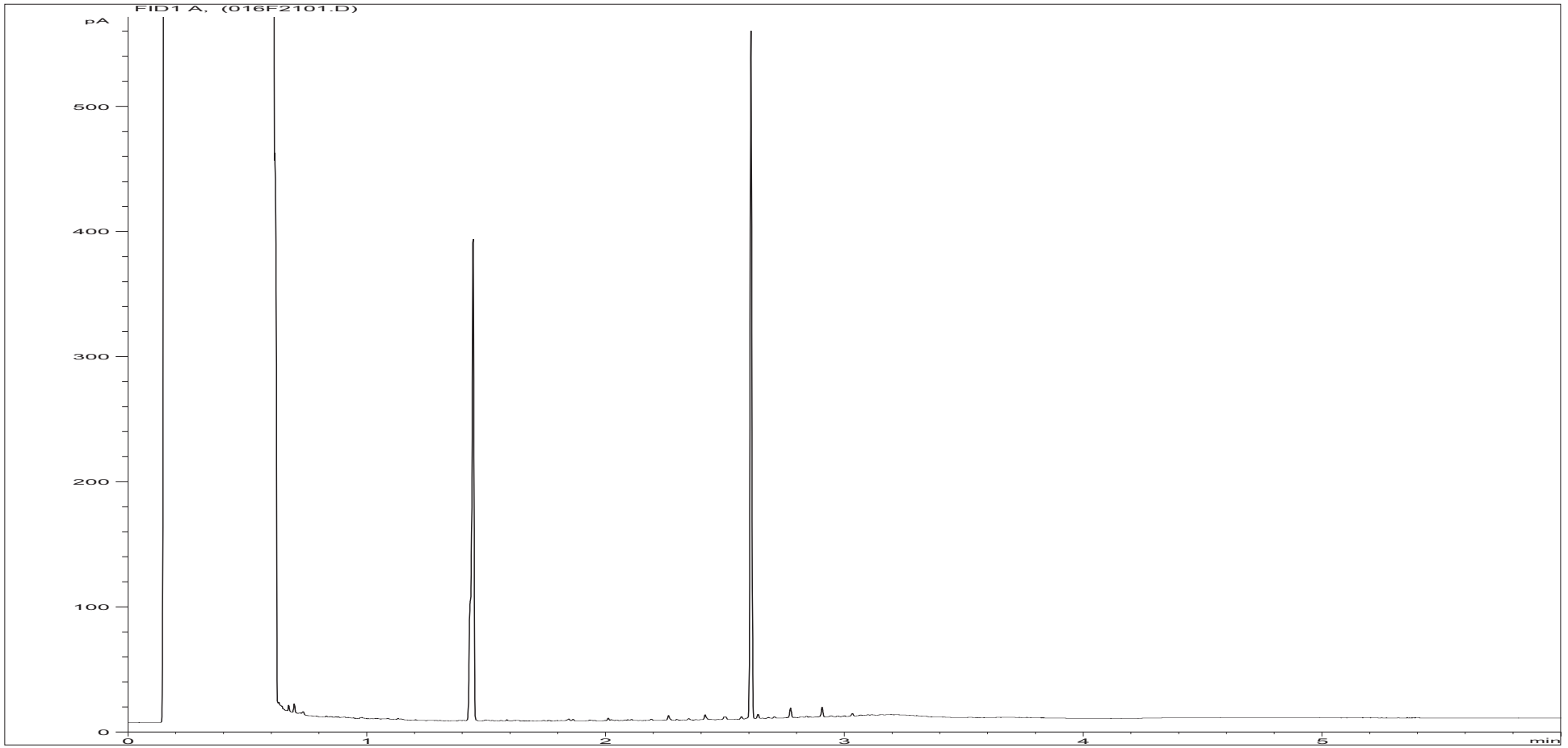
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613063SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP12 0.1
Acquisition Date/Time:	29-Apr-16, 04:45:51		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\047F6001.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

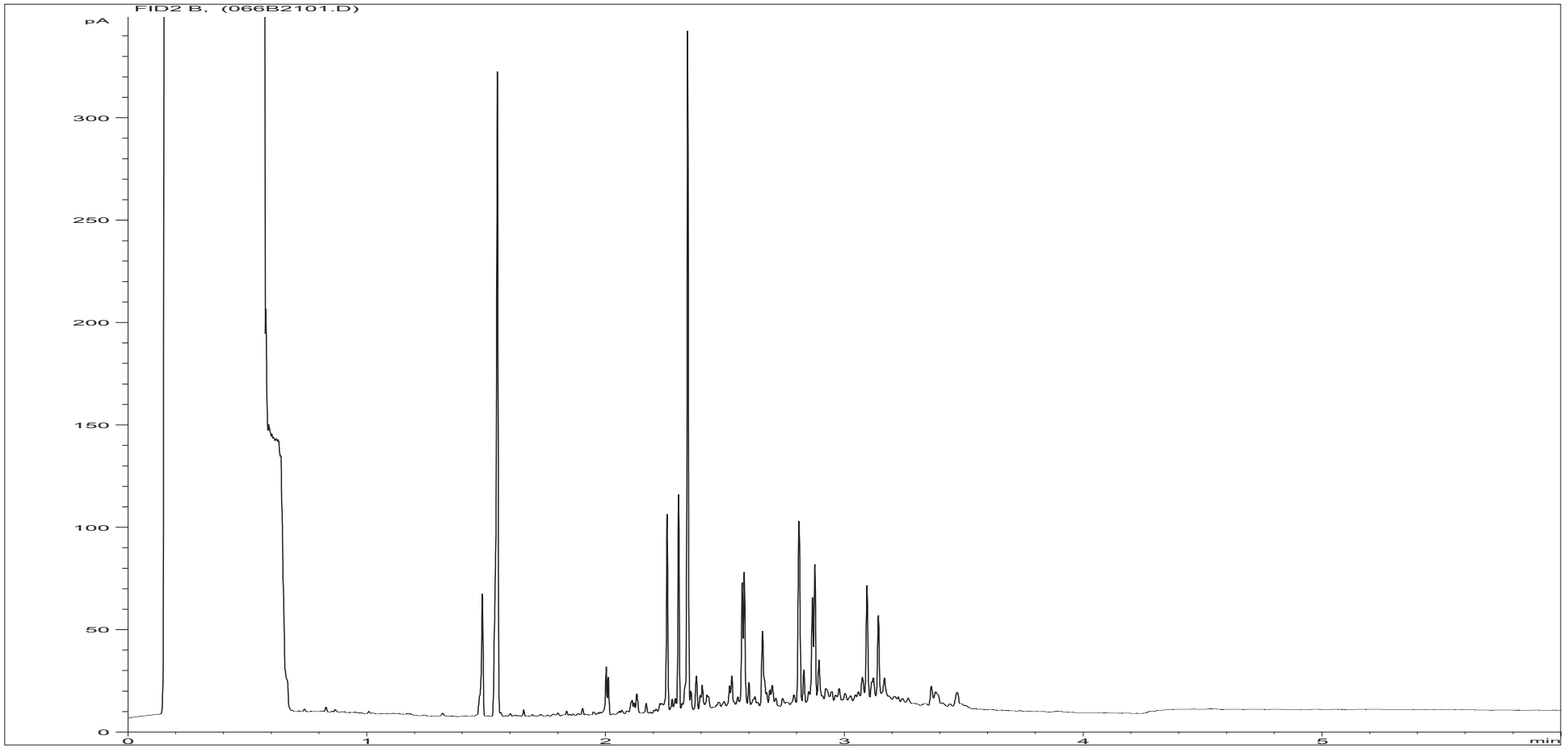
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613064ALI	**Job Number:**	S16_3043M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP13 0.5
Acquisition Date/Time:	21-Apr-16, 16:17:39		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\016F2101.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

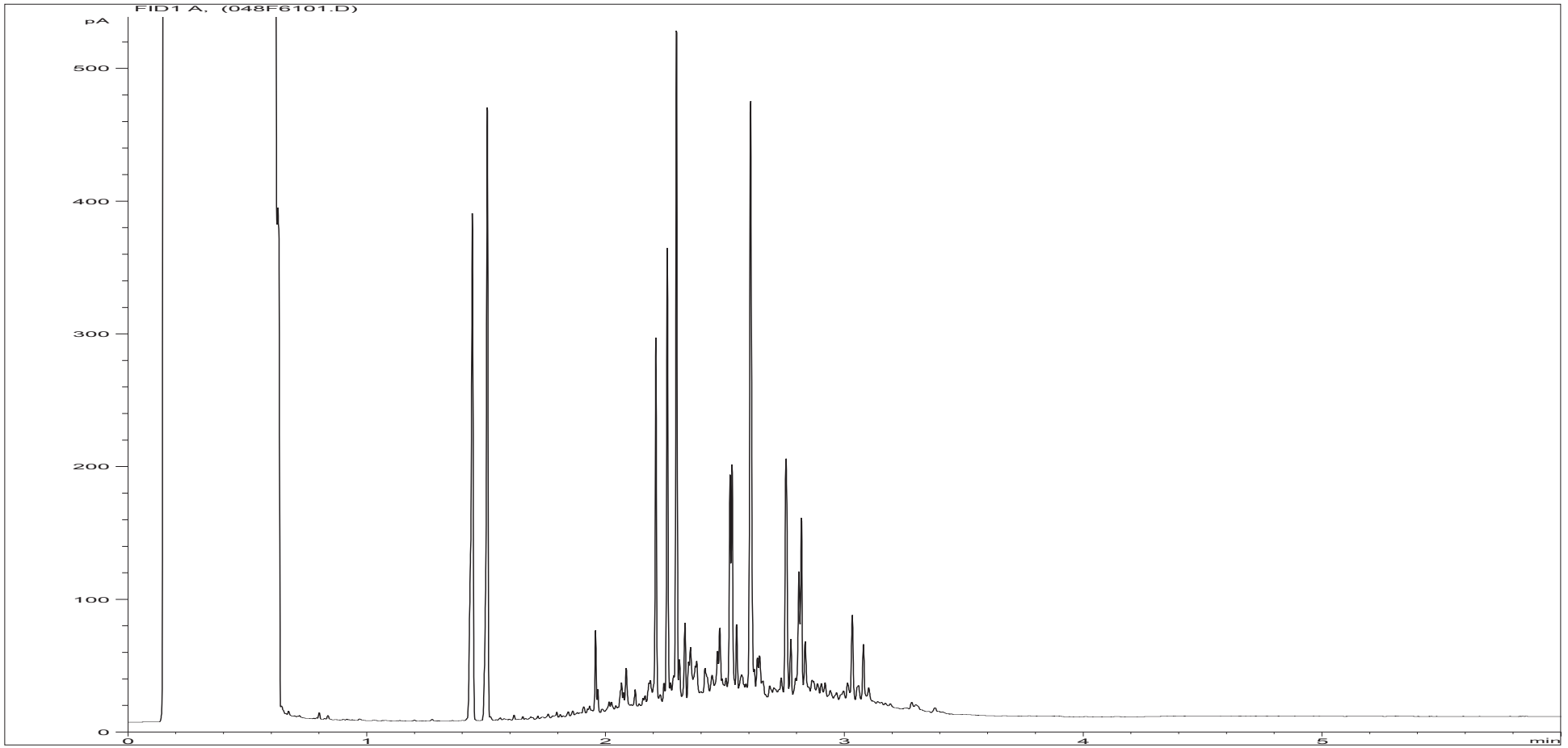
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613064ARO	**Job Number:**	S16_3043M
Multiplier:	11.84	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP13 0.5
Acquisition Date/Time:	21-Apr-16, 16:17:39		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\066B2101.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

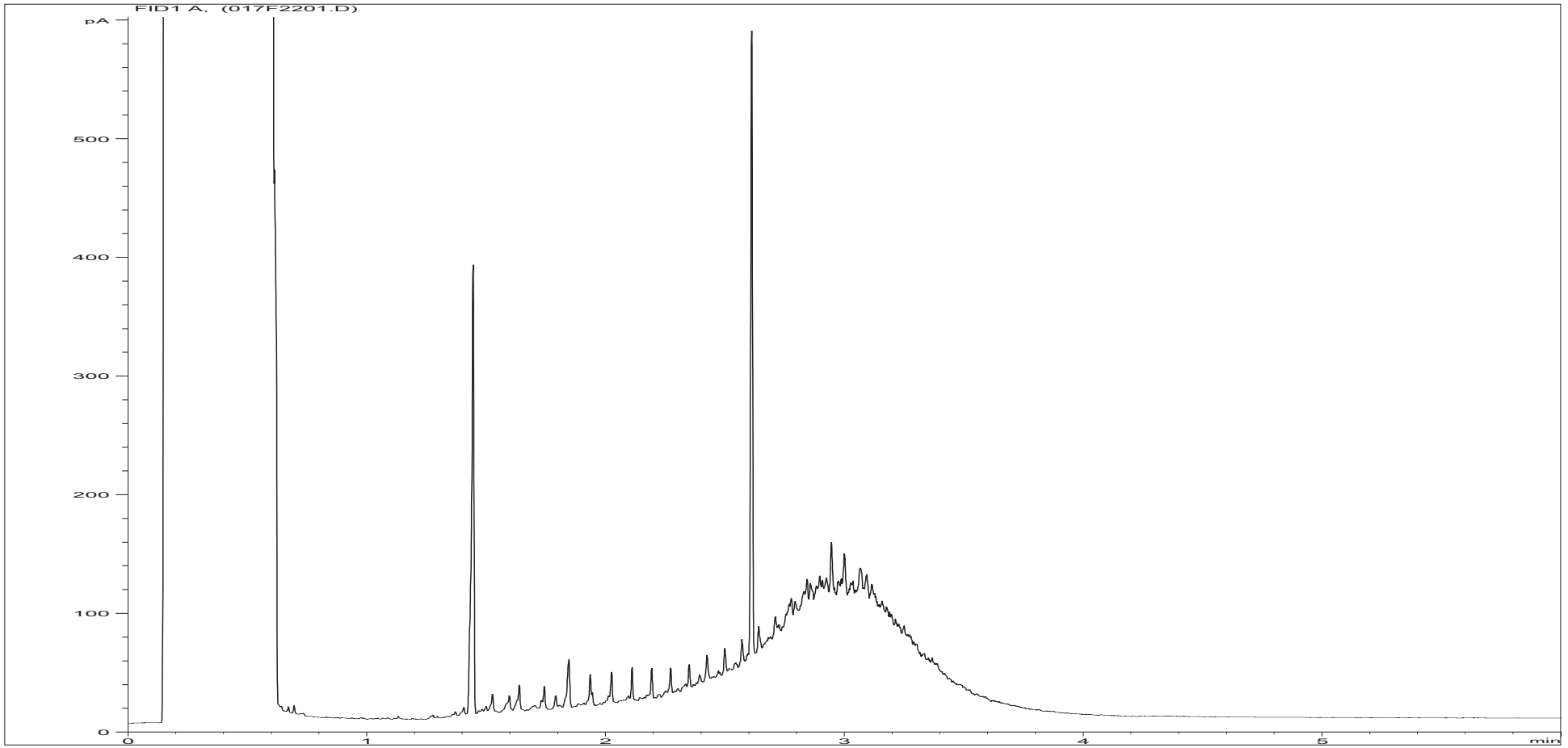
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613064SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP13 0.5
Acquisition Date/Time:	29-Apr-16, 04:59:06		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\048F6101.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

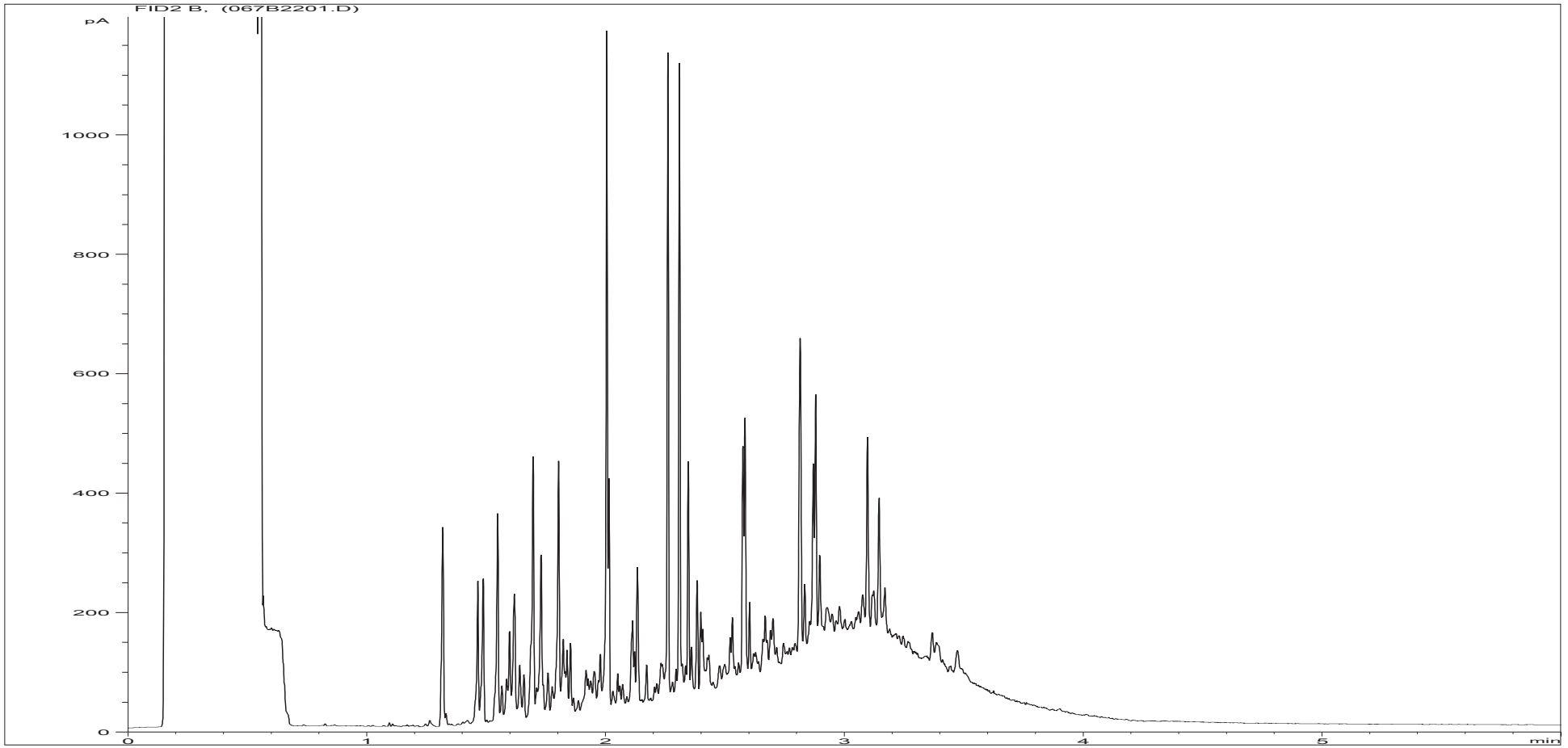
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613065ALI	**Job Number:**	S16_3043M
Multiplier:	16.08	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP14 0.5
Acquisition Date/Time:	21-Apr-16, 16:31:20		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\017F2201.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

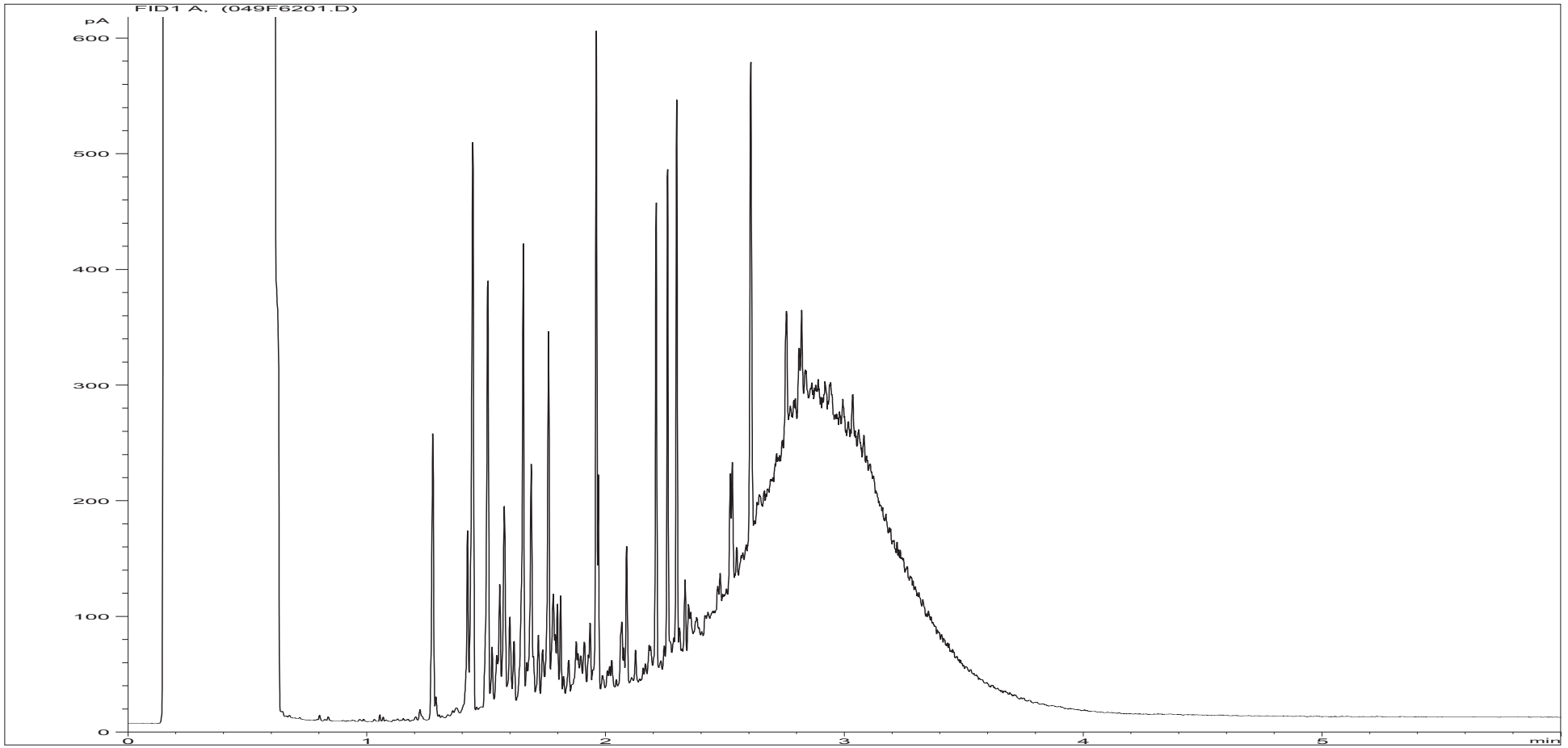
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613065ARO	**Job Number:**	S16_3043M
Multiplier:	12.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP14 0.5
Acquisition Date/Time:	21-Apr-16, 16:31:20		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\067B2201.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

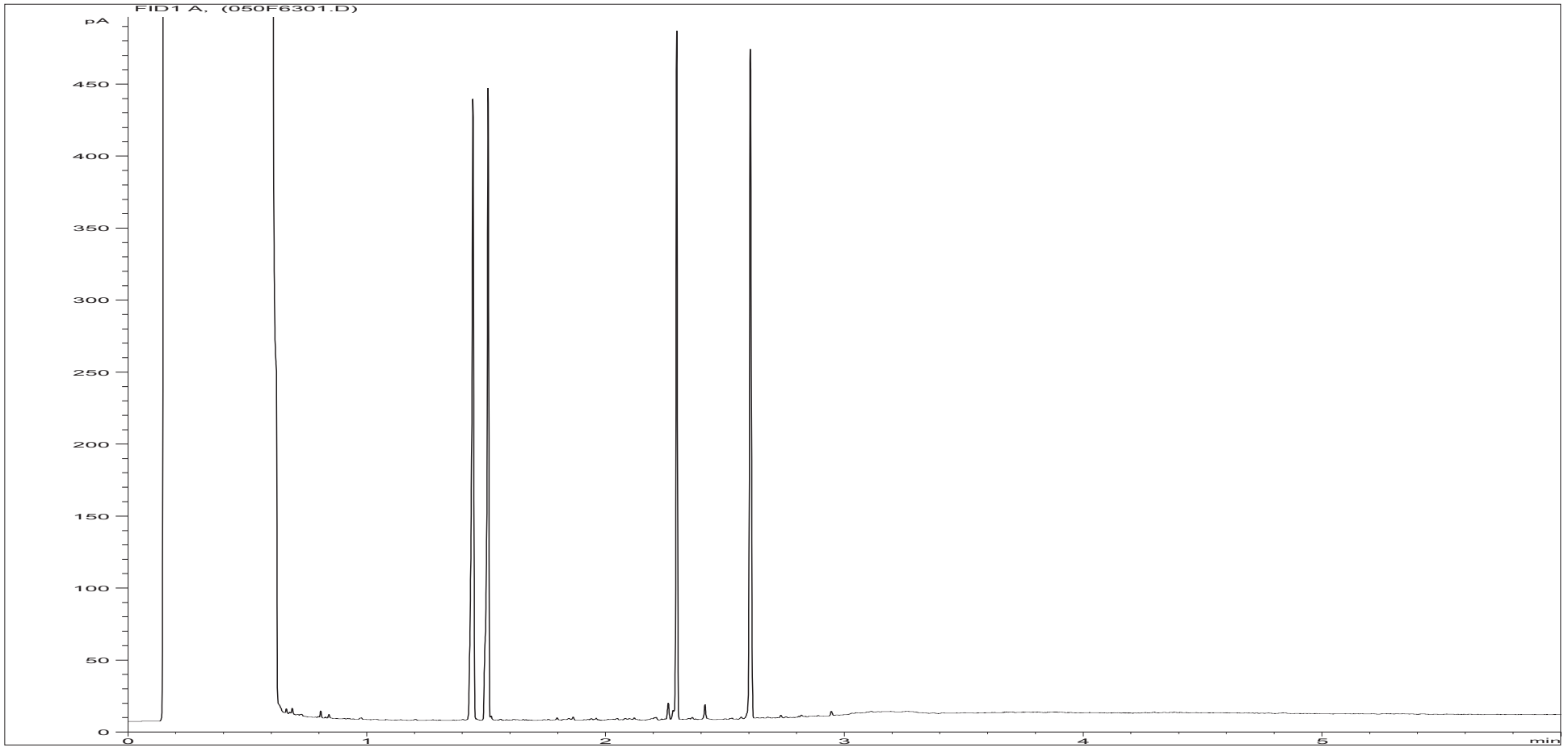
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613065SCU	**Job Number:**	S16_3043M
Multiplier:	16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP14 0.5
Acquisition Date/Time:	29-Apr-16, 05:12:25		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\049F6201.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

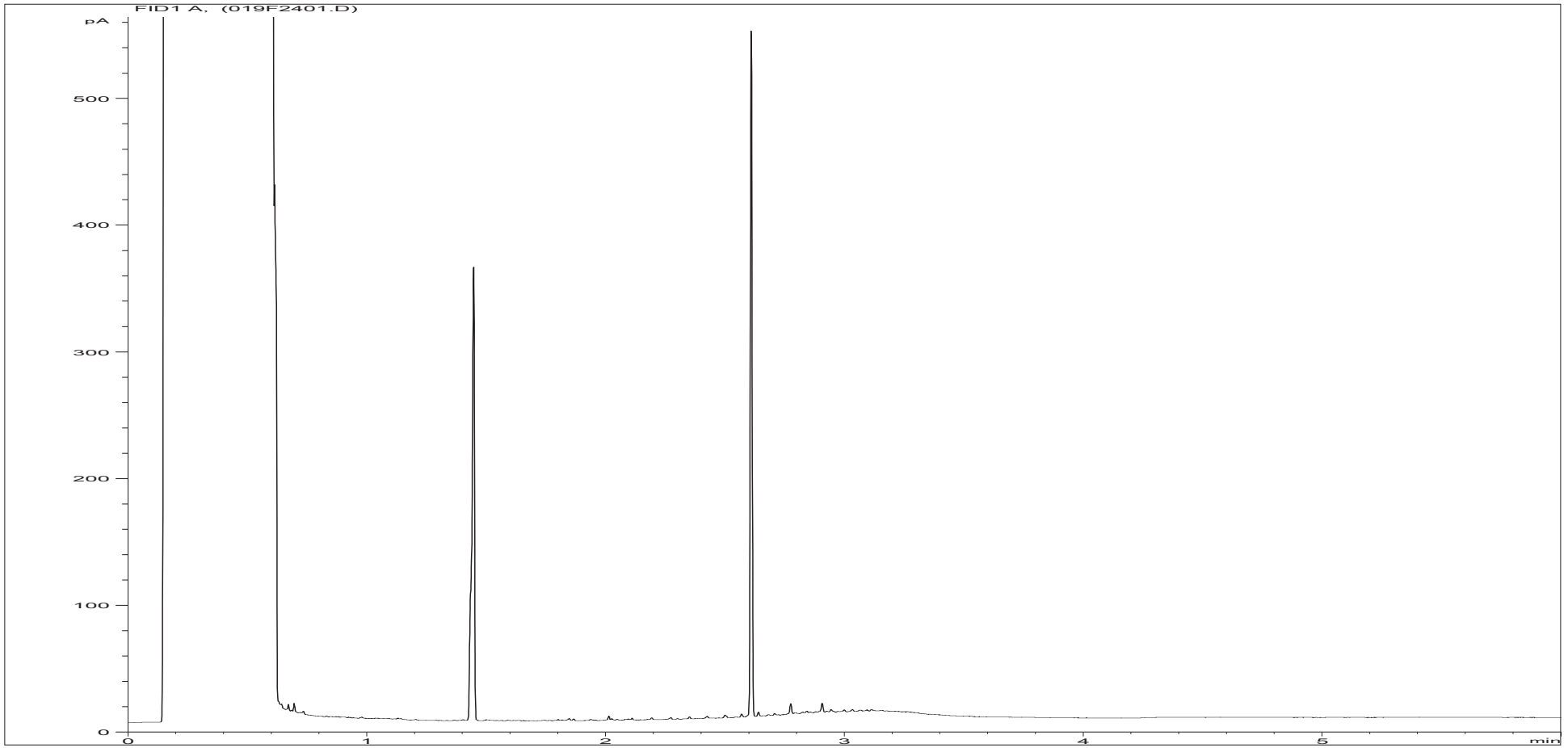
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613066SCU	**Job Number:**	S16_3043M
Multiplier:	15.68	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP15 1.0
Acquisition Date/Time:	29-Apr-16, 05:25:37		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\050F6301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

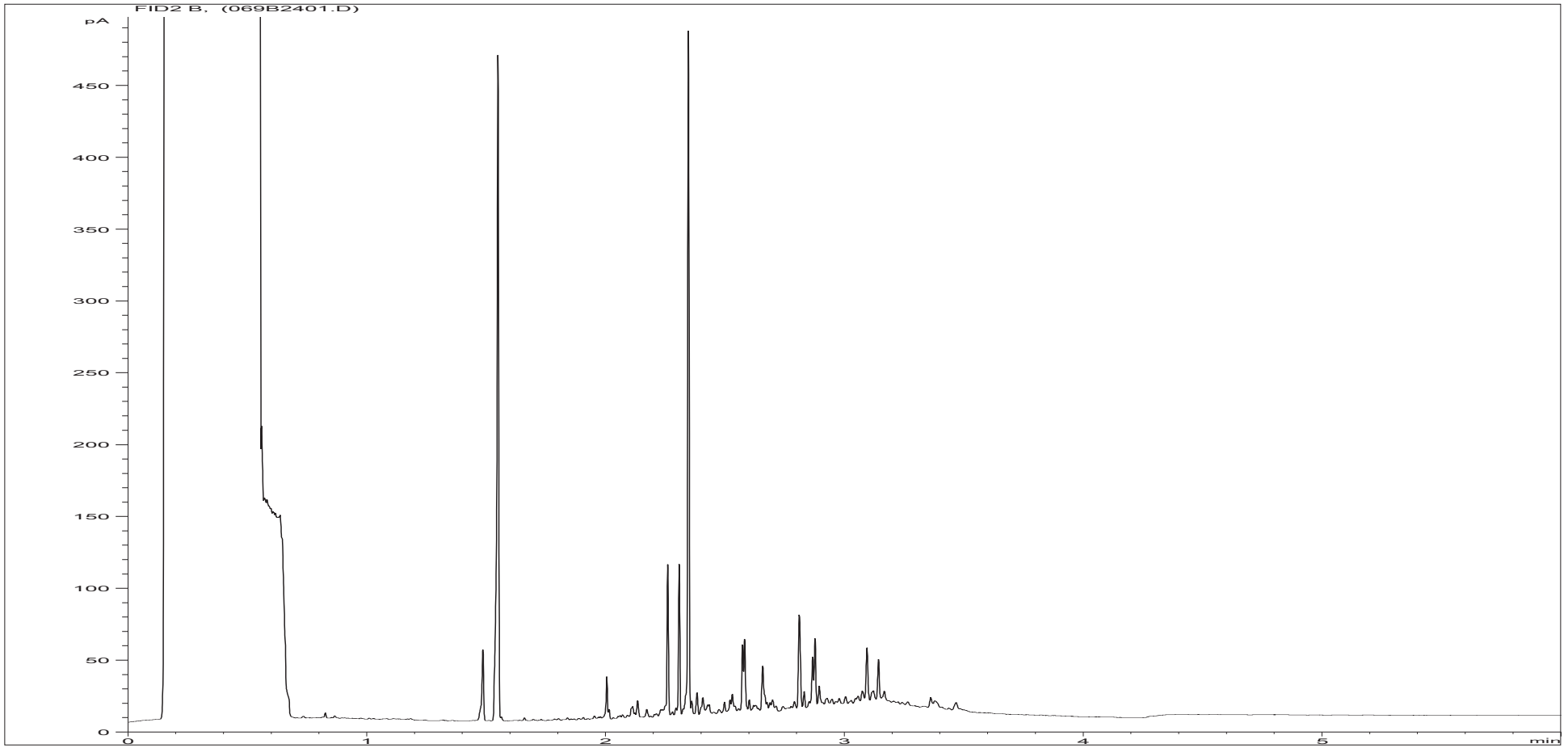
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613067ALI	**Job Number:**	S16_3043M
Multiplier:	16.32	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP16 0.1
Acquisition Date/Time:	21-Apr-16, 16:58:34		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\019F2401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

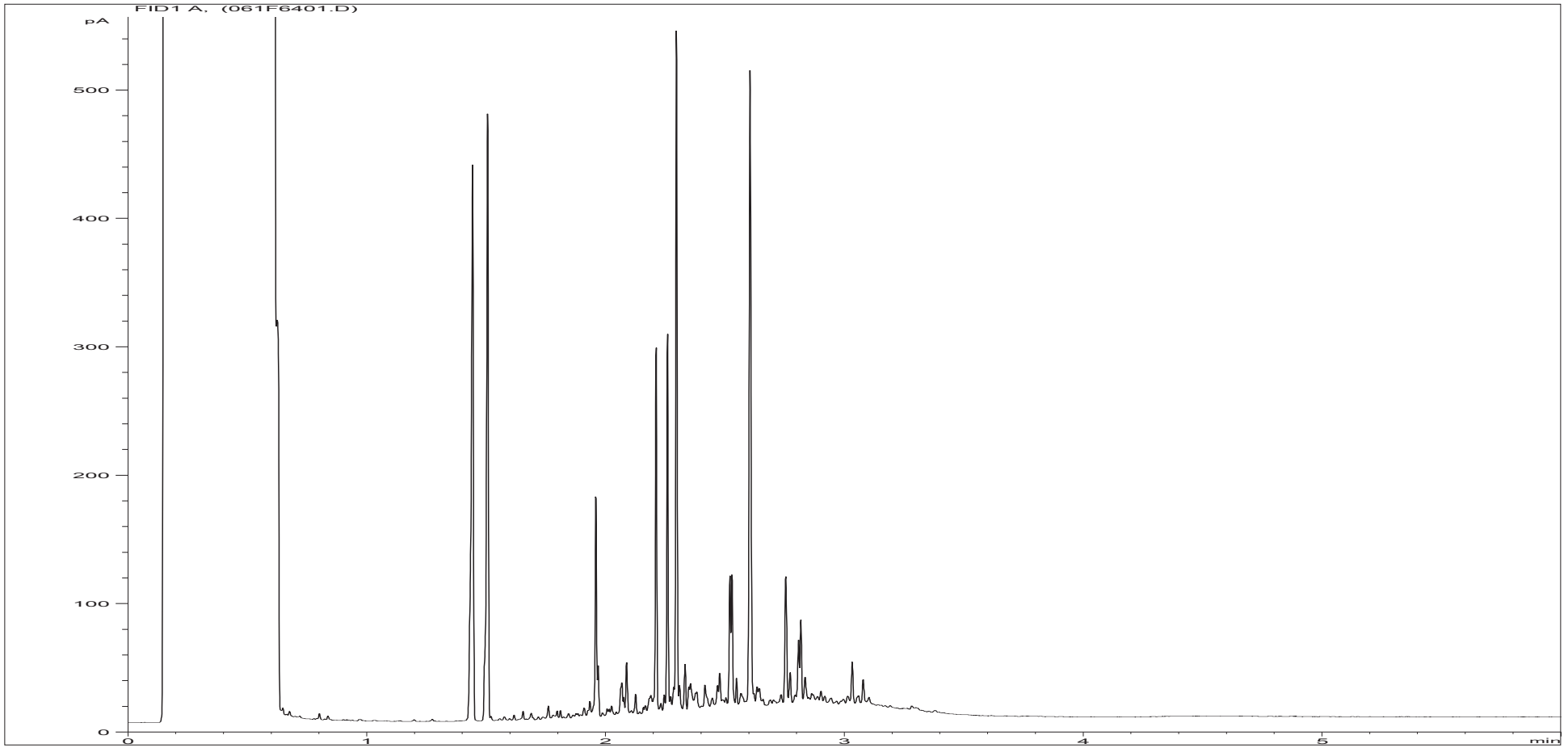
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613067ARO	**Job Number:**	S16_3043M
Multiplier:	12	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP16 0.1
Acquisition Date/Time:	21-Apr-16, 16:58:34		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\069B2401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

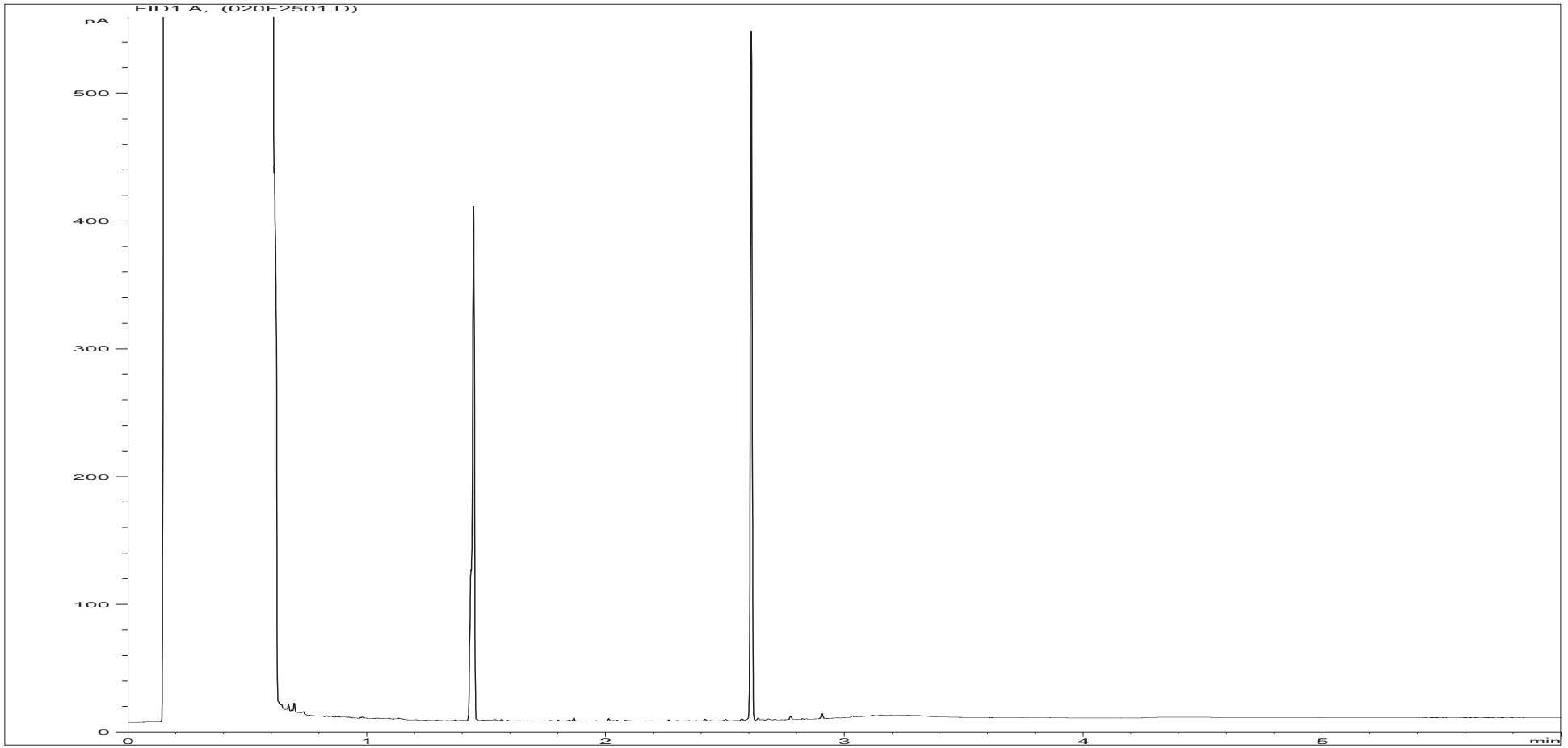
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613067SCU	**Job Number:**	S16_3043M
Multiplier:	15.36	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP16 0.1
Acquisition Date/Time:	29-Apr-16, 05:38:50		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\061F6401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

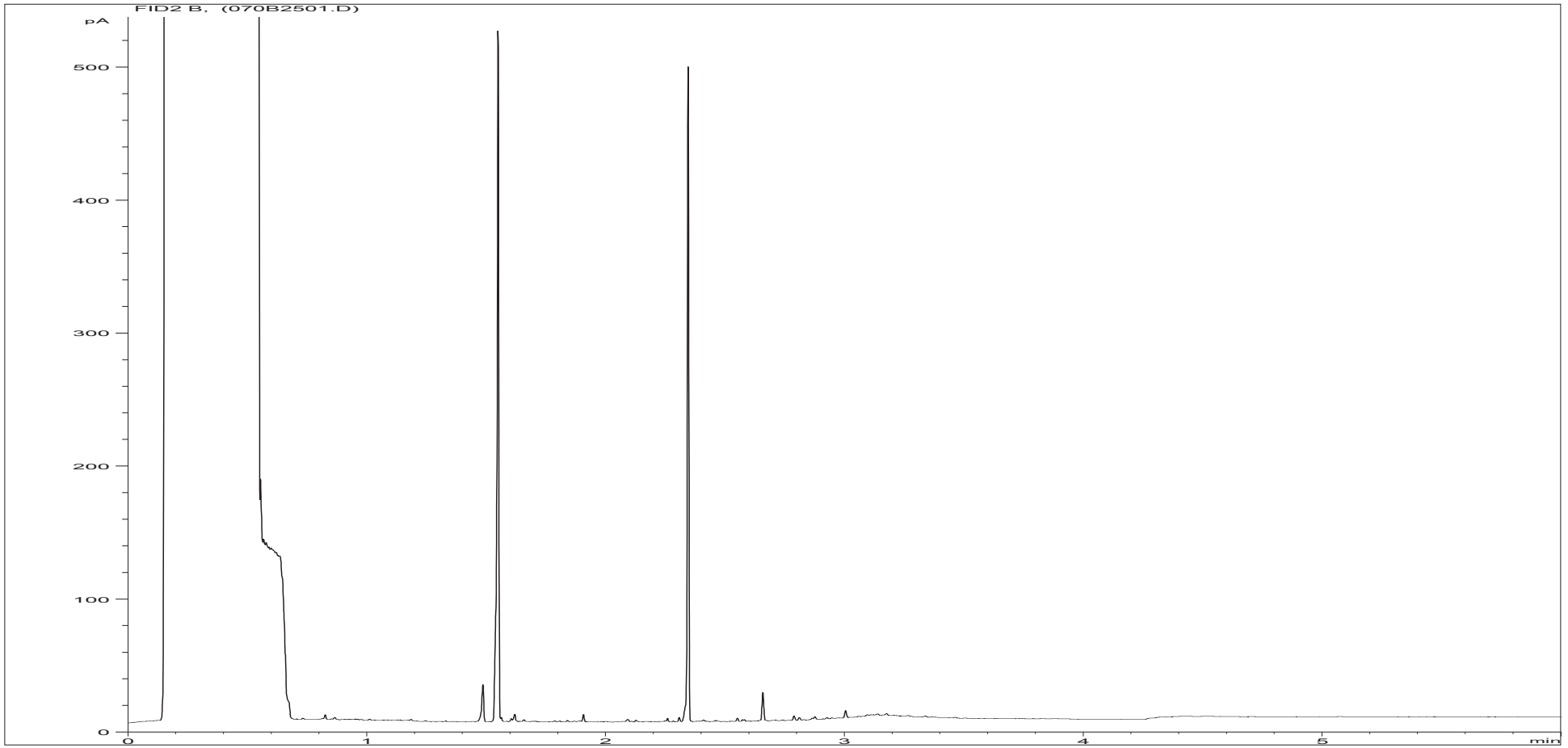
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613068ALI	**Job Number:**	S16_3043M
Multiplier:	16.08	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP17 0.1
Acquisition Date/Time:	21-Apr-16, 17:12:10		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\020F2501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

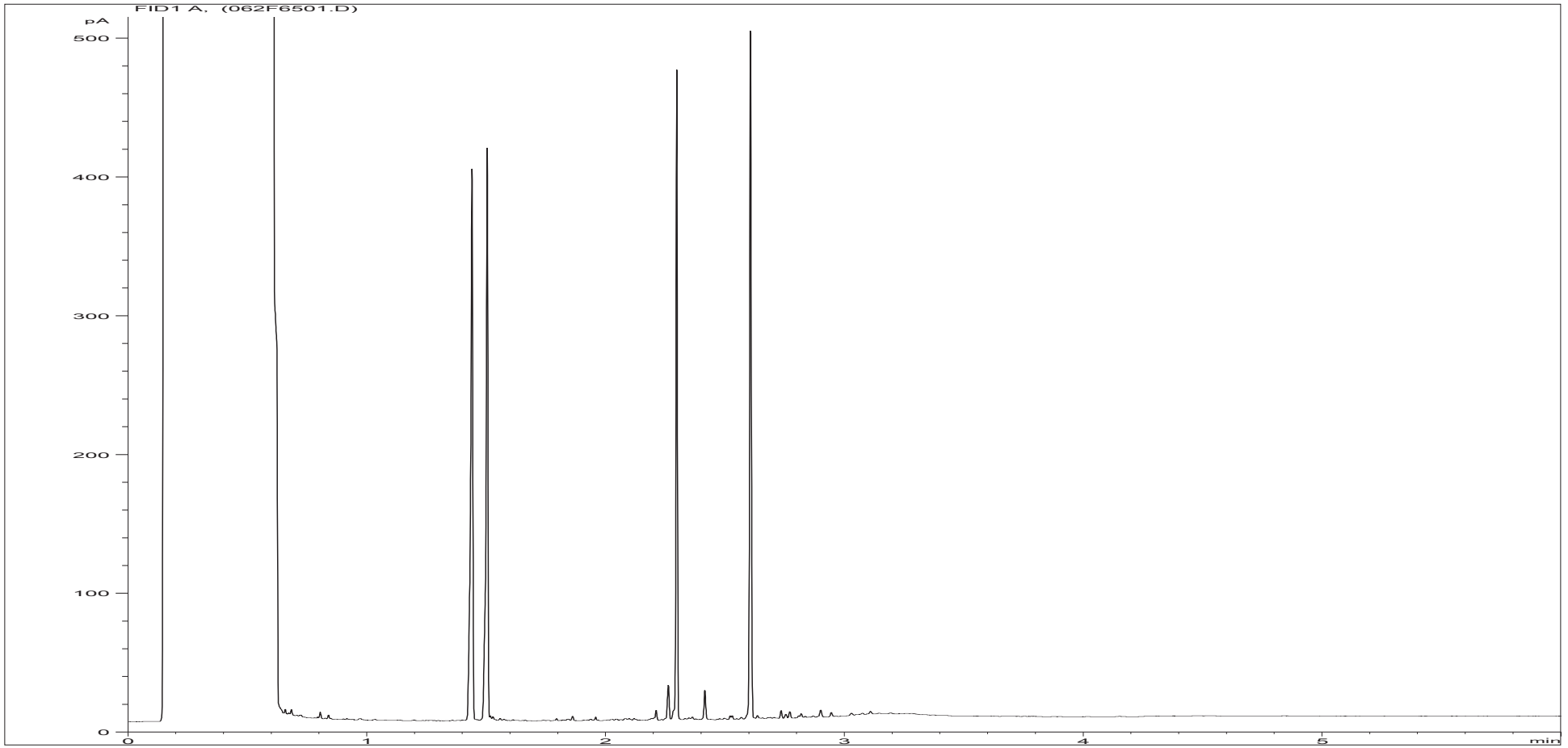
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613068ARO	**Job Number:**	S16_3043M
Multiplier:	12.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP17 0.1
Acquisition Date/Time:	21-Apr-16, 17:12:10		
Datafile:	D:\TES\DATA\Y2016\042116TPH_GC4\042116 2016-04-21 11-40-31\070B2501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613068SCU	**Job Number:**	S16_3043M
Multiplier:	14.72	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP17 0.1
Acquisition Date/Time:	29-Apr-16, 05:52:08		
Datafile:	D:\TES\DATA\Y2016\042816TPH_GC4\042816 2016-04-28 15-30-35\062F6501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Volatile Organic Compounds by HSA-GCMS

Accredited?: Yes

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood	**Directory/Quant file:**	420VOC.MS19\ Initial Calibration	**Matrix:**	Soil
Sample Details:	TP14 0.5	**Date Booked in:**	18-Apr-16	**Method:**	Headspace
LIMS ID Number:	CL1613065	**Date Analysed:**	20-Apr-16	**Multiplier:**	0.96
Job Number:	S16_3043M	**Operator:**	PR	**Position:**	23

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
Dichlorodifluoromethane	75-71-8 **	-	< 1	-	N
Chloromethane	74-87-3 *	-	< 3	-	N
Vinyl Chloride	75-01-4	-	< 1	-	UM
Bromomethane	74-83-9	-	< 1	-	UM
Chloroethane	75-00-3	-	< 2	-	UM
Trichlorofluoromethane	75-69-4	-	< 1	-	UM
1,1-Dichloroethene	75-35-48 *	-	< 1	-	N
trans 1,2-Dichloroethene	156-60-5	-	< 1	-	UM
1,1-Dichloroethane	75-34-3	-	< 1	-	UM
MTBE	1634-04-4	-	< 1	-	UM
2,2-Dichloropropane	594-20-7	-	< 1	-	UM
cis 1,2-Dichloroethene	156-59-2	-	< 6	-	UM
Bromochloromethane	74-97-5	-	< 1	-	UM
Chloroform	67-66-3	-	< 1	-	UM
1,1,1-Trichloroethane	71-55-6	-	< 1	-	UM
Carbon Tetrachloride	56-23-5	-	< 1	-	UM
1,1-Dichloropropene	563-58-6	-	< 1	-	UM
Benzene	71-43-2	4.23	3	M	UM
1,2-Dichloroethane	107-06-2	-	< 1	-	UM
Trichloroethene	79-01-6 **	-	< 1	-	N
1,2-Dichloropropane	78-87-5	-	< 1	-	UM
Dibromomethane	74-95-3	-	< 1	-	UM
Bromodichloromethane	75-27-4	-	< 1	-	UM
cis 1,3-Dichloropropene	10061-01-5	-	< 1	-	UM
Toluene	108-88-3	-	< 6	-	UM
trans 1,3-Dichloropropene	10061-02-6	-	< 1	-	UM
1,1,2-Trichloroethane	79-00-5	-	< 1	-	UM
Tetrachloroethene	127-18-4	-	< 3	-	UM
1,3-Dichloropropane	142-28-9	-	< 1	-	UM
Dibromochloromethane	124-48-1	-	< 1	-	UM
1,2-Dibromoethane	106-93-4	-	< 1	-	UM
Chlorobenzene	108-90-7	-	< 1	-	UM
Ethylbenzene	100-41-4	5.52	2	M	UM
1,1,1,2-Tetrachloroethane	630-20-6	-	< 1	-	UM
m and p-Xylene	108-38-3/106-42-3	-	< 4	-	UM

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
o-Xylene	95-47-6	5.70	3	M	UM
Styrene	100-42-5	-	< 1	-	UM
Bromoform	75-25-2	-	< 1	-	UM
iso-Propylbenzene	98-82-8	-	< 1	-	UM
1,1,2,2-Tetrachloroethane	79-34-5 **	-	< 1	-	N
Propylbenzene	103-65-1	-	< 1	-	UM
Bromobenzene	108-86-1	-	< 1	-	UM
1,2,3-Trichloropropane	96-18-4	-	< 1	-	UM
2-Chlorotoluene	95-49-8	-	< 1	-	UM
1,3,5-Trimethylbenzene	108-67-8	6.00	8	M	UM
4-Chlorotoluene	106-43-4	-	< 1	-	UM
tert-Butylbenzene	98-06-6	-	< 1	-	UM
1,2,4-Trimethylbenzene	95-63-6	6.13	18	M	UM
sec-Butylbenzene	135-98-8	-	< 1	-	UM
p-Isopropyltoluene	99-87-6	-	< 1	-	UM
1,3-Dichlorobenzene	541-73-1	-	< 1	-	UM
1,4-Dichlorobenzene	106-46-7	-	< 1	-	UM
n-Butylbenzene	104-51-8 *	-	< 1	-	N
1,2-Dichlorobenzene	95-50-1	-	< 1	-	UM
1,2-Dibromo-3-chloropropane	96-12-8	-	< 1	-	UM
1,2,4-Trichlorobenzene	120-82-1 *	-	< 3	-	N
Hexachlorobutadiene	87-68-3 **	-	< 2	-	N
Naphthalene	91-20-3 D	7.14	10300	97	UM
1,2,3-Trichlorobenzene	87-61-6	-	< 3	-	UM

Concentrations are reported on a dry weight basis
Compounds marked ** are not UKAS or Mcerts accredited
"M" denotes that % fit has been manually interpreted
This analysis was conducted on an 'As Received' basis.

Internal standards	R.T.	Area %
Pentafluorobenzene	4.04	99
1,4-Difluorobenzene	4.39	89
Chlorobenzene-d5	5.49	76
Bromofluorobenzene	5.89	70
1,4-Dichlorobenzene-d4	6.29	67
Naphthalene-d8	7.12	34

Surrogates	% Rec
Dibromofluoromethane	41
Toluene-d8	98

Note: Volatile compounds degrade with time, and this may affect the integrity of the data depending on the timescale between sampling and analysis. It is recommended that analysis takes place within 7 days of sampling.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	Waterman Infrastructure & Environment Ltd				**Leaching Data**	
					Weight of sample (kg)	0.296
Contact	Jon Coates				Moisture content @ 105°C (% of Wet Weight)	36.5
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	Biggins Wood				Volume of water required to carry out 2:1 stage (litres)	0.379
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
TP5 2.0		S16_3043M	CL/1613054	27-Apr-16	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	4.1	3	5	6
N	LOI450	Loss on Ignition (%)	11.6			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.11	6		
N	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.042	1		
U	TPHFIDUS	Mineral Oil (mg/kg)	1370	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	43.34	100		
U	PHSOIL	pH (pH units)	7.9		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	5.16		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except ºº		mg/kg (dry weight)				
U	WSLM3	pH (pH units) ºº	8.1	8.5	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) ºº	368	212					
U	ICPMSW	Arsenic	0.005	0.007	0.01	0.07	0.5	2	25
U	ICPWATVAR	Barium	0.29	0.17	0.58	1.9	20	100	300
U	ICPMSW	Cadmium	0.0002	0.0003	0.0004	0.003	0.04	1	5
U	ICPMSW	Chromium	0.001	0.002	0.002	0.02	0.5	10	70
U	ICPMSW	Copper	0.033	0.039	0.066	0.38	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.007	0.003	0.014	0.04	0.5	10	30
U	ICPMSW	Nickel	0.004	0.004	0.008	0.04	0.4	10	40
U	ICPMSW	Lead	0.056	0.106	0.112	0.99	0.5	10	50
U	ICPMSW	Antimony	0.006	0.004	0.012	0.04	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.136	0.234	0.272	2.21	4	50	200
U	KONENS	Chloride	6	9	12	86	800	15000	25000
U	ISEF	Fluoride	0.8	0.8	1.6	8	10	150	500
U	ICPWATVAR	Sulphate as SO4	8	7	16	71	1000	20000	50000
N	WSLM27	Total Dissolved Solids	287	166	574	1821	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	27	13	54	149	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

WASTE ACCEPTANCE CRITERIA TESTING
BSEN 12457/3

Client	Waterman Infrastructure & Environment Ltd				**Leaching Data**	
					Weight of sample (kg)	0.300
Contact	Jon Coates				Moisture content @ 105°C (% of Wet Weight)	27.1
					Equivalent Weight based on drying at 105°C (kg)	0.225
Site	Biggins Wood				Volume of water required to carry out 2:1 stage (litres)	0.375
					Fraction of sample above 4 mm %	0.000
Sample Description		**Report No**	**Sample No**	**Issue Date**	Fraction of non-crushable material %	0.000
TP10 Composite		S16_3043M	CL/1613059	27-Apr-16	Volume to undertake analysis (2:1 Stage) (litres)	0.300
					Weight of Deionised water to carry out 8:1 stage (kg)	1.650

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
N	WSLM59	Total Organic Carbon (% M/M)	6.99	3	5	6
N	LOI450	Loss on Ignition (%)	10.1			10
U	BTEXHSA	Sum of BTEX (mg/kg)	<0.07	6		
N	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.035	1		
U	TPHFIDUS	Mineral Oil (mg/kg)	<14	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<2.15	100		
U	PHSOIL	pH (pH units)	8.4		>6	
N	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7	3.27		To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	2:1 Leachate	8:1 Leachate	Calculated amount leached @ 2:1	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/3 @ L/S 10 litre kg-1 mg/kg (dry weight)		
			mg/l except °°		mg/kg (dry weight)				
U	WSLM3	pH (pH units) °°	8.1	8.5	Calculated data not UKAS Accredited				
U	WSLM2	Conductivity (µs/cm) °°	418	165					
U	ICPMSW	Arsenic	0.002	0.003	0.004	0.03	0.5	2	25
U	ICPWATVAR	Barium	0.06	0.2	0.12	1.8	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.0001	<0.0002	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	0.001	<0.002	<0.01	0.5	10	70
U	ICPMSW	Copper	0.01	0.011	0.02	0.11	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.0001	<0.0002	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.007	0.004	0.014	0.04	0.5	10	30
U	ICPMSW	Nickel	0.002	0.001	0.004	0.01	0.4	10	40
U	ICPMSW	Lead	0.009	0.002	0.018	0.03	0.5	10	50
U	ICPMSW	Antimony	0.003	0.003	0.006	0.03	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.001	<0.002	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.007	0.027	0.014	0.24	4	50	200
U	KONENS	Chloride	13	4	26	52	800	15000	25000
U	ISEF	Fluoride	1.3	1.3	2.6	13	10	150	500
U	ICPWATVAR	Sulphate as SO4	57	9	114	154	1000	20000	50000
N	WSLM27	Total Dissolved Solids	326	128	652	1544	4000	60000	100000
U	SFAPI	Phenol Index	<0.05	<0.05	<0.1	<0.5	1		
N	WSLM13	Dissolved Organic Carbon	10	7	20	74	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

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Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

IOM

WORKING FOR A HEALTHIER FUTURE

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: ESG Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: 48119-9

PROJECT NO: 610

DATE OF ISSUE: 27.04.16

DATE SAMPLES RECEIVED: 20.04.16

DATE SAMPLES ANALYSED: 27.04.16

SAMPLE DESCRIPTION: Seventeen soil/loose aggregate samples.

ANALYSIS REQUESTED: Qualitative analysis of samples for determination of presence/type of asbestos.

METHODS:

Our method involves initial examination of entire samples followed by detailed analysis of representative sub-samples. The sub samples are analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

RESULTS:

Initial Screening

Asbestos was detected in one of the seventeen soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

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IOM CONSULTING LIMITED, registered in Scotland No. SC205670

UKAS TESTING
0374

CONTRACT NO: 48119-9
PROJECT NO: 610
DATE OF ISSUE: 27.04.16

RESULTS: (cont.)

Table 1: Qualitative Results

ESG Job I.D: S163043

IOM Sample Number	Client Sample Number	ACM Type Detected	PLM Result
S38741	S1613050 TP1 0.1	-	No Asbestos Detected
S38742	S1613051 TP2 0.1	Free Fibres	Amosite
S38743	S1613052 TP3 0.5	-	No Asbestos Detected
S38744	S1613053 TP4 0.1	-	No Asbestos Detected
S38745	S1613054 TP5 2.0	-	No Asbestos Detected
S38746	S1613055 TP6 0.5	-	No Asbestos Detected
S38747	S1613056 TP7 0.1	-	No Asbestos Detected
S38748	S1613057 TP8 0.5	-	No Asbestos Detected
S38749	S1613058 TP9 1.5	-	No Asbestos Detected
S38750	S1613059 TP10 Composite	-	No Asbestos Detected
S38751	S1613060 TP18 Composite	-	No Asbestos Detected
S38752	S1613062 TP11 0.1	-	No Asbestos Detected
S38753	S1613063 TP12 0.1	-	No Asbestos Detected
S38754	S1613064 TP13 0.5	-	No Asbestos Detected
S38755	S1613065 TP14 0.5	-	No Asbestos Detected
S38756	S1613067 TP16 0.1	-	No Asbestos Detected
S38757	S1613068 TP17 0.1	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

Julie Simpson

AUTHORISED BY: .....

J Simpson
Senior Scientific Technician

IOM

WORKING FOR A HEALTHIER FUTURE

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: ESG Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: 48263-1

PROJECT NO: 610

DATE OF ISSUE: 10.05.16

DATE SAMPLES RECEIVED: 03.05.16

DATE SAMPLES ANALYSED: 10.05.16

SAMPLE DESCRIPTION: One soil/loose aggregate sample weighing approximately 1.3kg

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

www.iom-world.org
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Tel: 0131 449 8000 Fax: 0131 449 8084 Email: iom@iom-world.org
IOM CONSULTING LIMITED, registered in Scotland No. SC206570

UKAS TESTING
0374

CONTRACT NO: 48263-1
PROJECT NO: 610
DATE OF ISSUE: 10.05.16

RESULTS: (cont.)

Table 1: Qualitative Results

ESG Job I.D: S163043

IOM sample number	Client sample number	ACM type detected	PLM result
S38960	S1613051 TP2 0.1	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are outwith the scope of our UKAS accreditation.

AUTHORISED BY: .....
J Simpson
Senior Scientific Technician

Analysis Report

Report Number: 16/APR/COA/1602238
Supplier: Contaminated Land
PO Box 100
Ashby Road
Burton on Trent
Grade:
Our Ref Waterman EED

Date Sampled: 20 April 2016
Date Received: 20 April 2016
Test Date: 20 April 2016 To 26 April 2016
Date Reported: 26 April 2016
Sampling:

			Test	CV Air Dried
			Method	CA11
Sample ID	Sample Date	Ref	Units	kJ/kg
684634	20/04/2016	CL/1613054 FF980		1600
684635	20/04/2016	CL/1613065 FF982		900

Report Authorised By

Hayley James
Reporting Administrator

For and on behalf of ESG

Procedures used: As method reference

* Denotes calculated values using UKAS accredited results
** Non accredited method for this matrix
*** Sub Contracted test UKAS accredited laboratory
**** Sub Contracted test none UKAS accredited laboratory
# Customer Supplied Result

Notes: I/S Insufficient sample to test
U/S unsuitable sample to test

UKAS TESTING
0001

Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163043M

Consignment No S55182
Date Logged 18-Apr-2016
Report Due 11-May-2016

ID Number	Description	MethodID	AMMAR	ANC	BTEXHSA		CEN Leachate		CustServ	Dep.Opt		ELESULP	FOCS	GROHSA		ICPACIDS	ICPBOR	ICPMSS									
		Sampled	Exchange.Ammonium AR	Acid Neut. Capacity	BTEX-HSA + MTBE analysis	MTBE (µg/kg)	CEN Leac(P)1	CEN Leac(P)2	REPORT A	DO ID and QUANT if ASB Found	DO Waste Guidance interp if TPH>1000	Elemental Sulphur	S.O.M. % (Calc)	GRO (AA) by HSA GC-FID	GRO (C6-C8)	SO4-- (acid sol)	Boron (H20 Soluble)	Arsenic (MS)	Cadmium (MS)	Chromium (MS)	Copper (MS)	Lead (MS)	Mercury (MS)	Nickel (MS)	Selenium (MS)	Vanadium (MS)	Zinc (MS)
			✓		✓							✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
CL/1613050	TP1 0.1	12/04/16																									
CL/1613051	TP2 0.1	12/04/16	E																								
CL/1613052	TP3 0.5	12/04/16																									
CL/1613053	TP4 0.1	12/04/16																									
CL/1613054	TP5 2.0	12/04/16	E																								
CL/1613055	TP6 0.5	13/04/16																									
CL/1613056	TP7 0.1	12/04/16																									
CL/1613057	TP8 0.5	13/04/16																									
CL/1613058	TP9 1.5	13/04/16																									
CL/1613059	TP10 Composite	11/04/16	E																								
CL/1613060	TP18 Composite	11/04/16																									
CL/1613061	TP18 Biggins 1	11/04/16																									
CL/1613062	TP11 0.1	11/04/16																									
CL/1613063	TP12 0.1	12/04/16																									
CL/1613064	TP13 0.5	13/04/16																									

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

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

Deviating Sample Key

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

Requested Analysis Key

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

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

Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163043M

Consignment No S55182
Date Logged 18-Apr-2016
Report Due 11-May-2016

ID Number	Description	Sampled	MethodID	ICPWSS	KONECL	KONECR	KoneNO3	LOI(%MM)	MCertS	PAHMSUS	PCBUSECOAR	PHSOIL	SFAS	Sub020		Sub022	SVOCMSUS	TMSS	TPHFID-SCU	TPHFIDUS		TPHUSSI	VOCHSAS	WSLM59
				SO4-- (H2O sol) mg/l	Chloride:(2:1)	Chromium vi:	Nitrate 2:1 mg/kg	L.O.I. % @ 450C	MCertS Analysis	PAH (17) by GCMS	PCB-7 Congeners Analysis	pH units (AR)	Sulphide as S (AR)	^Asbestos (screen).	^Asbestos ID & Quan	^Gross CV	SVOC by GCMS (AR)	Tot.Moisture @ 105C	TPH by GCFID (AR) SCU	TPH Band (>C10-C40)	TPH Interpretation.(Waste Guidance)	TPH by GCFID (AR/Si)	VOC HSA-GCMS	Total Organic Carbon
				✓						✓		✓		✓	✓		✓	✓		✓		✓	✓	
CL/1613050	TP1 0.1	12/04/16																E						
CL/1613051	TP2 0.1	12/04/16																E						
CL/1613052	TP3 0.5	12/04/16																E						
CL/1613053	TP4 0.1	12/04/16																E						
CL/1613054	TP5 2.0	12/04/16																E						
CL/1613055	TP6 0.5	13/04/16																E						
CL/1613056	TP7 0.1	12/04/16																E						
CL/1613057	TP8 0.5	13/04/16																E						
CL/1613058	TP9 1.5	13/04/16																E						
CL/1613059	TP10 Composite	11/04/16																E						
CL/1613060	TP18 Composite	11/04/16																E						
CL/1613061	TP18 Biggins 1	11/04/16																E						
CL/1613062	TP11 0.1	11/04/16																E						
CL/1613063	TP12 0.1	12/04/16																E						
CL/1613064	TP13 0.5	13/04/16																E						

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

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

Deviating Sample Key

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

Requested Analysis Key

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

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

Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163043M

Consignment No S55182
Date Logged 18-Apr-2016
Report Due 11-May-2016

ID Number	Description	MethodID	AMMAR	ANC	BTEXHSA		CEN Leachate		CustServ	Dep.Opt		ELESULP	FOCS	GROHSA		ICPACIDS	ICPBOR	ICPMSS									
		Sampled	Exchange.Ammonium AR	Acid Neut. Capacity	BTEX-HSA + MTBE analysis	MTBE (µg/kg)	CEN Leac(P)1	CEN Leac(P)2	REPORT A	DO ID and QUANT if ASB Found	DO Waste Guidance interp if TPH>1000	Elemental Sulphur	S.O.M. % (Calc)	GRO (AA) by HSA GC-FID	GRO (C6-C8)	SO4-- (acid sol)	Boron (H20 Soluble)	Arsenic (MS)	Cadmium (MS)	Chromium (MS)	Copper (MS)	Lead (MS)	Mercury (MS)	Nickel (MS)	Selenium (MS)	Vanadium (MS)	Zinc (MS)
			✓		✓							✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
CL/1613065	TP14 0.5	13/04/16																									
CL/1613066	TP15 1.0	11/04/16																									
CL/1613067	TP16 0.1	11/04/16																									
CL/1613068	TP17 0.1	12/04/16																									

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

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

Deviating Sample Key

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

Requested Analysis Key

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

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Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163043M

Consignment No S55182
Date Logged 18-Apr-2016
Report Due 11-May-2016

ID Number	Description	MethodID	ICPWSS	KONECL	KONECR	KoneNO3	LOI(%MM)	MCertS	PAHMSUS	PCBUSECDAR	PHSOIL	SFAS	Sub020		Sub022	SVOCMSUS	TMSS	TPHFID-SCU	TPHFIDUS		TPHUSSI	VOCHSAS	WSLM59
		Sampled	SO4-- (H2O sol) mg/l	Chloride:(2:1)	Chromium vi:	Nitrate 2:1 mg/kg	L.O.I. % @ 450C	MCertS Analysis	PAH (17) by GCMS	PCB-7 Congeners Analysis	pH units (AR)	Sulphide as S (AR)	^Asbestos (screen).	^Asbestos ID & Quan	^Gross CV	SVOC by GCMS (AR)	Tot.Moisture @ 105C	TPH by GCFID (AR) SCU	TPH Band (>C10-C40)	TPH Interpretation.(Waste Guidance)	TPH by GCFID (AR/Si)	VOC HSA-GCMS	Total Organic Carbon
			✓						✓		✓		✓	✓		✓	✓		✓		✓	✓	
CL/1613065	TP14 0.5	13/04/16															E						
CL/1613066	TP15 1.0	11/04/16															E						
CL/1613067	TP16 0.1	11/04/16															E						
CL/1613068	TP17 0.1	12/04/16															E						

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

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

Deviating Sample Key

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

Requested Analysis Key

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

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

Report Number : EFS/163043

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
PAHMSUS	CL1613050-CL1613068	The Secondary process control result associated with this Test has not wholly met the requirements of the Laboratory Quality Management System (QMS). All other Process controls (including the Primary Process control) are within specification. The Laboratory believes that the validity of the data has not been affected but in line with our QMS policy we have removed accreditation from the affected analyte, Phenanthrene. These circumstances should be taken into consideration when utilising the data.
PAHMSUS	CL1613061	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted to improve the signal to noise ratio but in doing so, the detection limit for this test has been elevated.
SVOCMSUS	CL1613065	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted to improve the signal to noise ratio but in doing so, the detection limit for this test has been elevated.
SVOCMSUS	CL1613065	The Secondary process control result associated with this Test has not wholly met the requirements of the Laboratory Quality Management System (QMS). All other Process controls (including the Primary Process control) are within specification. The Laboratory believes that the validity of the data has not been affected but in line with our QMS policy we have removed accreditation from Anthracene. These circumstances should be taken into consideration when utilising the data.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	AMMAR	As Received	Determination of Exchangeable Ammonium in Soil using potassium chloride extraction, discrete colorimetric detection
Soil	ANC	Oven Dried @ < 35°C	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Soil	BTEXHSA	As Received	Determination of Benzene, Toluene, Ethyl benzene and Xylenes (BTEX) by Headspace GCFID
Soil	ELESULP	Oven Dried @ < 35°C	Determination of Elemental Sulphur using Solvent Extraction followed by HPLC detection.
Soil	FOCS	Oven Dried @ < 35°C	Calculation of Soil Organic Matter content from Organic Carbon content of soil samples
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPBOR	Oven Dried @ < 35°C	Determination of Boron in soil samples by hot water extraction followed by ICPOES detection
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in soil samples by aqua regia digestion followed by ICPMS
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	KONECL	Oven Dried @ < 35°C	Determination of Chloride in Soil using water extraction at the stated water:soil ratio, discrete colorimetric detection
Soil	KONECR	Oven Dried @ < 35°C	Determination of Chromium vi in soil samples by water extraction followed by colorimetric detection
Soil	KoneNO3	Oven Dried @ < 35°C	Determination of Nitrate in soil samples by water extraction followed by colorimetric detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBUSECDAR	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners/aroclors by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	SFAS	As Received	Segmented flow analysis with colorimetric detection
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	SVOCMSUS	As Received	Determination of Semi Volatile Organic Compounds in soil samples by Dichloromethane/Acetone extraction followed by GCMS detection

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	TMSS	As Received	Determination of the Total Moisture content at 105ºC by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	TPHFID-SCU	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including cleanup of extract using activated silica
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	TPHUSSI	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including quantitation of Aromatic and Aliphatic fractions.
Soil	VOCHSAS	As Received	Determination of Volatile Organic Compounds (VOC) by Headspace GCMS
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ISEF	As Received	Determination of Fluoride in water samples by Ion Selective Electrode (ISE)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM2	As Received	Determination of the Electrical Conductivity (µS/cm) by electrical conductivity probe.
Water	WSLM27	As Received	Gravimetric Determination
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

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

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

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

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

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

Symbol Reference

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

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

Sample Descriptions

Client : Waterman Infrastructure & Environment Ltd

Site : Biggins Wood

Report Number : S16_3043

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1613050	TP1 0.1	Brown Stone CLAY
CL/1613051	TP2 0.1	Grey Stone CLAY
CL/1613052	TP3 0.5	Brown Stone SILT
CL/1613053	TP4 0.1	Brown Stone SILT
CL/1613054	TP5 2.0	Brown MADE GROUND
CL/1613055	TP6 0.5	Brown MADE GROUND
CL/1613056	TP7 0.1	Brown CLAY Root Fibres
CL/1613057	TP8 0.5	Brown MADE GROUND
CL/1613058	TP9 1.5	Brown MADE GROUND
CL/1613059	TP10 Composite	Brown MADE GROUND
CL/1613060	TP18 Composite	Brown Stone SILT
CL/1613061	TP18 Biggins 1 (NVM)	Grey TARMAC
CL/1613062	TP11 0.1	Brown MADE GROUND
CL/1613063	TP12 0.1	Brown CLAY
CL/1613064	TP13 0.5	Brown MADE GROUND
CL/1613065	TP14 0.5	Grey MADE GROUND
CL/1613066	TP15 1.0	Grey CLAY
CL/1613067	TP16 0.1	Brown Stone SILT Root Fibres
CL/1613068	TP17 0.1	Brown Stone CLAY

Our Ref: EFS/163217M (Ver. 1)
Your Ref:

April 29, 2016

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

Telephone: 01283 554400
Facsimile: 01283 554422

Jon Coates
Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

For the attention of Jon Coates

Dear Jon Coates

Sample Analysis - Biggins Wood

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

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

Where appropriate the samples will be kept until 02/06/16 when they will be discarded. Please call 01283 554463 for an extension of this date.
Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

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

Yours sincerely

for ESG

S Stone
Project Co-ordinator
01283 554463

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Environmental Scientifics Group Limited.
Registered No: 2880501

TEST REPORT

1252

Report No. EFS/163217M (Ver. 1)

Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

Site: Biggins Wood

The 2 samples described in this report were registered for analysis by ESG on 21-Apr-2016. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 29-Apr-2016

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 ESG.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 3)
Table of PAH (MS-SIM) (80) Results (Pages 4 to 5)
Table of GRO Results (Page 6)
Table of TPH (Si) banding (std) (Page 7)
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GC-FID Chromatograms (Pages 9 to 12)
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Analytical and Deviating Sample Overview (Pages 14 to 15)
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On behalf of ESG :
Declan Burns

Managing Director
Multi-Sector Services

Date of Issue: 29-Apr-2016

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

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
Method Codes :			GROHSA	GROHSA	ICPBOR	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	Sub002a	TMSS	TPHUSSI	ICPMSS
Method Reporting Limits :			0.2	0.2	0.5	0.3	0.2	1.2	1.6	0.7	0.5	2	0.5	16		0.2	20	0.6
Accreditation Code:				UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	U	U		N
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**GRO (AA) by HSA GC-FID**	**GRO (C6-C8)**	**Boron (H20 Soluble)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**^Asbestos Screen**	**Tot.Moisture @ 105C**	**TPH by GCFID (AR/Si)**	**Vanadium (MS)**
1613757	BH105 0.10	**19-Apr-16**	Req	<0.3	2.3	14.8	17.74	52.2	63.9	244.6	<0.52	42.6	0.7	1720	NAIIS	27.7	Req	66.5
1613758	BH105 1.00	**19-Apr-16**		<0.3	2.8	12.9	2.28	30.7	24	50.0	<0.5	47.6	0.5	252		22.1		49.7

ESG

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Client Name Waterman Infrastructure & Environment Ltd

Contact Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**29-Apr-2016**
Report Number	**EFS/163217M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

		Units :	mg/kg	mg/kg	mg/kg	mg/kg												
		Method Codes :	KONECR	TPHFID-SCU	TPHFID-SCU	PAHMSUS												
		Method Reporting Limits :	0.1	10	10													
		Accreditation Code:	N	N														
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Chromium vi:**	**TPH by GCFID (AR) SCU**	**TPH Carbon Banding SCU**	**PAH (17) by GCMS**												
1613757	BH105 0.10	**19-Apr-16**	0.2	29	Req	Req												
1613758	BH105 1.00	**19-Apr-16**	<0.1	21	Req	Req												

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Client Name	**Waterman Infrastructure & Environment Ltd**
Contact	Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**29-Apr-2016**
Report Number	**EFS/163217M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	BH105 0.10	**Job Number:**	S16_3217M
LIMS ID Number:	CL1613757	**Date Booked in:**	21-Apr-16
QC Batch Number:	160490	**Date Extracted:**	25-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	26-Apr-16
Directory:	2616PAHMS20\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8	5.45	0.21	97	UM
Anthracene	120-12-7	-	< 0.11	-	U
Fluoranthene	206-44-0	6.75	0.60	90	UM
Pyrene	129-00-0	7.03	0.48	99	UM
Benzo[a]anthracene	56-55-3	8.69	0.29	92	UM
Chrysene	218-01-9	8.74	0.33	93	UM
Benzo[b]fluoranthene	205-99-2	10.20	0.39	86	UM
Benzo[k]fluoranthene	207-08-9	10.24	0.15	87	UM
Benzo[a]pyrene	50-32-8	10.62	0.30	98	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.00	0.21	75	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	12.28	0.19	88	UM
Coronene	191-07-1 *	-	< 0.11	-	N
Total (USEPA16) PAHs	-	-	< 3.78	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	78
Acenaphthene-d10	78
Phenanthrene-d10	75
Chrysene-d12	66
Perylene-d12	61

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	108
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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:	Waterman Infrastructure & Environment Ltd: Biggins Wood		
Sample Details:	BH105 1.00	**Job Number:**	S16_3217M
LIMS ID Number:	CL1613758	**Date Booked in:**	21-Apr-16
QC Batch Number:	160490	**Date Extracted:**	25-Apr-16
Quantitation File:	Initial Calibration	**Date Analysed:**	26-Apr-16
Directory:	2616PAHMS20\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.10	-	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	-	< 0.10	-	UM
Phenanthrene	85-01-8	-	< 0.10	-	UM
Anthracene	120-12-7	-	< 0.10	-	U
Fluoranthene	206-44-0	-	< 0.10	-	UM
Pyrene	129-00-0	-	< 0.10	-	UM
Benzo[a]anthracene	56-55-3	-	< 0.10	-	UM
Chrysene	218-01-9	-	< 0.10	-	UM
Benzo[b]fluoranthene	205-99-2	-	< 0.10	-	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.10	-	UM
Benzo[a]pyrene	50-32-8	-	< 0.10	-	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.10	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.10	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.10	-	UM
Coronene	191-07-1 *	-	< 0.10	-	N
Total (USEPA16) PAHs	-	-	< 1.64	-	N

* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	81
Acenaphthene-d10	80
Phenanthrene-d10	78
Chrysene-d12	69
Perylene-d12	62

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	107
Terphenyl-d14	82

Concentrations are reported on a dry weight basis.

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.

Gasoline Range Organics
(BTEX and Aliphatic Carbon Ranges)

Customer and Site Details: Waterman Infrastructure & Environment Ltd : Biggins Wood
Job Number: S16_3217
Directory: E:\TES\DATA\2016\0425HSAA_GC9\042516A 2016-04-25 13-37-58\031F2601.D
Method: Headspace GCFID
Accreditation Code: UM

Matrix: Soil
Date Booked in: 21-Apr-16
Date extracted: 25-Apr-16
Date Analysed: 25-Apr-16, 21:0

*** Sample data with an asterisk are not UKAS accredited.**

		Concentration, (mg/kg) - as dry weight.					Aliphatics				
Sample ID	**Client ID**	**Benzene**	**Toluene**	**Ethyl benzene**	**m/p-Xylene**	**o-Xylene**	**C5 - C6**	**>C6 - C7**	**>C7 - C8**	**>C8 - C10**	**Total GRO**
CL1613757	BH105 0.10	<0.014	<0.014	<0.014	<0.014	<0.014	<0.3	<0.3	<0.3	<0.3	<0.3

Note: Benzene elutes between C6 and C7, toluene elutes between C7 and C8, ethyl benzene and the xylenes elute between C8 and C9.
Each BTEX compound is deducted from the appropriate band to give the aliphatic fractions, however aromatic compounds may still be contributing to these fractions

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

ALIPHATIC / AROMATIC FRACTION BY GC/FID

Customer and Site Details: Waterman Infrastructure & Environment Ltd : Biggins Wood
Job Number: S16_3217M
QC Batch Number: 160490
Directory: D:\TES\DATA\Y2016\042616TPH_GC4\042616 2016-04-26 10-56-27\074B3101.D
Method: Ultra Sonic

Separation: Silica gel
Eluents: Hexane, DCM

Matrix: Soil
Date Booked ir 21-Apr-16
Date Extracted 25-Apr-16
Date Analysed 26-Apr-16, 17:53:59

This sample data is not MCERTS accredited.
*** This sample data is not ISO17025 accredited.**

		Concentration, (mg/kg) - as dry weight.											
		>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35		>C8 - C40	
Sample ID	Client ID	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics
* CL1613757	BH105 0.10	<5.59	<6	<5.59	<6	<5.59	<6	<5.59	<6	<12.24	<12.12*	<27.9	<28

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

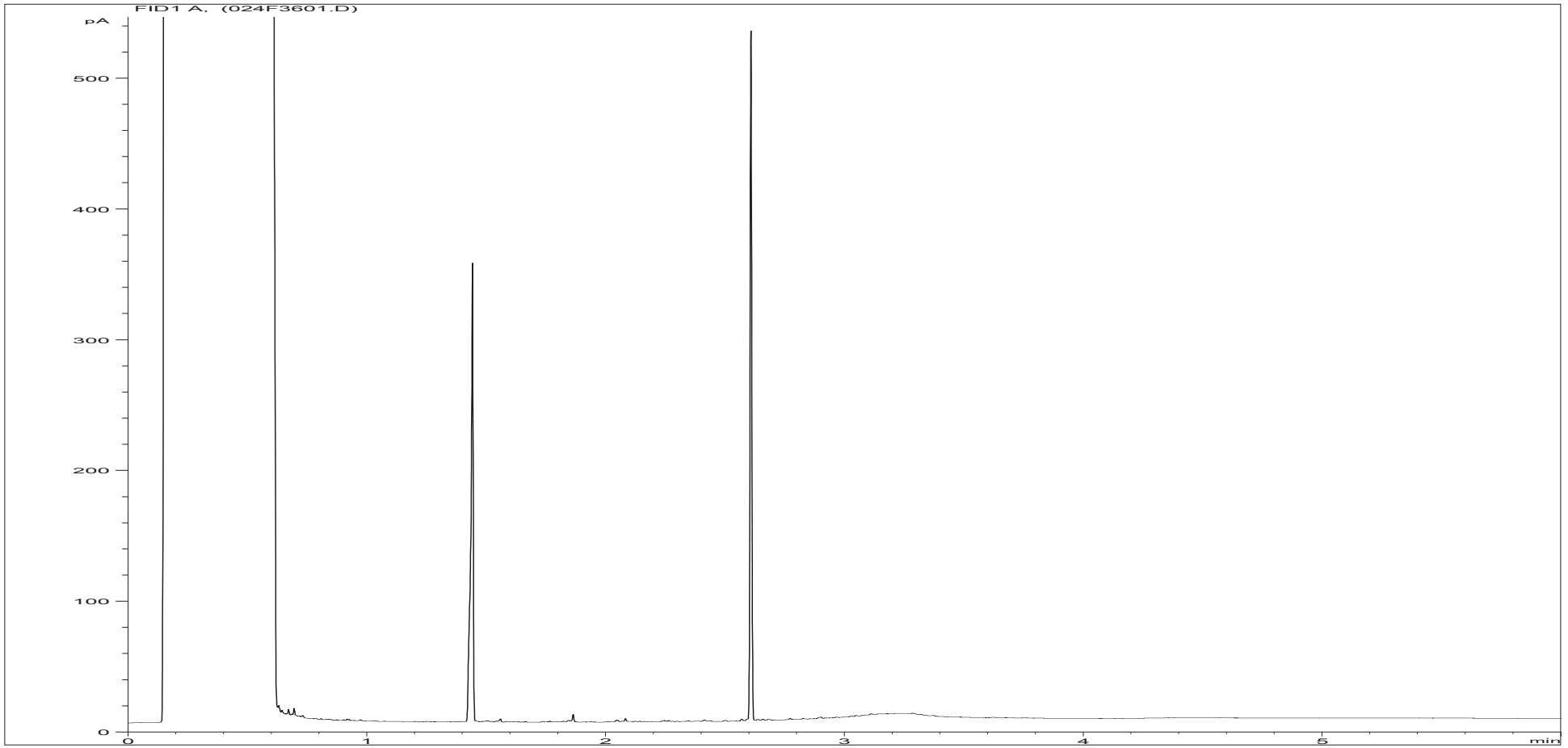
Total Petroleum Hydrocarbons (TPH) Carbon Ranges

Customer and Site Details:	Waterman Infrastructure & Environment Ltd : Biggins Wood	**Matrix:**	Soil
Job Number:	S16_3217M	**Date Booked in:**	21-Apr-16
QC Batch Number:	160490	**Date Extracted:**	25-Apr-16
Directory:	D:\TES\DATA\Y2016\042616TPH_GC15\042616 2016-04-26 17-00-04\080B3401.D	**Date Analysed:**	27-Apr-16, 02:37:44
Method:	Ultra Sonic		
Accreditation code:	N		

			Concentration, (mg/kg) - as dry weight.				
	Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
*	CL1613757	BH105 0.10	<6	<6	6.46	<6	19.1
*	CL1613758	BH105 1.00	<5.34	<5.34	6.59	<5.34	12.1

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

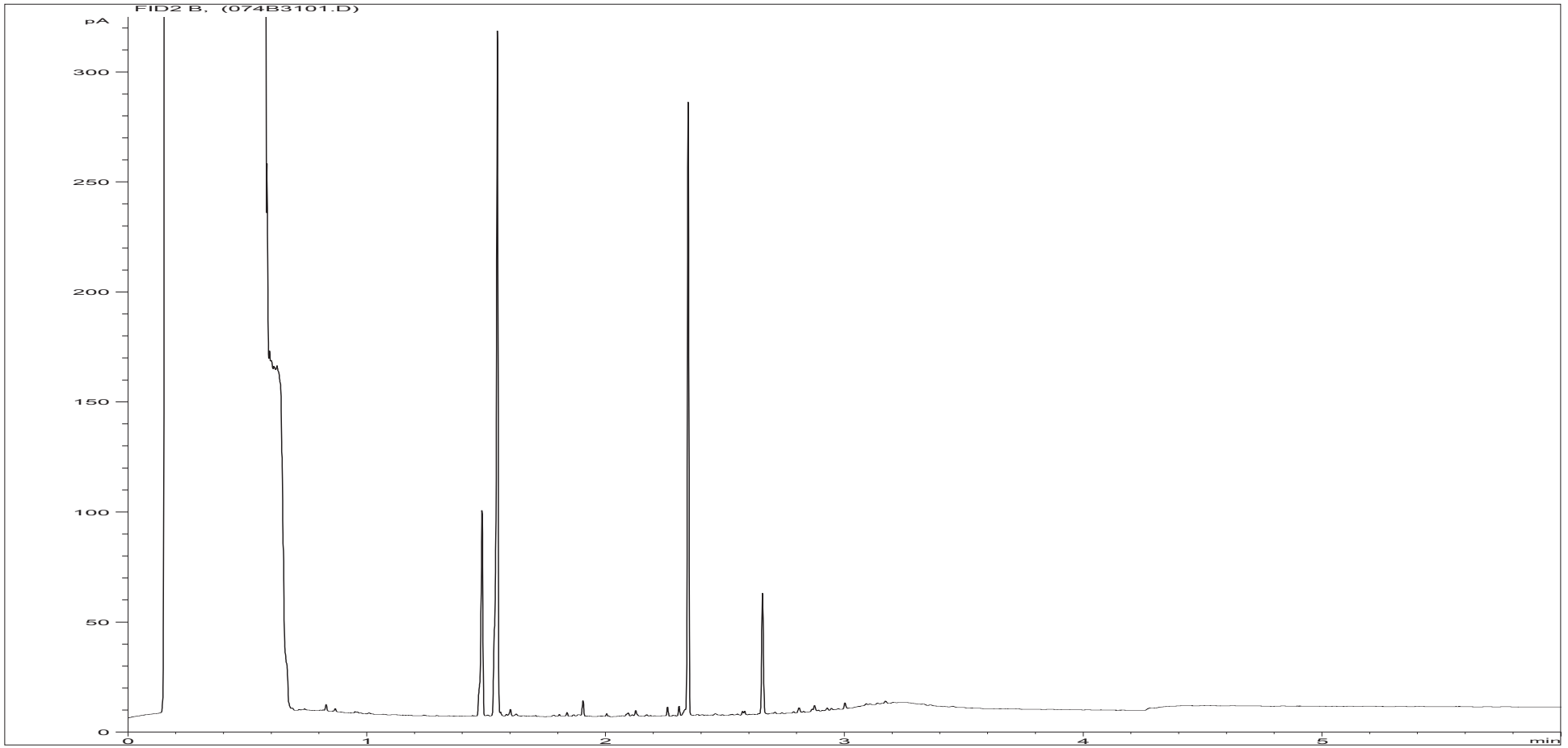
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL1613757ALI	**Job Number:**	S16_3217M
Multiplier:	16.16	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH105 0.10
Acquisition Date/Time:	26-Apr-16, 19:01:25		
Datafile:	D:\TES\DATA\Y2016\042616TPH_GC4\042616 2016-04-26 10-56-27\024F3601.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

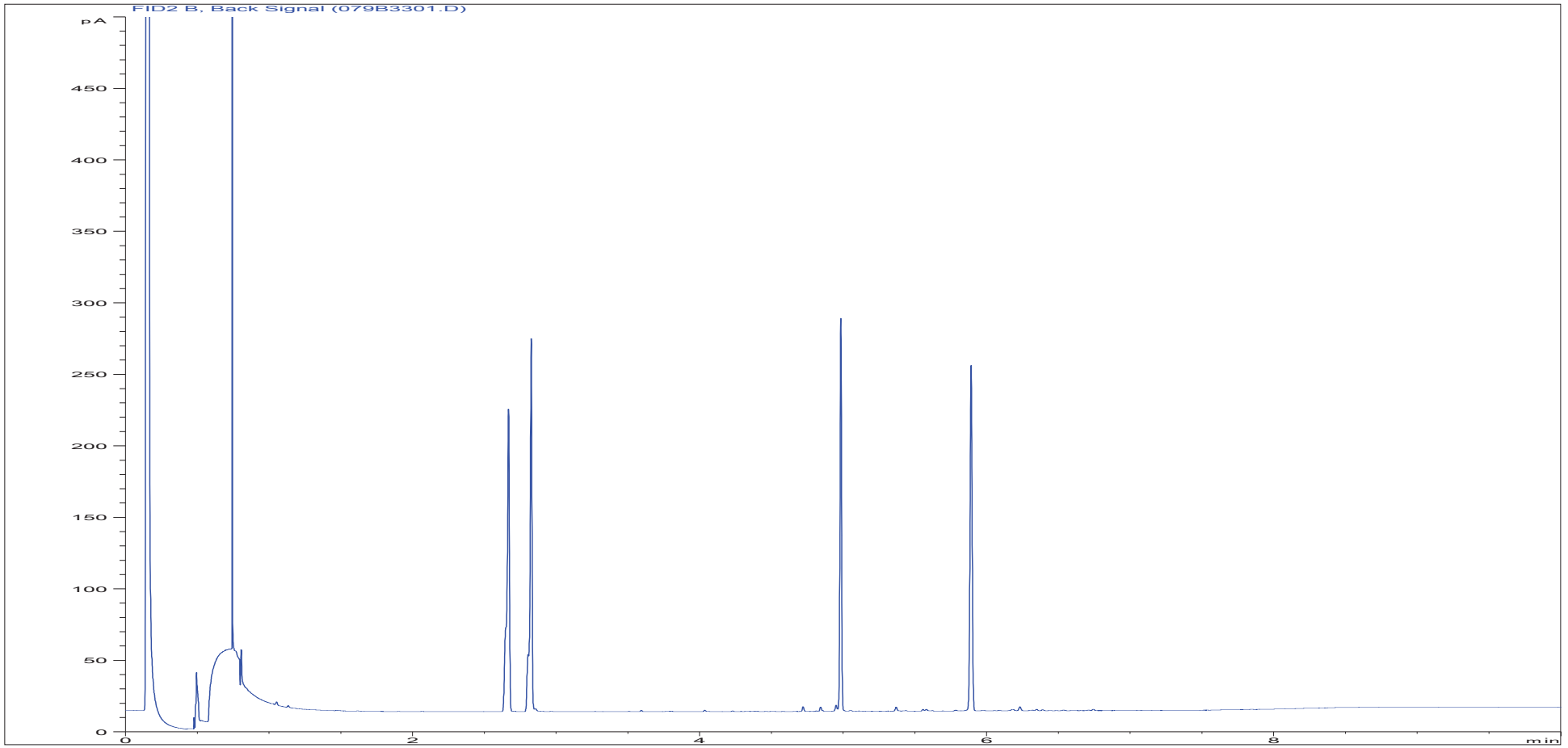
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL1613757ARO	**Job Number:**	S16_3217M
Multiplier:	12.24	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	BH105 0.10
Acquisition Date/Time:	26-Apr-16, 17:53:59		
Datafile:	D:\TES\DATA\Y2016\042616TPH_GC4\042616 2016-04-26 10-56-27\074B3101.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

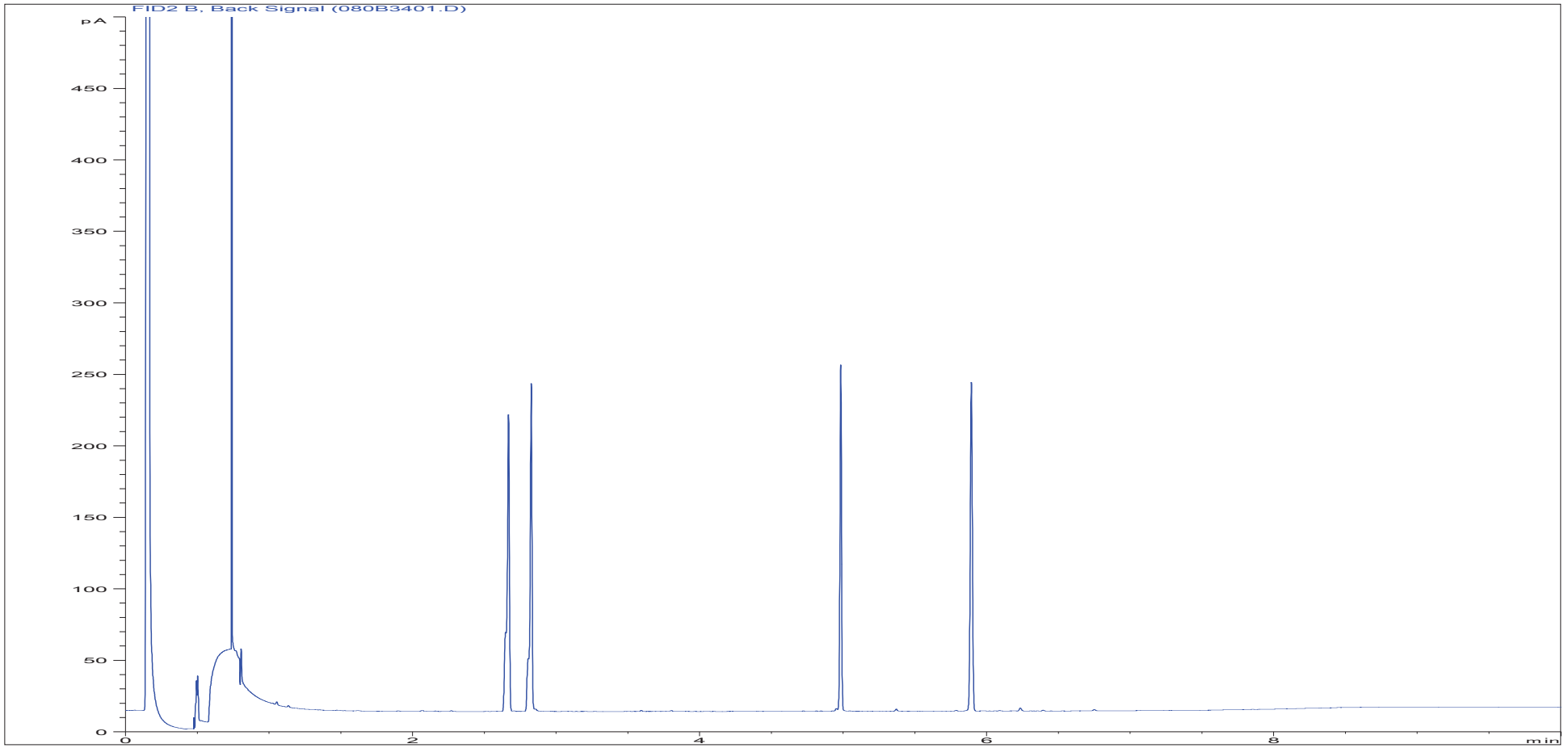
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613757SCU	**Job Number:**	S16_3217M
Multiplier:	15.68	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	TPH_RUNF.M	**Client Sample Ref:**	BH105 0.10
Acquisition Date/Time:	27-Apr-16, 02:20:06		
Datafile:	D:\TES\DATA\Y2016\042616TPH_GC15\042616 2016-04-26 17-00-04\079B3301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1613758SCU	**Job Number:**	S16_3217M
Multiplier:	16.64	**Client:**	Waterman Infrastructure & Environment Ltd
Dilution:	1	**Site:**	Biggins Wood
Acquisition Method:	TPH_RUNF.M	**Client Sample Ref:**	BH105 1.00
Acquisition Date/Time:	27-Apr-16, 02:37:44		
Datafile:	D:\TES\DATA\Y2016\042616TPH_GC15\042616 2016-04-26 17-00-04\080B3401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

ASBESTOS ANALYSIS RESULTS - SOIL ANALYSIS

ESG Asbestos Limited Certificate of Analysis for Asbestos in Soils, Sediments and Aggregates

1089

Detection limit of Method SCI-ASB-020 is 0.001%

Sampling has been carried out by a third party

Client:	ESG Environmental Chemistry	**Page 1 of 1**	
Address:	Etwall House, Bretby Business Park, Ashby Road, Burton upon Trent	**Report No:**	**ANO-0488-12399**
For the attention of:	Waterman Infrastructure & Environment Ltd	**Report Date:**	**27/04/2016**
Site Address:	Biggins Wood	**Project Number:**	**S163217**

Sample Number	Sample Date	Sample Location & Matrix	Test Date	Total Sample Dry Weight (g)	Weight of <2mm Fraction (g)	Asbestos(g) in >8mm+>2mm	Asbestos(g) in <2mm	% Asbestos by weight of Total Dried Sample	Asbestos Fibre Types Identified
CL/1613757	19/04/16	BH105 0.10 Soils	27/04/2016					Screen Only	NAIIS

Keys

NAACR = Not Analysed at Clients Request

NAIIS = No Asbestos Identified in Sample (Screens Only)

*** visible to naked eye**

NADIS = No Asbestos Detected in Sample (ID & Quant Only)

Name: Craig Wilton

Position: Lab Analyst

Authorised Signatory:

The sample analysis for the above results was carried out using the procedures detailed in ESG Asbestos Limited in house method (SCI-ASB-020) based on HSE document MDHS 90 - Asbestos Contaminated Land - Draft 5 - November 1997 (withdrawn). Fibre identification was carried out using ESG Asbestos Limited in house method of transmitted/polarised light microscopy and centre stop dispersion staining (SCI-ASB-007), based on HSE's HSG 248. The analysis of fine fraction for asbestos content only includes fibres and does not discriminate non-asbestos fibres. All fibres are assumed, unless specified, to be amphiboles. All tests were carried out at ESG Asbestos Laboratory, Ashbourne House, Bretby Business Park, Ashby Road, Burton-upon-Trent, Staffordshire. DE15 0XD, UKAS Laboratory Number 1089.

Where individual results are flagged see report notes for status.

Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163217M

Consignment No S55348
Date Logged 21-Apr-2016
Report Due 28-Apr-2016

ID Number	Description	MethodID	CustServ	Dep.Opt		GROHSA		ICPBOR	ICPMSS									KONECR	MCertS	PAHMSUS	Sub002a	Sub020	TMSS	TPHFID-SCU		TPHFIDUS	TPHUSSI
		Sampled	REPORT A	DO ID and QUANT if ASB Found	DO Waste Guidance interp if TPH>1000	GRO (AA) by HSA GC-FID	GRO (C6-C8)	Boron (H20 Soluble)	Arsenic (MS)	Cadmium (MS)	Chromium (MS)	Copper (MS)	Lead (MS)	Mercury (MS)	Nickel (MS)	Selenium (MS)	Vanadium (MS)	Zinc (MS)	Chromium vi:	MCertS Analysis	PAH (17) by GCMS	^Asbestos Screen	^Asbestos ID & Quan	Tot.Moisture @ 105C	TPH by GCFID (AR) SCU	TPH Carbon Banding SCU	TPH Interpretation.(Waste Guidance)	TPH by GCFID (AR/Si)
						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓				✓
CL/1613757	BH105 0.10	19/04/16																										
CL/1613758	BH105 1.00	19/04/16																										

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

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

Deviating Sample Key

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

Requested Analysis Key

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

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

Analytical and Deviating Sample Overview

Customer Waterman Infrastructure & Environment Ltd
Site Biggins Wood
Report No S163217M

Consignment No S55348
Date Logged 21-Apr-2016

Report Due 28-Apr-2016

ID Number	Description	Sampled	MethodID	TPHUSSI
				TPH by GCFID (AR/Si)
				✓
CL/1613757	BH105 0.10	19/04/16		
CL/1613758	BH105 1.00	19/04/16		

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

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

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

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

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

Report Number : EFS/163217

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
TPHUSSI	CL1613757	The Secondary process control result associated with this Test has not wholly met the requirements of the Laboratory Quality Management System (QMS). All other Process controls (including the Primary Process control) are within specification. The Laboratory believes that the validity of the data has not been affected but in line with our QMS policy we have removed accreditation from the affected analytes C21-35 from the aromatic fraction . These circumstances should be taken into consideration when utilising the data.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPBOR	Oven Dried @ < 35°C	Determination of Boron in soil samples by hot water extraction followed by ICPOES detection
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in soil samples by aqua regia digestion followed by ICPMS
Soil	KONECR	Oven Dried @ < 35°C	Determination of Chromium vi in soil samples by water extraction followed by colorimetric detection
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	TMSS	As Received	Determination of the Total Moisture content at 105ºC by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	TPHFID-SCU	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including cleanup of extract using activated silica
Soil	TPHUSSI	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including quantitation of Aromatic and Aliphatic fractions.

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

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

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

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

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

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

Symbol Reference

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

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

Sample Descriptions

Client : Waterman Infrastructure & Environment Ltd

Site : Biggins Wood

Report Number : S16_3217

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1613757	BH105 0.10	Brown CLAY
CL/1613758	BH105 1.00	Grey/Brown CLAY

Our Ref: EFS/163321M (Ver. 2)
Your Ref:

May 10, 2016

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

Telephone: 01283 554400
Facsimile: 01283 554422

Jon Coates
Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

For the attention of Jon Coates

Dear Jon Coates

Sample Analysis - Biggins Wood

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

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

The samples will be kept until the agreed date when they will be discarded. Please call 01283 554463 for an extension of this date.
Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

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

Yours sincerely

for ESG

S Stone
Project Co-ordinator
01283 554463

Environmental Chemistry, ESG, P.O. Box 100, Burton-upon-trent, DE15 0XD Tel: 01283 554400 Fax: 01283 554422
Environmental Scientifics Group Limited.
Registered No: 2880501

TEST REPORT

1252

Report No. EFS/163321M (Ver. 2)

Waterman Infrastructure & Environment Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

Site: Biggins Wood

The 9 samples described in this report were registered for analysis by ESG on 25-Apr-2016. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 10-May-2016

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 ESG.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Table of PAH (MS-SIM) (80) Results (Pages 5 to 12)
Table of PCB Congener Results (Pages 13 to 14)
Table of SVOC Results (Page 15)
Table of GRO Results (Page 16)
Table of TPH (Si) banding (std) (Page 17)
Table of TPH Texas banding (std) (Page 18)
GC-FID Chromatograms (Pages 19 to 42)
Table of VOC (HSA) Results (Page 43)
Table of WAC Analysis Results (Page 44)
Subcontracted Analysis Reports (Pages 45 to 47)
The accreditation status of subcontracted analysis is displayed on the appended subcontracted analysis reports.
Table of Asbestos Screening Results (Page 48)
Analytical and Deviating Sample Overview (Pages 49 to 50)
Table of Additional Report Notes (Page 51)

On behalf of ESG :
Declan Burns

Managing Director
Multi-Sector Services

Date of Issue: 10-May-2016

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

		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	mg/kg	mg/kg
		Method Codes :	AMMAR	ELESULP	GROHSA	GROHSA	ICPACIDS	ICPBOR	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPWSS
		Method Reporting Limits :	0.5	20	0.2	0.2	20	0.5	0.3	0.2	1.2	1.6	0.7	0.5	2	0.5	16	10	
		Accreditation Code:	UM	UM		UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**Exchange.Ammonium AR**	**Elemental Sulphur**	**GRO (AA) by HSA GC-FID**	**GRO (C6-C8)**	**SO4-- (acid sol)**	**Boron (H20 Soluble)**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**SO4-- (H2O sol) mg/l**	
1614121	TP18 STOCKPILE (NVM)	14-Apr-16																	
1614122	BH101 0.50	14-Apr-16			Req	<0.3		1.2	11.7	0.33	26.4	37.8	132.7	<0.53	24	0.6	138.7		
1614123	BH101 1.50	14-Apr-16				<0.3		2.2	14	<0.21	41.1	21	28.6	<0.5	43.7	<0.5	53.7		
1614124	BH102 0.5	14-Apr-16			Req	<0.2		1.2	8.8	0.27	30.2	20.5	680.3	<0.52	24.4	<0.5	110.0		
1614125	BH102 3.0	14-Apr-16				<0.2		1.3	7.5	<0.20	25.1	12.5	229.0	<0.5	26.5	<0.5	59		
1614126	BH103 0.5	15-Apr-16			Req	<0.2		1.3	18.7	0.49	24.3	35.6	368.2	<0.53	20.4	0.9	131		
1614127	BH103 3.0	15-Apr-16				<0.3		1.3	8.5	0.4	30.8	26.0	145.3	<0.5	24.7	0.5	117.6		
1614128	BH104 0.10	13-Apr-16	<0.7	<21	Req	<0.3	1360	2.7	13.8	0.53	36.5	39.4	162	<0.54	33.9	0.9	121.0	611	
1614129	BH104 4.00	13-Apr-16				<0.3		15.7	58	2.05	52.9	2630	2490	2.87	92.1	1.7	1810		

ESG

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Client Name Waterman Infrastructure & Environment Ltd

Contact Jon Coates

Biggins Wood

Sample Analysis

Date Printed	**10-May-2016**
Report Number	**EFS/163321M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.

			Units :	pH Units				mg/kg	%	mg/kg	mg/kg	µg/kg	Mol/kg	% M/M	mg/kg	mg/l	mg/kg	mg/kg	%
			Method Codes :	PHSOIL	Sub002a	Sub002b	Sub020	SVOCMSUS	TMSS	TPHFIDUS	TPHUSSI	VOCHSAS	ANC	FOCS	ICPMSS	KONECL	KONECR	KoneNO3	LOI(%MM)
			Method Reporting Limits :						0.2	10	20		0.04	0.04	0.6	1	0.1	0.4	0.2
			Accreditation Code:	UM	U	U	U		U	N			N	N	N	N	N	N	N
LAB ID Number CL/	Client Sample Description	Sample Date		pH units (AR)	^Asbestos Screen	^Asbestos ID	^Asbestos ID & Quan	SVOC by GCMS (AR)	Tot.Moisture @ 105C	TPH Band (>C10-C40)	TPH by GCFID (AR/Si)	VOC HSA-GCMS	Acid Neut. Capacity	S.O.M. % (Calc)	Vanadium (MS)	Chloride:(2:1)	Chromium vi:	Nitrate 2:1 mg/kg	L.O.I. % @ 450C
1614121	TP18 STOCKPILE (NVM)	14-Apr-16				NADIS													
1614122	BH101 0.50	14-Apr-16		8.5	NAIIS			Req	20.4		Req	Req		2.19	36.7		<0.1		
1614123	BH101 1.50	14-Apr-16		8.7					22.3					1.07	67		<0.1		
1614124	BH102 0.5	14-Apr-16		8.1	NAIIS				17.5		Req			1.80	39		<0.1		
1614125	BH102 3.0	14-Apr-16		8.4	NAIIS				19.8					0.94	28.8		<0.1		
1614126	BH103 0.5	15-Apr-16		8.5	NAIIS				17.3		Req			5.90	41.2		<0.1		
1614127	BH103 3.0	15-Apr-16		8.8	CH		NADIS		20.8					2.65	44.6		<0.1		
1614128	BH104 0.10	13-Apr-16		8.7	NAIIS				27.2	1250	Req		0.43	3.78	70.3	124	<0.1	<0.4	5.6
1614129	BH104 4.00	13-Apr-16		7.5	NAIIS				28.1					19.9	91.0		<0.1		

ESG

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Sample Analysis

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