DEVELOPMENT SERVICES
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Site:	Mill Hill Road, Hinckley
Client:	David Wilson Homes
Ref:	GRM/P3779/RemState F.1
Date:	October 2007

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1.0 INTRODUCTION

1.1 PREAMBLE

GRM has been appointed by David Wilson Homes (Client) to provide a draft remediation method statement for the development of the site at Mill Hill Lane, Hinckley.

A desk study and site inspection ('Phase I' assessment) and intrusive ground investigation (Phase II assessment) were carried out during September 2006, the results of which were reported in Site Appraisal Report GRM/P3779/ F.1, October 2006.

The Client proposes to develop the site with up to 2 storey housing and apartments with associated infrastructure. The proposed end use includes private rear gardens, an amenity garden, soft landscaping and hard standing (in the form of access roadways and car parking areas). The outline development proposal provided by the Client, in the form of a proposed development layout plan, is presented in Appendix A.

The Client has not informed GRM of any potential development hazards.

This remediation method statement is intended to provide procedures for dealing with the contaminated ground encountered on the site during the site appraisal to mitigate the risk to human health and the environment for the proposed residential with private gardens end use. This report should be submitted to the local authority for approval in accordance with the relevant planning conditions.

Consideration is also given to the foundation designs appropriate for this site. To keep the remedial works in context, reference is made to asbestos removal, demolition, drainage, and other enabling works, however, these references and comments are not intended to form any part of a specification of works and should not be considered in preference to best practice, legal or any other overriding requirements.

Recommendations made in this report are supplemental to and not a replacement of the detailed consideration of the site made in Site Appraisal Report GRM/P3779/ F.1 October 2006. If there appears to be contradictory statements or recommendations between the Site Appraisal Report and this Remediation Method Statement, GRM should be consulted for clarification.

Other documents available since the issue of the Site Appraisal Report regarding the development of this site include:

- Asbestos Survey Report (type 3) by AH Allen Limited, report number 06/1334, December 2006.

GRM standard limitations of reporting are provided on the back cover of this report.

2.0 SUMMARY OF SITE APPRAISAL

2.1 INTRODUCTION

The following is a summary of the Site Appraisal report. For full details of the findings, observations and recommendations, reference should be made to Site Appraisal Report GRM/P3779/ F.1.

2.2 SITE DESCRIPTION

The site, at National Grid Reference (NGR) SP 424 940, is approximately 500 metres to the west of Hinckley town centre. A site location plan showing the boundary of the site is presented in Appendix B.

The site area is approximately 0.20 hectares. The northern and western boundaries are marked by Mill Hill Road and Cleveland Road respectively. An access road and open space, associated with works to the south east of the site, form the eastern and eastern part of the southern boundaries. The remainder of the southern boundary is formed by the residential property adjacent to the site.

The site is occupied by one/two storey brick built factory units with open areas to the rear of the buildings. Basement areas exist on the eastern margin and a lift in the central area. Some buildings were roofed with cement sheet (possible asbestos risk). The principal use of the site is for the finishing of imported garments and embroidery. No fuel tanks or use of solvents were reported by the previous owner of the site. The main entry for gas and electricity to the site appears to be from Mill Hill Road. No overhead cables crossed the site.

Site surfacing varies from concrete slabs, cobble sets, engineering bricks and tarmac.

The area surrounding the site slopes gently to the south east, however, the site is generally level. The south eastern corner of the site has been built up to provide a level platform. A retaining wall up to 2m in height exists on the eastern and south eastern boundaries. The condition of the retaining walls was not inspected as part of this assessment. The site is approximately 1m higher that the rear garden of the residential property to the south west of the site.

Access to the site was via an archway through the main building from Mill Hill Lane and from Cleveland Road. Both accesses are suitable for vehicles, although the access from Mill Hill Lane is limited.

2.3 SITE HISTORY

The earliest maps examined indicate the site to comprise open fields with trees and a sand pit over much of the eastern part of the site. The sand pit is not shown on the 1903 map.

Land use indicated on the site from 1924 includes: boot and shoe manufactures, hosiery manufacturers, works, factory and building yard.

The surrounding area is indicated to be predominately residential. A factory and works is indicated off the south east corner of the site.

2.4 GEOLOGY

The BGS Geological Sheet for this area shows superficial deposits of the Oadby Till and Wolston Sand and Gravel deposits over a Solid geology of the Mercia Mudstone Formation.

As found ground conditions were Made Ground, highly variable in both depth, ranging from 0.40 to 4.50 metres begl, and composition, varying from soft to stiff, slightly gravelly Clays, loose and medium dense slightly gravelly Sands and Silts. Interpretation of the superficial deposits from the exploratory holes was not conclusive. It is considered that the superficial deposits are likely to be a transitional facies between the Wolston Sand and Gravel and the Oadby Till.

2.5 HYDROGEOLOGICAL/ HYDROLOGICAL INFORMATION

The aquifer status of the site is non-aquifer. There are no recorded groundwater abstractions for domestic purposes within 1000 metres of the site. The nearest non-potable abstraction is 994 metres to the east of the site. The site is not within a source protection zone.

The nearest surface water feature is at 424 metres to the west of the site, which coincides with the moat/pond associated with Castle Hill. The site is not reported to be at risk from river flooding, however a flood risk assessment may be required. The nearest surface water abstraction licence is 855 metres to the south of the site and is for non-potable purposes. There are no discharge consents or reported pollution incidents that appear to be associated with the site.

2.6 MINERAL RESOURCES

The review of historical OS maps of the area indicates that a sand pit was situated on the eastern half of the site. Apart from the sand pit there is no evidence that further exploitation of minerals, including coal, occurred on the site or is likely to impact the development of the site.

2.7 ENVIRONMENTAL INFORMATION

Environmental database information from Landmark Data Limited does not indicate any hazards that may affect the proposed development.

2.8 ARCHAEOLOGY

Archaeological information has not been sought as part of this assessment and has not been identified as an issue by the Client.

2.9 RADON GAS (DESK STUDY ASSESSMENT)

The desk study data does not suggest a requirement for Radon protection to dwellings on this site.

2.10 CONTAMINANTS OF CONCERN

It is not considered that the past land use on the site and potential nearby industrial sources are represented by the generalised assessment contained in CLR 8 or the DoE Industry Profiles. Likely contaminants of concern have been selected by GRM based on past experience of similar sites. These include heavy metals (Arsenic, Cadmium, Chromium, Lead, Mercury, Selenium, Copper, Nickel, Zinc), PAHs and inorganics such sulphate and pH. Screens for cyanide and phenols were also included.

A type 3 Asbestos survey was carried out on the buildings. No asbestos type materials were observed in any of the exploratory holes. Older electricity substations and high voltage switch boxes, where PCBs are usually used, were not observed on this site.

Although potential sources of hydrocarbons have not been identified during the desk study, hydrocarbon analysis was scheduled as part of the investigation as evidence of hydrocarbon impact was observed during the fieldwork. Samples from the site were screened for hydrocarbons and VOCs.

2.11 FIELDWORK

Window sampling techniques were selected to investigate this site because of access restrictions. A total of fifteen exploratory holes were undertaken, positioned on a general grid, within the constraints of existing structures and access, and advanced to depths of between 3.00 and 7.00 metres begl. WS1 to 7 were targeted within the Made Ground on the south east corner of the site and the area of the former sand pit. Two extra exploratory holes were targeted around WS8 (where hydrocarbons were determined during the field works).

A total of 15 general suites of chemical testing were carried out on soil samples. In addition TPH and VOC testing was carried out on samples from WS8 and to screen soil samples from across the site.

Gas and groundwater monitoring standpipes were installed in WS1, 3, 5, 6, 11 and 13. Four monitoring visits were completed within a four week period following the completion of the fieldworks.

An exploratory hole location plan is provided in Appendix C.

2.12 PROVEN GROUND CONDITIONS

The encountered ground conditions were:

- Made Ground
- Superficial Deposits

2.12.1 Made Ground

The Made Ground encountered on the site was highly variable in both depth and composition, ranging from 1.50 to 4.50m begl over the eastern half of the site and 0.40 to 1.90m begl over the western half of the site.

The Made Ground comprised sandy gravelly clays, sandy clays and clayey gravelly sands. It is considered that the Made Ground comprised locally derived natural materials with foreign clasts, generally less than 5%, including brick, coal, glass, slate, concrete, ash, clinker and carbonaceous material. Voided Made Ground, with a significant content of whole bricks was encountered in WS13 to a depth of 1.00 metre begl,

2.12.2 Superficial Deposits

Superficial deposits were variable and comprised a series of interbedded Sands (locally clayey), sandy gravelly Clays, sandy Clays and Silt. In situ strengths of the soils were generally firm, varying locally to soft or stiff in the cohesive soils and loose or medium dense in the granular soils.

2.12.3 Groundwater

Groundwater was encountered in WS6 at 3.50 metres begl as seepage. The remaining boreholes were dry. Groundwater was not encountered during the monitoring of the standpipes except in WS6, where depths to groundwater varied from 4.82 to 4.08m begl, during September and October 2006.

The groundwater encountered on the site is interpreted as perched groundwater and it is not considered that the permanent water table was encountered.

2.12.4 Ground Gas

Ground gas monitoring during September and October 2006 did not encounter Methane. Concentrations of Carbon Dioxide of between 0.0 and 7.7% v/v were recorded. Oxygen concentrations of between 9.6 and 20.4% v/v were measured. No gas flow was recorded from the monitoring wells.

No organic materials were identified in the Made Ground encountered in the exploratory holes.

There appears to be a gradient of Carbon Dioxide concentrations across the site, being greatest in the south east corner and least in the north western corner of the site. This may suggest an off site source of ground gas.

2.13 CONTAMINATION OBSERVATIONS AND LABORATORY TESTING

Hydrocarbon odours, similar to diesel fuel, were noted in WS8, ranging from very slight to strong, being strongest at 2.50 to 3.60 and diminishing with depth. WS 14 and 15, adjacent to WS8 did not encounter hydrocarbon odours.

The US95's calculated for the contaminants tested for were all below the relevant Soils Guidance Value (SGV) or GAC (Generic Assessment Criteria) for residential with private rear garden land use. No pervasive contamination has been identified.

The following hotspots of contamination were identified:

- WS12 @ 0.30/0.40m - Mercury concentration of 9.4 mg/kg
- WS8 @ 0.40 to 0.60 and 2.60 to 2.80m - EPH concentration of 1100 to 5400 mg/kg
- WS8 @ 2.60 to 2.80m - Benzene concentration of 0.016 mg/kg

In summary the risk to the end user from pervasive soil contamination is considered to be negligible and no site wide remediation is required. Remediation of the hotspots identified in WS8 and WS12 is required as the concentrations revealed exceed the relevant SGV / TAC.

2.14 PHASE II CONCEPTUAL MODEL

The intrusive investigation has revealed hotspots of Mercury, Benzene and Petroleum Hydrocarbons. A type 3 survey has been carried out that has identified asbestos within the existing structures. Gas monitoring has been undertaken and elevated concentrations of Carbon Dioxide have been confirmed.

For end-users, the primary human health receptors are residents of the proposed development and construction workers. Pathways of concern include indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil and vegetables, and soil dust and dermal contact with contaminated soil and soil dust.

Pervasive concentrations of Arsenic and hotspots of petroleum hydrocarbons and Mercury have been determined on the site at concentrations that suggest that plastic MDPE water supply pipes may not be appropriate.

For controlled waters, the primary receptor for the site has been confirmed as the moat/pond associated with Castle Hill some 424 metres to west. However there is not considered to be a plausible pathway between the site and the moat/pond due to the lack of groundwater (to act as a carrier) and the distance between the source and receptor. Therefore the presence of potential contaminant sources, petroleum hydrocarbons and mercury, is unlikely to pose a risk to controlled waters.

The pollutant linkage model is illustrated in detail on the following page.

Pollutant Linkage Model

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Solution**
Contaminated Made Ground/natural soils. Hotspots of Mercury and petroleum hydrocarbons (including Benzene).	Indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil, vegetables and soil dust, and dermal contact with contaminated soil and soil dust.	Residents of the completed development and construction workers.	Capping of soft landscaping / gardens and/or removal of contaminated soils.
Ground Gases (Carbon Dioxide) from Made Ground or potential off site source.			Install Gas Precautions to buildings.
Asbestos containing materials associated with buildings.	Inhalation of asbestos fibres.	Demolition workers (Asbestos).	Removal of Asbestos prior to demolition.

CONTROLLED WATERS			
Contaminated Made Ground/natural soils. Hotspots of Mercury and petroleum hydrocarbons (including Benzene).	Leaching of contaminants and vertical migration to the groundwater table and transport via groundwater.	Surface water feature.	Absence of shallow permanent groundwater and distance to the receptor removes the presence of a plausible pathway link.

CONSTRUCTION MATERIALS			
Contaminated Made Ground. Contaminants of concern including Arsenic, Mercury and petroleum hydrocarbons.	Migration of contamination through leaks and joints, degradation of pipe materials.	Water Pipes.	Upgrade water pipes and/or clean backfill material.

3.0 ADDITIONAL WORKS RECOMMENDED OCTOBER 2006

The requirement for further investigation was identified in Site Appraisal Report GRM/P3779/ F.1, to determine more accurately the impact of some of the identified hazards on the development. They included:

- Following demolition of the buildings and lifting of hard standing, trial pitting and where appropriate chemical testing, should be undertaken to determine the extent of the hydrocarbon and Mercury hotspots.
- Following demolition of the buildings and lifting of hard standing, trenching should be undertaken to determine whether a buried tank forms the source of the hydrocarbon hotspot.
- Following demolition of the buildings and lifting of hard standing, trenching should be undertaken to determine the steepness of the boundary between the natural and Made Ground in the area of the sand pit.
- Confirmation of recommendations for the protection of water supply pipes.
- Inspection of existing retaining walls.
- A remediation method statement may be required by the Local Authority / NHBC, if contaminated soils are to be removed / capped.
- Validation testing of any soils imported to back fill basement areas.
- Should the identified hotspots be excavated as part of the proposed remediation then validation inspection and testing will be required, post remediation, to satisfy the Local Authority / NHBC.
- Asbestos survey of the existing buildings will be required to be completed by a suitable specialist company prior to demolition.

4.0 FURTHER WORKS/ASSESSMENT COMPLETED

4.1 ASBESTOS SURVEY

As recommended in the Site Appraisal Report GRM/P3779/ F.1, a type 3 Asbestos Survey was carried out by AH Allen Limited, report reference 06/1334, in December 2006.

A copy of the Asbestos Survey Report should be provided to all interested parties including the local authority and demolition contractors or contractors specialising in the removal of asbestos. The report should form part of any tender package for the demolition of the site or removal of the asbestos.

The recommendations in the Asbestos Survey Report should be carried out prior to commencement of any demolition works.

4.2 GROUND GASES

The ground gas monitoring data has been re-assessed in accordance with CIRIA C659, 'Assessing risks posed by hazardous ground gas to buildings'.

The backfilled sand pit and presence of Made Ground poses a risk to the proposed development as a potential gas generation source. An off site source was implied by the gas monitoring data from 2006, however, the desk study did not identify any potential off site source of ground gas. On the basis that no organic matter was observed in the Made Ground, the generation potential of the source of the ground gas (Made Ground and sand pit area) is considered to be low. Given the proposed development, the sensitivity is considered to be moderate to high. Therefore between six monitoring events over three months and nine monitoring events over six months would be appropriate to assess the ground gas regime provided that relatively consistent results are recorded and no other source is determined.

The results of the five visits undertaken between July 2007 and September 2007 are presented in Appendix F as part of the completed gas monitoring programme.

4.3 CONSIDERATION OF HYROCARBON TEST RESULTS

The target values used for the assessment of hydrocarbon test results in Site Appraisal report GRM/P379/ F.1 have been superseded in light of the new CLEA calculation sheets appropriate for hydrocarbons. The tier 1 assessment criteria determined by GRM are presented in Appendix D.

The TPH CWG test results determined for the sample from WS8 @ 2.60 to 2.80m begl were compared to the tier 1 assessment criteria. Results for the following contaminants exceeded their respective tier 1 assessment criteria.

Aliphatic Hydrocarbons

- C8-10,
- C10-12,

- C12-16.

Aromatic Hydrocarbons

- C8-10,
- C10-12,
- C12-16,
- C16-21,
- C21-35.

The result for Benzene of 0.016mg/kg is below the tier 1 assessment criterion of 0.57mg/kg.

4.4 ADDITIONAL INVESTIGATION

Additional investigation has been carried out in the area of the hydrocarbon hotspot, encountered in WS8. Anecdotal evidence from an employee on the site, gained since the time of the original investigation, indicated that a surface fuel tank and pump had been situated in the area of WS8 at some time in the past.

Three additional window sample boreholes (WS16, 17 and 18) were undertaken adjacent to the area of WS8 as indicated on the exploratory hole location plan in Appendix C.

These window sample holes have not been logged, being purely to delineate the extent of hydrocarbon contamination and obtain samples for hydrocarbon testing.

Hydrocarbon odours were noted on site in WS17 at 3.50m. No hydrocarbon odours were encountered in the soils either above or below this depth. No hydrocarbon odours were encountered in WS16 and 18. Samples from WS16 - (0.50m and 3.50m), WS17 - (0.50m, 2.00m, 3.50m and 4.00m) and WS18 - (0.50m and 3.50m) were scheduled for TPH CWG testing.

The results of the testing are that hydrocarbons were only detected in the sample from WS17 at 2.00m depth. In this sample the concentrations of the following contaminants were recorded at concentrations in excess of GRM tier 1 Assessment Criteria

Aliphatic Hydrocarbons

- C8-10,
- C10-12,
- C12-16.

Aromatic Hydrocarbons

- C10-12,
- C12-16.

The test result sheets for the TPH CWG testing are presented in Appendix F.

It is considered that the hydrocarbon contamination demonstrated in WS8 and WS17 is at sufficient depth, i.e. 2.00 to 3.60m not to represent a risk to the end users of the site.

Provided that the contaminated material is not disturbed or brought to the surface during construction activities such as excavation for services or foundations or that material contaminated with hydrocarbons is not encountered at shallower depths then no further action is considered necessary to protect the end users of the site.

The location of the hydrocarbon contamination as seen from the exploratory holes appears to be laterally across the site from WS8 to WS17, becoming deeper with distance from WS8. No evidence of hydrocarbons was observed in the surrounding WS holes 6, 11, 14-16 inclusive and 18.

4.5 FOUNDATIONS

Keller Ground Engineering Limited were approached regarding an appropriate distance between vibro installed stone columns and the retaining wall bounding the south east corner of the site, necessary to protect the structural integrity of the retaining wall.

Accordingly GRM were advised that a minimum of 2.50m distance is required between the retaining wall and stone columns to ensure that the emplacement of the stone columns does not de-stabilize or cause structural damage to the retaining wall.

4.6 ADDITIONAL GAS MONITORING

A total of eight monitoring visits have been made to the site between September 2006 and September 2007 in two separate phases of monitoring.

In summary the results of the gas monitoring are:

- Methane concentrations - 0% v/v
- Carbon Dioxide concentrations - 0 to 10% v/v
- Oxygen concentrations - 6.4 to 20.4% v/v
- Barometric pressure - 983 to 1002mb (4 sets of readings at <1000mb)
- Borehole gas flow - 0 to 0.9l/hr
- Groundwater detected in WS6 only levels 3.53 to 4.82m begl.

The gas monitoring results are detailed in Appendix E.

5.0 PHASE II CONCEPTUAL MODEL

The intrusive investigation has revealed hotspots of Mercury and Petroleum Hydrocarbons. A type 3 survey has been carried out that has identified asbestos within the existing structures. Gas monitoring has been undertaken and elevated concentrations of Carbon Dioxide have been confirmed.

For end-users, the primary human health receptors are residents of the proposed development and construction workers. Pathways of concern include indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil

and vegetables, and soil dust and dermal contact with contaminated soil and soil dust.

Pervasive concentrations of Arsenic and hotspots of petroleum hydrocarbons and Mercury have been determined on the site at concentrations that suggest that plastic MDPE water supply pipes may not be appropriate.

For controlled waters, the primary receptor for the site has been confirmed as the moat/pond associated with Castle Hill some 424 metres to west. However there is not considered to be a plausible pathway between the site and the moat/pond due to the lack of groundwater (to act as a carrier) and the distance between the source and receptor. Therefore the presence of potential contaminant sources, petroleum hydrocarbons and mercury, is unlikely to pose a risk to controlled waters.

The pollutant linkage model is illustrated in detail on the following page.

Revised conceptual model

Pollutant Linkage Model

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Solution**
Contaminated Made Ground/natural soils. Hotspots of Mercury	Indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil, vegetables, soil dust and dermal contact with contaminated soil and soil dust.	Residents of the completed development and construction workers.	Capping of gardens / soft landscaped areas and/or removal of Mercury contaminated soils.
Contaminated Made Ground/natural soils. Hotspots of petroleum hydrocarbons at 2.00m+			Hydrocarbon hotspot to deep to be a hazard.
Ground Gases (Carbon Dioxide) from Made Ground or potential off site source.			
Asbestos containing materials associated with buildings.	Inhalation of asbestos fibres	Demolition workers (Asbestos).	Removal of Asbestos prior to demolition.

CONTROLLED WATERS			
Contaminated Made Ground/natural soils. Hotspots of Mercury and petroleum hydrocarbons.	Leaching of contaminants and vertical migration to the groundwater table and transport via groundwater.	Surface water feature.	Absence of shallow permanent groundwater and distance to the receptor removes the presence of a plausible pathway link.

CONSTRUCTION MATERIALS			
Contaminated Made Ground. Contaminants of concern including Arsenic, Mercury and petroleum hydrocarbons.	Migration of contamination through leaks and joints, degradation of pipe materials.	Water Pipes.	Upgrade water pipes and/or place water pipes in clean backfill material.

6.0 REMEDIATION

6.1 INTRODUCTION

Additional works are required to finalise the remediation statement for this site. These comprise:

- Trenching of the area of the hydrocarbon hotspot to confirm the area of shallow impact and determine whether a contaminant source (i.e. buried tank) remains on site
- Validation testing from final levels to 1.00m below final levels in the area of plots 1 and 2 to ensure that the hydrocarbon hotspot does not impact the rear garden areas
- Validation testing from final levels to 1.00m below final levels in the area of plots 1 and 2 to ensure that the Mercury hotspot does not impact the rear garden areas
- Testing in the area of the hotspot of Mercury (WS12) to delineate the extent of the hotspot.

6.2 ASBESTOS

Asbestos identified in the type 3 Asbestos Survey report by AH Allen Limited, report reference 06/1334, December 2006, should be removed by a competent contractor. For the purposes of this report it is assumed that a competent and experienced contractor will be appointed and that best practice and legal requirements will be complied with.

As a minimum, demolition should not commence until the clean air certificates are available. The certificates will be required by the regulators, local authority and NHBC.

6.3 DEMOLITION

Following the completion of the removal of asbestos and certification of the buildings, the demolition contract may commence. For the purposes of this report it is assumed that a competent and experienced contractor will be appointed and that best practice and legal requirements will be adhered to.

It is recommended that a portion of the concrete hard standing in the south western corner of the site is left in place until the completion of the removal of the near surface hydrocarbon impacted soils (if this is encountered), to provide a storage area for impacted soils prior to removal from site to help prevent cross contamination of clean soils.

The concrete slab in the basement area of the north eastern corner of the site should either be removed in its entirety or at least be broken up so that it does not form a water trap or obstruction to foundation construction.

The basement walls in the north eastern corner of the site are effectively retaining walls to the areas external to the site, which are raised above the basement area by up to approximately 3m. The basement walls adjacent to the site boundary should be left in place in the north eastern corner of the site to maintain the stability of the external boundaries of the site and to provide a safe working area in this area.

Basement walls and foundations elsewhere should be removed and the resultant vertical sides battered back to a stable repose.

We recommend that a post demolition survey is carried out to record the general site levels, the areas of know voids in the basement and lift shaft areas and any other voids from basements or cellars or from the removal of sub surface construction encountered during the demolition and site clearance process.

6.4 REMEDIATION OF HYDROCARBON IMPACTED SOILS

Following the completion of the demolition, the area of the hydrocarbon impacted soils should be trenched to confirm the extent of the near surface impacted soils in the area of WS8.

Soils visibly impacted with hydrocarbons should be excavated out down to a depth of 1.00m below final levels and removed from site. If the impacted soils are not loaded straight onto wagons for disposal off site, they should be stored in a controlled designated area preferably on the concrete hard standing retained. If concrete hard standing has not been retained the designated area should be lined with polythene before the impacted soils are stockpiled. When the impacted soils are removed a 500mm thickness of the soils underlying the stockpile should also be removed. These precautions are to prevent cross contamination of the site with the hydrocarbon impacted soils.

Samples should be obtained from final levels to 1.00m below final levels in the area of the rear gardens of plots 1 and 2. The samples should be submitted for TPH CWG testing and the results compared to the tier 1 assessment criteria presented in Appendix D. If the test result concentrations are below the tier 1 assessment criteria the soils may remain in the garden areas (subject to the results of the Mercury testing described in 6.5 below). If the test result concentrations exceed the tier 1 assessment criteria then the soils are determined to be contaminated and the contaminated soils in the rear garden areas should be excavated out to a depth of 1.00m below final levels. The contaminated soils should be removed from site or stockpiled as described above prior to removal from site.

Any soils remaining in the garden areas above a reduced level of 1.00m because they are deemed to not be contaminated with hydrocarbons shall be subject to validation testing (TPH CWG).

Any hydrocarbon impacted soils, identified by visual or olfactory evidence, arising from foundation or service excavations should be segregated until further assessment can be carried out, if stockpiled they should be treated as described above. Alternatively the potentially contaminated soils could be disposed of off site or stockpiled prior to off site disposal as described above without the requirement for assessment, however, testing is likely to be required for the purpose of waste classification.

6.5 REMEDIATION OF MERCURY HOTSPOT

It is anticipated that the Mercury hotspot will be of limited extent. Near surface soil samples should be obtained from the area of WS12 from the upper 0.50m and at

0.50m to 1.00m. Sample points should include a location close to WS12 and a minimum of three at a distance of 2.00m from WS12.

It is not possible to detail remediation in this area until the sampling is completed and the test results are available. In the proposed development the area of WS12 is hard standing. Therefore provided the hotspot does not extend beyond the hard standing areas, it is only soils that are excavated out as part of the dwelling or hard standing construction that need to be considered for removal from site. As described in 6.4, impacted soils should be disposed of offsite or stockpiled to await off site disposal. Additional testing maybe required for waste classification.

If water supply pipes cross the area determined as the Mercury hotspot then the hotspot should be either removed entirely, with the impacted soils removed from site as described in the preceding paragraph or water pipes upgraded and the service trenches backfilled with clean and inert soils as described in 6.7.

Samples should be obtained from final levels to 1.00m below final levels in the area of the rear gardens of plots 1 and 2. The samples should be submitted for Mercury testing and the results compared to the tier 1 assessment criteria of 8mg/kg. If the test result concentrations are below 8mg/kg the soils may remain in the garden areas (subject to the outcome of hydrocarbon testing described in section 6.4). If the test result concentrations exceed 8mg/kg then the soils are determined to be contaminated and the impacted soils in the rear garden areas should be excavated out to a depth of 1.00m below final levels and disposed of as described in 6.4.

Any soils remaining in the garden areas above a reduced level of 1.00m because they are deemed to not be contaminated with hydrocarbons shall be subject to validation testing (Mercury).

6.6 GAS PROTECTION MEASURES

As the type of floor slab construction for the development is not currently known, the assessment of the gas regime and determination of gas protection measures for low rise dwelling and apartment blocks has been considered according to Situation A in CIRIA C659. The gas regime considered in this assessment is:

- No Methane
- Carbon Dioxide maximum concentration in the ground of 10% v/v
- Maximum borehole gas flow of 0.9 l/hr.

Using a maximum flow rate of 0.9l/hr and a maximum Carbon Dioxide concentration of 10%v/v, a GSV of 0.09 has been calculated. Due to the calculated GSV exceeding 0.07 but being below 0.7, the site is considered to fall into characteristic situation 2 – low risk according to Situation A assessment as described in CIRIA C659. Accordingly the following gas precautions should be adopted throughout the development:

- Ventilated sub floor void
- Membrane (minimum 2000 gauge DPM) fully sealed across the ground floor and cavity wall construction and at all service entries

The ventilated sub floor void could be provided by use of cast in situ floor slabs with a granular venting layer/pipe work arrangement. However, in GRM's experience the use of voided suspended floor slabs such as beam and block is likely to prove more cost effective and practical. Accordingly, it is recommended that voided suspended floors be used throughout the development.

6.7 WATER SUPPLY PIPES

Pervasive Arsenic concentrations (US_{95} = 14mg/kg), determined from the site appraisal were above the criteria for the acceptable use of HDPE water supply pipes. Hotspots of TPH and Mercury were determined from the site appraisal. These hotspots are in concentrations above the criteria for the acceptable use of HDPE water supply pipes. The contaminant thresholds for sub surface water supply pipes are presented in Appendix D.

The water supply company should be consulted as to a type of supply pipe appropriate to protect water supplies from the pervasive Arsenic concentrations.

The need for up grading of the water supply pipes in the area of the hydrocarbon and Mercury hotspots should be re-assessed following remediation described in 6.4 and 6.5.

An alternative strategy for remediation to protect water supply pipes, subject to the approval of the water supplier, is to use an alternative material such as protecta line and clean inert backfill for the service trenches.

7.0 VALIDATION

7.1 VALIDATION OF REMEDIATED AREAS

Excavations resulting from the removal of soils, impacted with hydrocarbons, will require validating to demonstrate that the hydrocarbons in the upper metre have been removed.

Validation samples should be obtained from the sides of the excavation at intervals of not less than 5 metres, or a minimum of 4 samples from each excavation. Where the depth of the excavation is less than 1.00m below final levels samples should be obtained from the base of the excavation at intervals of one sample per 25m^2 or a minimum of one sample from every excavation. The samples should be subject to TPH CWG testing.

The tier 1 assessment criteria presented in Appendix D should be adopted as the acceptance criteria for the validation testing. If the test results concentrations are below the acceptance criteria the excavation shall be considered to be validated. If the test result concentrations fall above the acceptance criteria the validation shall be deemed to have failed and the impacted material shall be removed and un-validated sections of the excavation shall be subject to repeat validation testing as described above.

The area of the Mercury hotspot should not require validation as it is under hard standing, unless removal is required due to the risk to water supply pipes. If removal is required, the same general principles detailed above for validation of the area impacted by hydrocarbons will apply, adopting the appropriate acceptance criterion presented in Appendix D.

7.2 VALIDATION OF IMPORTED SOILS

Topsoil and subsoil imported to site for capping rear garden areas or the amenity garden area, to raise levels to final levels or to provide a suitable growing medium for plants etc should be subject to validation testing. A minimum of 300mm of topsoil should be laid in areas where plants are to be grown. The validation sampling should be carried out once the soils are in situ in the rear garden areas or the amenity garden area.

Validation sampling should be carried out at a frequency of one test location per two rear garden areas. A minimum of two validation test locations is required in the amenity garden area. A minimum of one sample should be obtained from each soil type at each sampling location, i.e. topsoil and subsoil are separate soils types.

The tier 1 assessment criteria presented in Appendix D should be adopted as the acceptance criteria for the validation testing. All imported soils should be inert. The validation test suite should as a minimum comprise heavy metals (Arsenic, Cadmium, Chromium, Lead, Mercury, Selenium, Copper, Nickel, Zinc), speciated PAH's (EPA16), cyanide, phenols, sulphate and pH.

Should the concentrations of the test results exceed the acceptance criteria the material shall be rejected and will require removal from site. We would suggest that the cost for this be borne by the contractor.

7.3 IMPORTED FILL MATERIALS

Imported soils used to fill voids existing on site following demolition or arising from remediation activities will require validation. Validation testing should be carried out at a rate of one sample per wagon load delivered to site.

The tier 1 assessment criteria presented in Appendix D should be adopted as the acceptance criteria for the validation testing. All imported soils should be inert. The validation test suite should as a minimum comprise heavy metals (Arsenic, Cadmium, Chromium, Lead, Mercury, Selenium, Copper, Nickel, Zinc), speciated PAH's (EPA16), cyanide, phenols, sulphate and pH.

Should the concentrations of the test results exceed the acceptance criteria the material shall be rejected, however, removal from site may not be mandatory subject to additional risk assessment and provided that the materials can be classified as inert with respect to waste management criteria.

Again we would suggest that the cost for this be borne by the contractor.

The preceding validation method shall not be applicable to imported construction materials or certified re-cycled building materials.

8.0 FOUNDATIONS

8.1 INTRODUCTION

The Client proposes to develop the site with up to 2 storey housing and apartments with associated infrastructure. The proposed end use includes private rear gardens, soft landscaping and hard standing in the form of access roadways and car parking areas.

The Client has not provided the finished floor levels of the proposed structures, therefore it is assumed that finished levels will not vary appreciably from the existing ground levels. The depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown and therefore have not been taken in to account in the following assessment. It has been assumed that any such works will not compromise foundation and ground stability. Should the development proposals or finished levels be altered then the comments/recommendations below will require revising.

It should be noted that comments/recommendations in the following assessment are based on the results of window sample boreholes, which may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). It is considered that prior to development trial pitting should be undertaken to confirm the recommendations outlined below.

8.2 SUMMARY OF GROUND CONDITIONS

The depth to natural strata levels varied considerably over the eastern half of the site from 1.60 to 4.50 metres begl. The natural deposits encountered ranged from loose to medium dense granular soils and between soft and firm cohesive soils. Not unexpectedly, anticipated bearing capacities, assuming conventional trench footings, varied from 60 to 130kN/m^2.

The depth to natural strata levels over the western half of the site was less varied, however, depths of between 0.40 and 1.90 metres begl were proven. The natural soils encountered were generally firm or firm to stiff cohesive soils with an anticipated bearing capacity of at least 120kN/m^2, however, a significant soft spot to a depth of 2.10 metres begl was encountered in WS14.

8.3 ENGINEERING GROUND TREATMENT

The near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should be taken to avoid this as excessive disturbance may entail more onerous floor slab design, road cap thickness and increased amounts of off site disposal etc.

The near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

Following demolition, earthworks will be required to fill the voids in the area of existing basements, the lift pit and any other areas where existing basements, cellars or sub

surface construction are encountered and removed during the demolition and site clearance process. Suitably graded and crushed demolition rubble or imported materials can be used for this purpose. Materials for filling the voids should be free of degradable materials such as wood and harmful materials such as Asbestos. Validation testing of imported soils will be required to ensure they are inert and comply with the acceptance criteria presented in Appendix D.

The material should be laid in layers and lightly compacted to ensure an evenly compacted mass with no residual voids. Classification testing will be required to formulate a compaction specification.

8.4 EXCAVATION CONDITIONS

No trial pit stability observations are available, however, based on the results of the window sample boreholes and observation of similar soils seen on other sites, it is likely that shallow excavations will be stable in the short term. Deeper excavations, particularly in loose Made Ground will be susceptible to collapse. Such collapse could occur without warning. The granular materials encountered on the site, whether Made Ground or natural will be highly susceptible to disturbance by groundwater ingress and catastrophic collapse may occur.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times.

Excavation of the materials encountered during the ground investigation should be easily achieved using conventional hydraulic excavation techniques. A breaker or similar plant may be required where hardstanding or existing foundations are encountered.

The observed groundwater conditions suggest that only simple dewatering techniques (e.g. sump pumping) will be needed to control water ingress to 3 metres.

An allowance should be made for trench support and dewatering of deeper excavations.

8.5 EXISTING STRUCTURES / SUBSTRUCTURES

The existing structures on the site will have associated substructures including foundation, floor slabs and drainage. As the site has been developed and re-developed in the past, substructure construction may be encountered outside of the footprint of the existing structures.

Where practicable, old substructures should be fully removed, however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

8.6 FOUNDATIONS

The depth to natural strata levels varied considerably over the eastern half of the site from 1.60 to 4.50 metres begl. The natural deposits encountered ranged from loose to medium dense granular soils and soft and firm cohesive soils. Not unexpectedly, anticipated bearing capacities, assuming conventional trench footings, varied from 60

to 130kN/m^2. A basement exists on the north eastern corner of the site. Made Ground of 1.50m depth below the basement floor slabs was encountered in WS1 and depths to natural strata of the order of 4.00 to 4.50m below final levels should be anticipated in this area.

The depth to natural strata levels over the western half of the site was less varied, however, depths of between 0.40 and 1.90 metres begl were proven. The natural soils encountered were generally firm or firm to stiff cohesive soils with an anticipated bearing capacity of at least 120kN/m^2, however, a significant soft spot to a depth of 2.10 metres begl was encountered in WS14.

The majority of proposed plots are in areas of existing buildings and it is likely that areas of Made Ground or disturbed natural ground, deeper than the shallower of the depths referred to above, will be encountered due to the presence of existing foundations, services and buried structures.

Testing of samples of natural Clays encountered on the site indicate that the Clays are of a moderate shrinkage potential. Sands and slightly gravelly Sands were also encountered on the site; although these will be non-shrinkable they are likely to be frost susceptible. As the natural soils are highly variable laterally it is recommended that a minimum foundation depth of 900mm be adopted for this site. It is assumed that tree species selected for the landscaping of the development will not influence foundations at minimum depths.

The classification of the site for the protection of buried concrete is DS-1, AC-1s.

8.6.1 Plots 21 to 24

Plots 21 to 24 are situated in the south eastern corner of the site, in the area bound by the 2m high retaining wall. Made Ground from 1.40 to 4.50m was encountered in the area of plots 21 to 24 and suitable bearing strata were proved from depths of 2.60 to 4.50 metres begl (WS4 and 6). Suitable bearing strata were not proved across the whole of the area and WS7 was terminated in soft to firm clays at 5.00m depth.

Quite apart from not proving continuous bearing strata in this area, the proximity of the proposed plots to the retaining wall raises stability issues when considering the use of trench fill foundations. Even if ground levels were lowered to accommodate the excavation of trenches for foundations, GRM are still concerned regarding the short term stability of the retaining wall and the possibility of undermining the retaining wall foundations.

GRM have discussed the use of vibro stone columns in this area with Keller Ground Engineering Limited and have been informed that to ensure that the stability of the retaining wall is not compromised by the construction process and resultant vibration, stone columns would need to be at least 2.5m away from the retaining wall. Our estimate is that the build line of the gable end of plot 21 is only 1m away from the site boundary and therefore too close to the existing retaining wall.

Raft foundations would not be acceptable since the zone of influence of the raft will intercept the back of the retaining wall and is likely to cause instability and failure of the wall and foundation strata of the raft.

Piled foundations are the most reasonable foundation solution for plots 21 to 24. However, there are still engineering issues to be addressed. The window sample boreholes taken out in this area as part of the Site Appraisal, have not encountered a stratum suitable for load bearing of a pile and additional investigation is required to determine a suitable load bearing stratum for the piles and to provide parameters for pile design. It is recommended that two cable percussion boreholes should be undertaken in this area to obtain the necessary data.

GRM are concerned that the temporary loading on the retaining wall from a piling rig working in the area of plot 21 could de-stabilise the wall. The piling contractor should be made aware of the proximity of the retaining wall to the proposed plots and should be compelled to ensure that works carried out in this area guard against destabilisation or damage of the wall.

Consideration should be given to amending the layout in light of these development constraints to allow a more cost effective and practical foundation solution to be adopted in this area.

8.6.2 Plots 3 to 20

Plots 3 to 20 form a continuous apartment block adjacent to the northern and western boundaries of the site, straddling the basement area in the north east comer of the site at some point between plots 12 to 14 and 15 to 20. Thus depths to suitable bearing strata for foundations below final site levels will vary from 0.90 to approximately 4.50m with a significant step up in the area between plots 12 to 14 and 15 to 20 and locally up to 1.90m on the north western corner of the block. Depths to suitable bearing strata will also vary due to the presence of existing foundations and services.

Several approaches could be adopted for the foundations for plots 3 to 20, the simplest being traditional strip or trench fill foundations.

Assuming the basement walls are retained in the north east corner of the site to provide stability to the void, trench fill foundations could be constructed from the level of the basement floor. The construction can then be brought up to ground floor slab levels with brick/block work and the voids filled in as the work progresses. Some degree of compaction should be carried out to the fill, particularly to the fill external to the plot where services or hard standing areas may be affected by excess settlements. Although the construction of foundations may partially undermine the foundations of the basement walls, this will only be short term, during the construction of the footings, and since the area is to be back filled to final site levels, long term stability is not an issue.

As the foundations pass from the basement area they will require stepping up in accordance with NHBC recommendations. A net allowable bearing capacity of 120kN/m^2 is recommended. The bearing strata for plots 3 to 20 will vary between medium dense, orange brown Sands, firm, orange brown, slightly gravelly Clay, firm to stiff, dark green brown or orange brown, slightly gravelly Clay and stiff, orange brown, slightly gravelly Clay. On this basis it is recommended that all of the foundations for plots 3 to 20 are reinforced to guard against the effects of differential settlements from the differing bearing strata.

There is no reason not to adopt reinforced foundations constructed on vibro stone columns for plots 3 to 20 given the limitation that it must be ensured that there are no services in the adjacent footpath that may be affected or disrupted by the emplacement works and the stone columns in the western area of the site, where the natural ground is generally shallower, will require pre-boring. Furthermore piled foundations could be adopted for plots 3 to 20, however, further investigation will be required to determine a suitable load bearing formation for the piles.

It is considered that traditional foundation construction will be the optimal solution for plots 3 to 20. If either reinforced foundations constructed on vibro stone columns or piled foundations were adopted then the basement void on the north eastern corner will require filling prior to foundation construction to a standard suitable for supporting the rig or plant mobilised for the works.

8.6.3 Plots 1 and 2

A suitable bearing strata was encountered at depths of at least 0.90m and comprised firm to stiff or stiff, orange brown or green brown, slightly gravelly Clays. It is recommended that strip or trench fill foundations are adopted for plots 1 and 2. Recommended net allowable bearing capacities of 130kN/m2 are appropriate.

8.6.4 Specialist Foundations

Where specialist foundations are adopted, either reinforced foundations constructed on vibro stone columns or piled foundations; a working platform to the satisfaction of the contractor will be required.

Furthermore, where voids have to be back filled, the compaction applied should be such that either the vibro poker or piles can penetrate the compacted ground, provided this provides adequate support for the piling rig. If this is not achievable pre-boring through the compacted back fill maybe required.

9.0 EARTHWORKS

Following the demolition and site clearance, voids will exist on the site in the areas of the former basement on the north eastern corner of the site and lift shaft. Other voids may exist if other basement areas are encountered.

The voids will require filling to bring site levels up to final development levels. Generally the fill for the voids should be clean and inert. The fill should be placed in layers and compacted to provide a stable platform for the development of the site and for services and areas of hard standing, roadways, paths etc.

If the traditional foundation option is adopted then the filling operation of the voids in the area of plots 3 to 20 should be undertaken following the construction of the foundations and during the construction of sub ground floor brick/block work.

If emplacement of vibro stone columns or piling is required for plots 3 to 20 then the filling operation should take place prior to foundation construction. The fill should be compacted sufficiently to provide a stable working platform for piling rigs and other plant, but sufficiently loose to permit penetration of the vibro poker or pile, otherwise an allowance for pre-boring of pile positions should be made.

10.0 DISPOSAL AND CLASSIFICATION

Under current waste regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The analysis results presented in the Site Appraisal Report should be provided to the relevant landfill operators as representative of the sub surface Made Ground to be disposed of to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material distinctly different from the materials described in the Site Appraisal Report are encountered further assessment will be required. If material is classified as hazardous then the development site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating the new Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site are classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated.

The developer/builder is likely to be classed as the waste producer. Therefore, they have a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to cost savings when compared to the traditional side casting or single stockpile of arisings. Likewise making the site as volume neutral as possible will reduce the costs of development.

The contaminated soils (waste) removed to landfill as part of an approved remediation method statement will attract Landfill Tax. GRM can assist in the application for landfill tax exemption if waste is to be removed to protect the end user or controlled waters. It should be noted that contaminated materials arising as part of normal construction activities do not normally attract the exemption. Exemption should be applied for in advance and sufficient time (6 weeks) should be allowed for this prior to development.

11.0 SUMMARY OF FURTHER WORKS

Further recommended works not undertaken yet include:

- Confirmation of recommendations for the protection of water supply pipes
- Inspection of existing retaining walls

Following the completion of the demolition and site clearance the following remedial and validation works will be required:

- Validation testing from final levels to final levels less 1.00m in the area of plots 1 and 2 to ensure that the hydrocarbon hotspot does not impact the rear garden areas
- Validation testing from final levels to final levels less 1.00m in the area of plots 1 and 2 to ensure that the Mercury hotspot does not impact the rear garden areas
- Testing in the area of the hotspot of Mercury (WS12) to delineate the extent of the hotspot.
- Trial pitting and where appropriate chemical testing, should be undertaken to determine the extent of the hydrocarbon hotspots
- Trenching should be undertaken to determine whether a buried tank forms the source of the hydrocarbon hotspot
- Trenching should be undertaken to determine the steepness of the boundary between the natural and Made Ground in the area of the sand pit if required
- Validation testing of any soils imported to back fill basement areas
- Validation inspection and testing will be required of excavations following the removal of any hotspots, to satisfy the Local Authority / NHBC
- Validation of any imported soils for capping rear garden and amenity garden areas
- Completion report
- A flood risk assessment may be required for the site

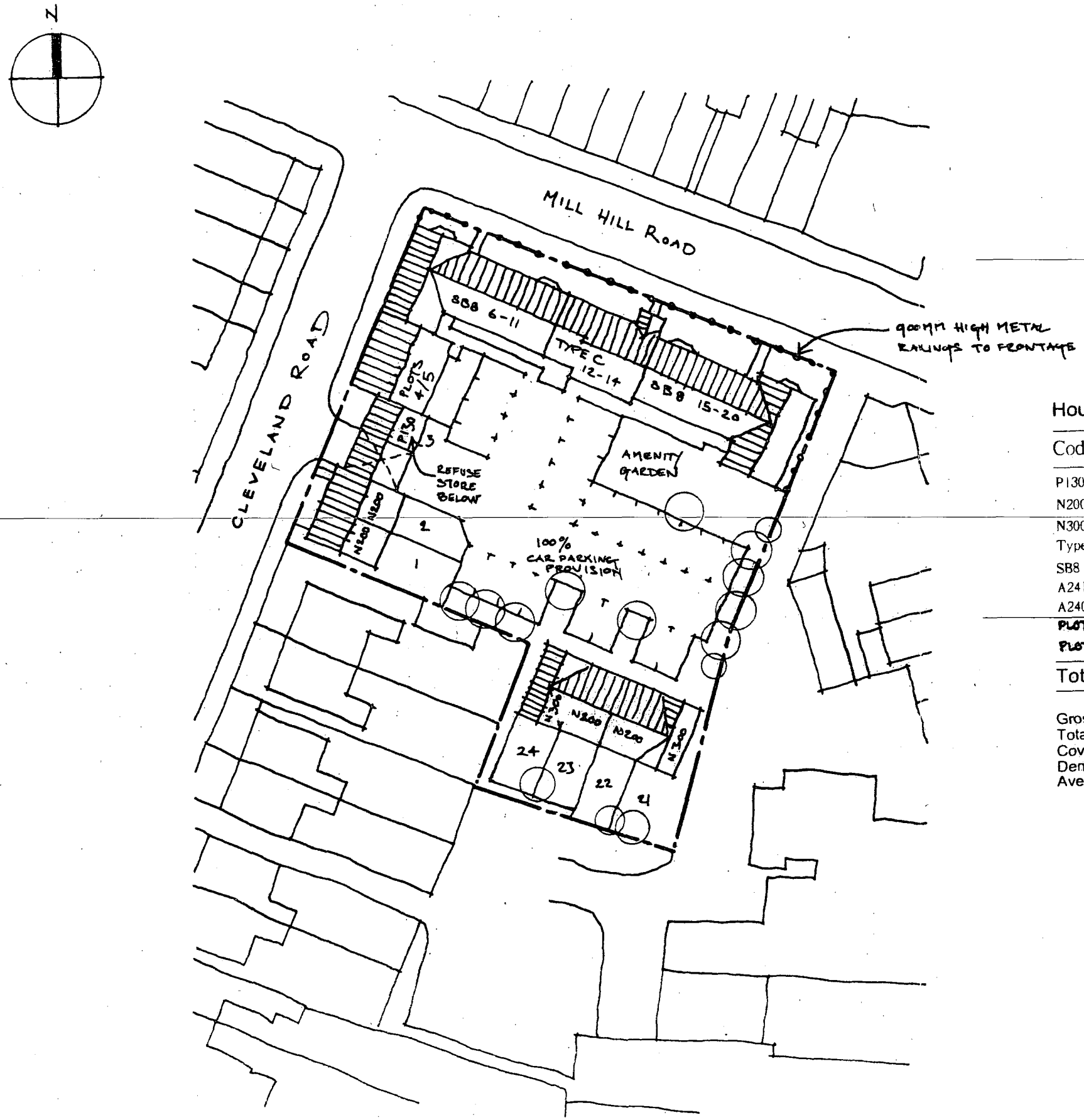
12.0 CONCLUSIONS

The conclusion of the Site Appraisal Report GRM/P3779/ f.1 has shown the site is suitable for the proposed development, assuming compliance with all the recommendations contained within the Appraisal Report and this Remediation Method Statement.

Document prepared by	**Clive Kirby BSc MSc FGS CGeol (Principal Engineering Geologist)**
Reviewed by	**Geoffrey Beckett FGS (Senior Engineering Geologist)**
Approved by	**Dr W S Peacock FGS CGeol (Director)**
When required in-house geological, geotechnical, environmental, structural and civil staff helped to produce this document.	

APPENDIX A

GRM
Development Solutions
geoenvironmental - civil - structural



MILL HILL ROAD, HINCKLEY

House Type Schedule:

Code	sq.ft	House Type Description	No.
P130	556	1 Bed House Type	1
N200	605	2 Bed House Type	4
N300	677	3 Bed House Type	2
Type C	632	2 Bed Apartment Type	3
SB8			
A241	568	2 Bed Apartment Type	6
A240	603	2 Bed Apartment Type	6
PLOT 4	460	1 Bed Site Specific Maisonette	1
PLOT 5	605	2 Bed Site Specific Maisonette	1
Total:			24

Gross Site Area	= 0.5 Acres
Total Footage	= 14,317 sq.ft
Coverage	= 28,634 sq.ft
Density	= 120 plots/ha
Average Plot Footage	= 596 sq.ft

This Feasibility Is Based on the Following

	Y	N	NK
Has site been visited	✓		
Ordnance Survey	✓		
Topographical Survey		✓	
Land Title Plan		✓	
Planning Authority Comments		✓	
Highway Authority Comments		✓	
Design Brief	✓		
Ground Report		✓	
Archaeological Report		✓	
Land Brief	✓		
Outline Consent	✓		
Full Plans Consent		✓	
S.106	✓		
Conservation Area		✓	
Density Restriction			✓
Affordable Housing		✓	
PPG3 Compliant	✓		
Space Standards Adhered To			✓
P.O.S. Standards Adhered To		✓	
N.R.A. Ponds, Ditchs, Easements.		✓	
Sewer/Cable Easements.			✓
Overhead Cables		✓	
Sub Station		✓	
P.O.S. Play Equipment		✓	
Public Footpaths		✓	
Protected Species		✓	
Tree Preservation Orders		✓	
Affordable Housing		✓	
Balancing Pond Required		✓	
Flood Plain		✓	
Outfalls Known		✓	
Tree Belts		✓	
Right Hand Turn Lane		✓	
Footpath Links		✓	
Noise Precautions			✓
Access Links To Future Development		✓	
Ransom Strips			✓
Pumping Station		✓	
Traffic Calming		✓	
Road Categories And Finishes Shown	✓		
Ecological Report Required			✓
Adjoining Properties Shown	✓		

Rev.	Description	Date

DAVID WILSON HOMES
PART OF WILSON BOWDEN plc
FOREST BUSINESS PARK
CARTWRIGHT WAY, BARDON HILL, LEICESTERSHIRE
LE67 1UB
Tel: 01530 276700 Fax: 01530 813491

Development
MILL HILL ROAD
HINCKLEY

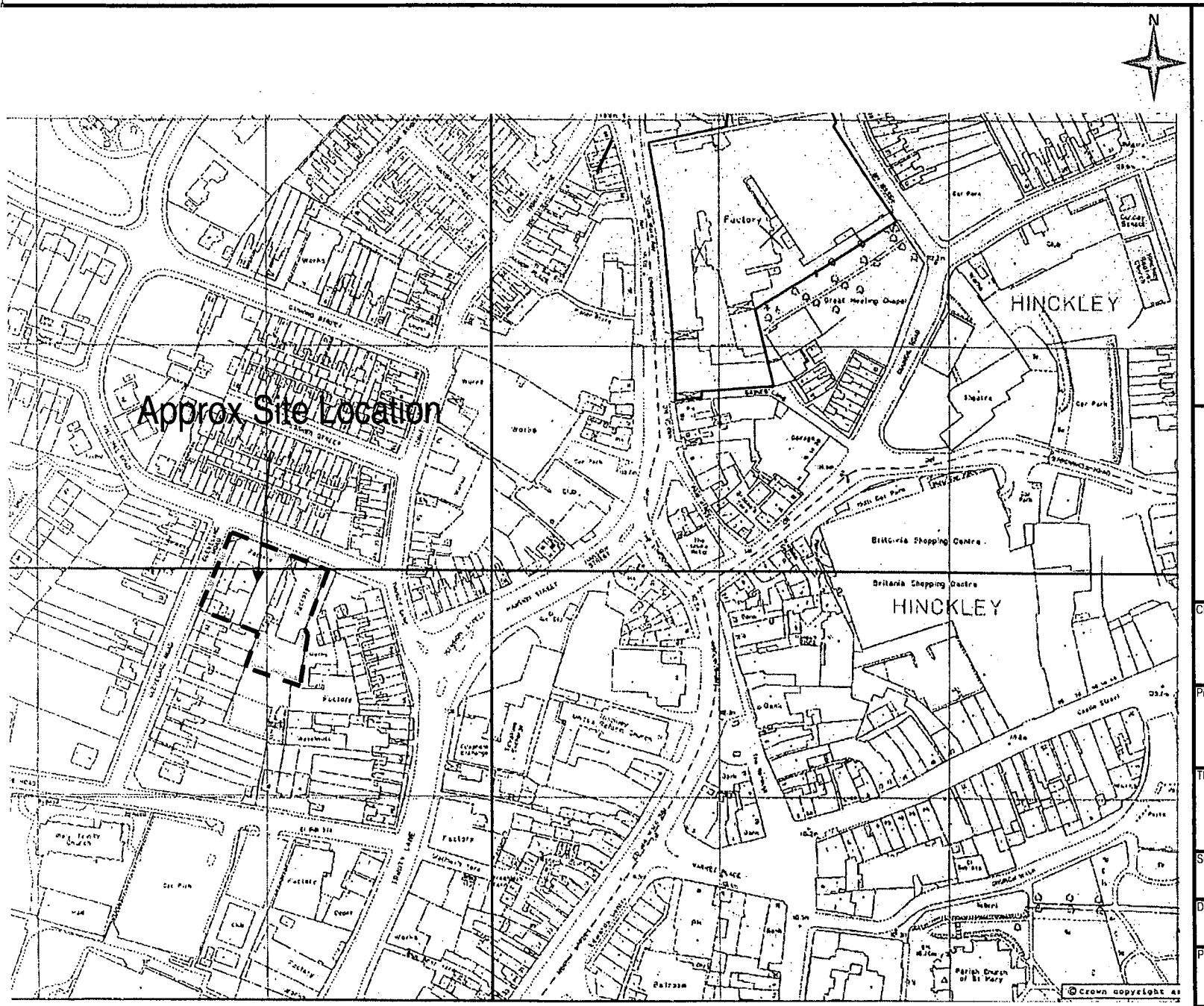
Drawing
FEASIBILITY LAYOUT

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Date: 05.09.06
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SK01

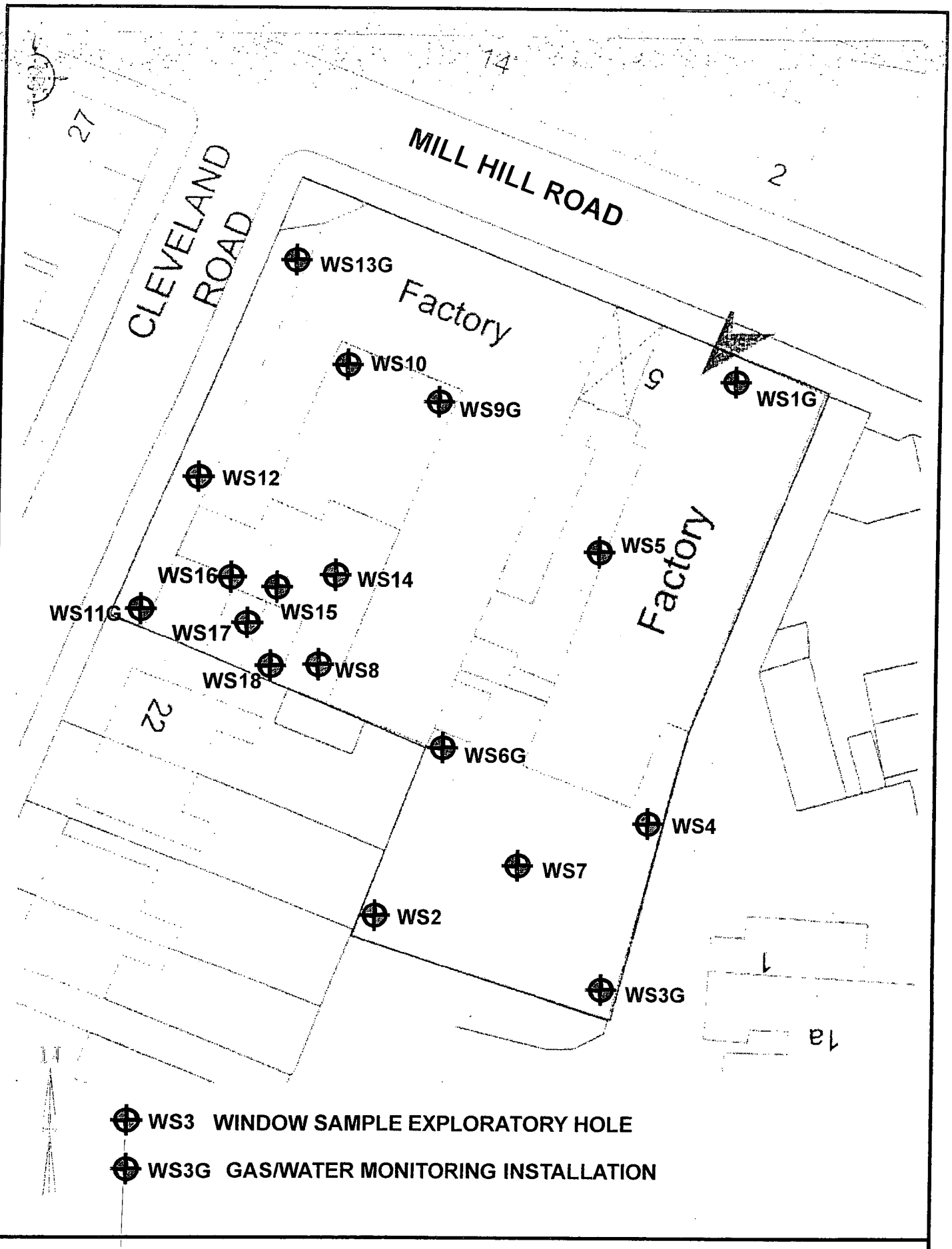
APPENDIX B

GRM Development Solutions
geoenvironmental - civil - structural


N
Approx Site Location
HINCKLEY
HINCKLEY
Britannia Shopping Centre
Britannia Shopping Centre
Factory
Factory
Factory
Factory
Factory
Factory
Factory
Factory
Theatre
Car Park
Car Park
Car Park
Car Park
Garages
Garages
Garages

APPENDIX C

GRM
Development Solutions
geoenvironmental - civil - structural



Exploratory Hole Location Plan of Site at Mill Hill Road, Hinckley.

Scale: NTS. Project ref GRM/P3779

APPENDIX D

GRM Development Solutions
geoenvironmental - civil - structural

CONTAMINANTS	CLEA SGVs**			
	Resi with plants	Resi w/out plants	Allotments	Comm/Ind
Arsenic	20	20	20	500
Cadmium*	*6 7 8* 1 2 8	30	*6 7 8* 1 2 8	1400
Chromium (hexavalent) Chromium (total)	130	200	130	5000
Lead	450	450	450	750
Mercury	8	15	8	480
Selenium	35	260	35	8000
Nickel	50	75	50	5000
Ethylbenzene***	*1 2.5 5* 9 21 41	*1 2.5 5* 16 41 80	*1 2.5 5* 18 43 85	*1 2.5 5* 48,000
Toluene***	*1 2.5 5* 3 7 14	*1 2.5 5* 3 8 15	*1 2.5 5* 31 73 140	*1 2.5 5* 150 350 680
Phenols***	**1 2.5 5** 78 150 280	**1 2.5 5** 21.9 34.4 37.3	**1 2.5 5** 80 155 280	**1 2.5 5** 21.9 43 78.1
	TIER 1 ASSESSMENT CRITERIA			
Boron (water soluble)				
Copper	653	25,000	No Tier 1 Value	760,000
Zinc**	395	6,089		110,452
PAH	As Per Individual Determinand			
Free Cyanide	34	34	34	34
	TIER 1 ASSESSMENT CRITERIA (PAHs)			
Acenaphthene	536	2540	No Tier 1 Values Calculated	88000
Acenaphthylene#	116	356		5372
Anthracene	4300	12700		351000
Benzo(a)anthracene	4.79	8.47		290
Benzo(a)pyrene ^	1.1	1.36		29.4
Benzo(b)fluoranthene	5.54	8.47		290
Benzo(ghi)perylene	62.6	84.7		2900
Benzo(k)fluoranthene	55.4	84.7		2900
Chrysene	479	847		29000
Dibenzo(ah)anthracene ^	1.03	1.29		29.5
Fluoranthene	796	1690		57700
Fluorene	454	1690		57700
Ideno(1,2,3-cd)pyrene	6.04	8.47		290
Napthalene	4.4	4.4		98
Phenanthrene#	1853	3013		53875
Pyrene	590	1270		43400

Revised May 2007

All figures are in mg/kg

GRM Tier 1 Assessment Criteria are Atkins Atrisk Values

^ Values calculated using CLEA UK

Acenaphthylene and Phenanthrene Tier 1 values calculated by GRM using SNIFFER.

NL: No Limit

* Cd values linked to *pH* of respective sample

** Values for Zinc calculated using the SNIFFER Model

*** SGV's linked to Soil Organic Matter (SOM) content of sample. SGV's assume that free phase is not present.

SGV's for Phenols (Residential w/out plant uptake & Comm/ind) are x 1000

GRM TIER 1 ASSESSMENT CRITERIA - PETROLEUM HYDROCARBON FRACTIONS									
LAND USE / CONTAMINANT	Residential **with** plant uptake			Residential **without** plant uptake			Commercial & industrial		
	% Soil Organic Matter (equivalent FOC)								
	1% (0.006)	2.5% (0.014)	5% (0.029)	1% (0.006)	2.5% (0.014)	5% (0.029)	1% (0.006)	2.5% (0.014)	5% (0.029)
ALIPHATIC									
C6-C8	5.37	11.9	22.7	5.37	11.9	22.7	242	535	1019
C8-C10	1.46	3.55	7	1.46	3.56	7.05	66	160	317
C10-C12	8.53	20.8	40.1	8.6	21.2	41.7	29900	29600	29800
C12-C16	40.7	93.5	162	42.1	101	187	29900	29600	29800
C16-35	16100	16100	16200	26100	26700	27300	618000	610000	613000
AROMATIC									
C5-7 (benzene)	0.57	1.32	2.57	0.61	1.41	2.75	26.9	62.1	121
C7-8 (toluene)	0.62	1.46	2.85	0.69	1.63	3.18	30.4	71.1	139
C8-C10	1.08	2.7	5.34	2.39	5.88	11.6	107	262	512
C10-C12	1.92	4.74	9.36	14.2	34.1	63.9	625	1448	2583
C12-C16	2.13	5.42	10.6	72.4	152	235	12150	12250	12300
C16-C21	116	129	133	289	338	361	9160	9230	9180
C21-C35	160	159	158	397	420	402	9380	9300	9250

Revised May 2007

GRM Tier 1 Assessment Criteria calculated as Generic Assessment Criteria using CLEA UK (SOM content as stated, pH 7).

All figures are reported in mg/kg.

UK Drinking Water Standards (UKDWS)

Parameter	Concentration	Units
Acrylamide	0.1	µg/l
Aluminium	200	µgAl/l
Ammonium	0.5	mgNH4/l
Antimony	5	µgSb/l
Arsenic	10	µgAs/l
Benzene	1	µg/l
Benzo(a)pyrene	0.01	µg/l
Boron	1	mgB/l
Bromate	10	µgBrO3/l
Cadmium	5	µgCd/l
Chromium	50	µgCr/l
Chloride (i)	250	mgCl/l
Conductivity (i)	2500	µS/cm at 20°C
Copper(ii)	2	mgCu/l
Cyanide	50	µgCN/l
1, 2 dichloroethane	3	µg/l
Epichlorohydrin	0.1	µg/l
Fluoride	1.5	mgF/l
Hydrogen ion	10	pH value
Iron	200	µgFe/l
Lead (ii)	25	µgPb/l
Manganese	50	µgMn/l
Mercury	1	µgHg/l
Mineral Oil (TPH)	10	µg/l
Nickel (ii)	20	µgNi/l
Nitrate (iii)	50	mgNO3/l
Nitrite (iii)	0.5	mgNO2/l
Phenol	0.5	µg/l
Polycyclic aromatic hydrocarbons (vii)	0.1	µg/l
Selenium	10	µgSe/l
Sodium	200	mgNa/l
Sulphate (i)	250	mgSO4/l
Tetrachloroethene and Trichloroethene (viii)	10	µg/l
Tetrachloromethane	3	µg/l
Trihalomethanes: Total (ix)	100	µg/l
Vinyl chloride	0.5	µg/l
Zinc	5000	µg/l

Pesticides		
Aldrin	0.03	µg/l
Dieldrin	0.03	µg/l
Heptachlor	0.03	µg/l
Heptachlor epoxide	0.03	µg/l
other pesticides	0.1	µg/l
Pesticides: Total (vi)	0.5	µg/l

Ref: UK Water Supply (Water Quality) Regulations 2000

Environmental Quality Standards (EQS) Groundwater Thresholds for List 1 & 2 Substances

Table 1: Environmental Quality Standards (EQS) for List 1 Dangerous Substances

Substance	All Freshwater EQS (ug/l)
Mercury	1
Cadmium	5
Hexachlorocyclohexane	0.1
Carbon tetrachloride	12
Total DDT	0.025
pp DDT	0.01
Pentachlorophenol	2
Dieldrin	0.01
Isodrin	0.005
Aldrin	0.01
Endrin	0.005
Total Drins	0.03
Hexachlorobenzene	0.03
Hexachlorobutadiene	0.1
Chloroform	12
1,2-dichloroethane	10
Trichlorethylene	10
Perchlorethylene	10
Trichlorobenzene	0.4

Table 2a: Environmental Quality Standards (EQS) for List 2 Dangerous Substances

Substance	EQS Type	All Freshwater EQS (ug/l)	Substance	EQS Type	All Freshwater EQS (ug/l)
1,1,1-Trichloroethane	Annual average	100	Fenitrothion	Annual average	0.01
1,1,2-Trichloroethane	Annual average	400	Flucofuron	95 percentile	1
2,4-D (ester)	Annual average	1	Iron (dissolved)	Annual average	1000
2,4-D (non-ester)	Annual average	40	Lead (dissolved)	Annual average	Hardness related (see table 2b for details)
2,4-Dichlorophenol	Annual average	20	Linuron	Annual average	2
2-Chlorophenol	Annual average	50	Malathion	Annual average	0.01
4-Chloro-3-methyl-phenol	Annual average	40	Mecoprop	Annual average	20
Arsenic (dissolved)	Annual average	50	Mevinphos	Maximum concentration	0.02
Atrazine & Simazine	Annual average	2	Naphthalene	Annual average	10
Azinphos-methyl	Annual average	0.01	Nickel (dissolved)	Annual average	Hardness related (see table 2b for details)
Bentazone	Annual average	500	Omethoate	Annual average	0.01
Benzene	Annual average	30	PCSDs	95th percentile	0.05
Biphenyl	Annual average	25	Permethrin	95th percentile	0.01
Boron (dissolved)	Annual average	2000	pH	95th percentile	06-Sep
Chloronitrotoluenes	Annual average	10	Sulcofuron	95th percentile	25
Chromium (dissolved)	Annual average	Hardness related (see table 2b for details)	Toluene	Annual average	50
Copper (dissolved)	Annual average	Hardness related (see table 2b for details)	Triazaphos	Annual average	0.005
Cyfluthrin	95th percentile	0.001	Tributyltin	Maximum concentration	0.02
Demeton	Annual average	0.5	Trifluralin	Annual average	0.1
Dichlorvos	Annual average	0.001	Triphenyltin	Maximum concentration	0.02
Dichlorvos	Maximum concentration	-	Vanadium (dissolved)	Annual average	Hardness related (see table 2b for details)
Dimethoate	Annual average	1	Xylene (m and p, o)	Annual average	30
Endosulphan	Annual average	0.003	Zinc (total)	Annual average	Hardness related (see table 2b for details)
Ammonia (as NH3)		15	500		

Table 2b: Environmental Quality Standards (EQS) for hardness related List 2 dangerous substances

Substance	EQS type	EQS (ug/l) for Hardness bands (mg/l CaCO3) 0-50	>50-100	>100-150	>150-200	>200-250	>250
Freshwaters, suitable for all fishlife							
Copper (dissolved)	Annual average	1	6	10	10	10	28
Copper (dissolved)	95th percentile	5	22	40	40	40	112
Nickel (dissolved)	Annual average	50	100	150	150	200	200
Vanadium (dissolved)	Annual average	20	20	20	20	60	60
Freshwaters, suitable for Salmonid (game) fish							
Chromium (dissolved)	Annual average	5	10	20	20	50	50
Lead (dissolved)	Annual average	4	10	10	20	20	20
Zinc (total)	Annual average	8	50	75	75	75	125
Zinc (total)	95th percentile	30	200	300	300	300	500
Freshwaters, suitable for Cyprinid (coarse) fish							
Chromium (dissolved)	Annual average	150	175	200	200	250	250
Lead (dissolved	Annual average	20	125	125	250	250	250
Zinc (total)	Annual average	75	175	250	250	250	500
Zinc (total)	95th percentile	300	700	1000	1000	1000	2000

Revised 31/03/06

Contaminant Thresholds for Subsurface Water Pipes

Contaminant	Material selection Threshold Level (mg/kg dried soil)
Corrosion	
Sulphate (SO4)	2000
Sulphur (S)	5000
Sulphide (S)	250
pH	<pH5, >pH8
Toxic Substances	
Antimony (Sb)	10
Arsenic (As)	10*
Cadmium (Cd)	3
Chromium (hexavalent) (Cr)	25
Chromium (total)	600
Cyanide (free) (Cn)	25*
Cyanide (complexed) (Cn)	250*
Lead (Pb)	500
Mercury (Hg)	1
Selenium (Se)	3
Thiocyanate (SCN)	50
Organic Contaminants	
Coal Tar	50
Cyclohexane extractable	50
Phenol	5
Poly Aromatic Hydrocarbons	50
Toluene extractable	50
TPH DRO (diesel, kerosene)	100
Petrol	10
Mineral oils	1000

* It is not recommended that water pipes should be laid in sites where these substances are identified or suspected

Ref: Water Regulations Advisory Scheme (WRAS) (No. 9-04-03 Issue 1)

APPENDIX E

GRM Development Solutions
geoenvironmental - civil - structural

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 26-Sep-06

CONDITIONS. Overcast / Wet

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.0	19.4	0.0	1000	Dry	4.00
WS 3	0.0	4.3	13.5	0.0	1000	Dry	4.08
WS 5	0.0	0.3	20.2	0.0	1000	Dry	7.00
WS 6	0.8	2.8	13.9	0.0	1000	4.82	6.00
WS 9	0.0	0.5	20.2	0.0	1000	Dry	4.04
WS 11	0.0	0.5	20.1	0.0	1000	Dry	4.35
WS 13	0.0	0.0	20.4	0.0	1000	Dry	3.98

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 03-Oct-06

CONDITIONS. Overcast / Dry

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ

Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.7	19.3	0.0	983	Dry	4.00
WS 3	0.0	6.5	10.6	0.0	983	Dry	4.08
WS 5	0.0	1.4	19.5	0.0	983	Dry	7.00
WS 6	0.0	4.1	10.5	0.0	983	4.08	6.00
WS 9	0.0	1.6	18.9	0.0	983	Dry	4.04
WS 11	0.0	0.7	17.1	0.0	983	Dry	4.35
WS 13	0.0	0.3	19.9	0.0	983	Dry	3.98

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 10-Oct-06

CONDITIONS. Overcast / Dry

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.8	19.3	0.0	1000	Dry	4.00
WS 3	0.0	7.8	9.6	0.0	1000	Dry	4.08
WS 5	0.0	1.7	19.1	0.0	1000	Dry	7.00
WS 6	0.0	4.4	11.2	0.0	1000	4.42	6.00
WS 9	0.0	1.7	19.0	0.0	1000	Dry	4.04
WS 11	0.0	1.4	18.7	0.0	1000	Dry	4.35
WS 13	0.0	0.3	19.9	0.0	1000	Dry	3.98

Notes

N/D = Not Detected
N/R = Not Recorded
% = By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 16-Oct-06

CONDITIONS. Overcast / Dry

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire.
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.6	19.3	0.0	1002	Dry	4.00
WS 3	0.0	7.5	9.3	0.0	1002	Dry	4.08
WS 5	0.0	1.4	19.2	0.0	1002	Dry	7.00
WS 6	0.0	4.2	10.9	0.0	1002	4.38	6.00
WS 9	0.0	1.5	18.9	0.0	1002	Dry	4.04
WS 11	0.0	1.0	19.1	0.0	1002	Dry	4.35
WS 13	0.0	0.4	19.7	0.0	1002	Dry	3.98

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 25-Jul-07

CONDITIONS. OVERCAST/WET

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ

Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.8	19.6	0.2	992	Dry	4.00
WS 3		Not Found					
WS 5	0.0	1.4	18.8	0.4	992	Dry	7.00
WS 6	0.0	5.5	7.2	0.6	992	3.75	6.00
WS 9	0.0	2.0	18.9	0.7	992	Dry	4.04
WS 11	0.0	1.3	16.5	0.7	992	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 06-Aug-07

CONDITIONS. Bright Sunny Clear

OPERATOR. Tony Heron

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.6	19.3	0.2	994	Dry	4.00
WS 3	0.0	8.0	8.8	0.2	992	Dry	4.07
WS 5	0.0	0.7	20.3	0.2	993	Dry	7.00
WS 6	0.0	5.8	7.7	0.8	992	3.66	6.00
WS 9	0.0	2.2	18.3	0.9	993	Dry	4.04
WS 11	0.0	1.6	19.2	0.7	993	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 15-Aug-07

CONDITIONS. OVERCAST/WET

OPERATOR. stephen morris

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.8	18.7	0.0	976	Dry	4.00
WS 3	0.0	6.2	11.6	0.0	976	Dry	4.08
WS 5	0.0	1.6	19.6	0.0	976	Dry	7.00
WS 6	0.0	6.8	6.4	0.0	976	3.53	6.00
WS 9	0.0	2.4	18.1	0.0	976	Dry	4.04
WS 11	0.0	1.5	17.7	0.0	976	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 23-Aug-07

CONDITIONS. CLEAR/SUNNY

OPERATOR. stephen morris

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.6	18.8	0.0	1002	Dry	4.00
WS 3	0.0	10.0	9.0	0.0	1002	Dry	4.08
WS 5	0.0	0.9	19.3	0.0	1002	Dry	7.00
WS 6	0.0	6.2	9.2	0.0	1002	4.22	6.00
WS 9	0.0	1.9	18.6	0.0	1002	Dry	4.04
WS 11	0.0	0.0	20.1	0.0	1002	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 06-Sep-07

CONDITIONS. OVERCAST/DRY

OPERATOR. stephen morris

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.5	18.9	0.0	1016	Dry	4.00
WS 3	0.0	11.0	10.6	0.0	1016	Dry	4.08
WS 5	0.0	0.4	19.8	0.0	1016	Dry	7.00
WS 6	0.0	7.2	4.6	0.0	1016	DRY	6.00
WS 9	0.0	2.0	18.2	0.0	1016	Dry	4.04
WS 11	0.0	1.0	19.4	0.0	1016	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

MONITORING OF SOIL GASES & GROUNDWATER

PROJECT NO. **P3779**

SITE. Mill Hill Road, Hinkley

CLIENT. David Wilson Homes (East Midlands)

DATE. 20-Sep-07

CONDITIONS. overcast/wet

OPERATOR. stephen morris

EQUIPMENT. **LMSxi Gas Data Recorder**

Ground Risk Management Limited
Bretby Business Park
Ashby Road
Burton-upon-Trent
Staffordshire
DE15 0YZ
Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: mail@grm-uk.com

Borehole / Well No	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Oxygen (O_2) %	Flow L/hr	Atmospheric Pressure	Depth to Groundwater	Depth to Borehole / Well Base
WS 1	0.0	1.8	18.8	0.0	996	Dry	4.00
WS 3	0.0	4.2	14.5	0.0	996	Dry	4.08
WS 5	0.0	1.7	19.0	0.0	996	Dry	7.00
WS 6	0.0	6.9	3.1	0.0	996	DRY	6.00
WS 9	0.0	2.1	18.5	0.0	996	Dry	4.04
WS 11	0.0	3.0	17.6	0.0	996	Dry	4.35
WS 13		under	car				

Notes

N/D	=	Not Detected
N/R	=	Not Recorded
%	=	By Volume

Signed (Operator) .....

APPENDIX F

GRM Development Solutions
geoenvironmental - civil - structural

Our Ref: EFS/073443M (Ver. 1)
Your Ref: P3779

August 20, 2007

TES Bretby
PO Box 100
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0XD

Telephone: 01283 554400
Facsimile: 01283 554422

Mr C Kirby
Ground Risk Management
Geotechnical, Structural and
Mining Consultants
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

For the attention of Mr C Kirby

Dear Mr Kirby

SOIL Sample Analysis - Mill Hill Lane

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 07/09/07 when they will be discarded. Please call 01283 554500 for an extension of this date.
Please be aware that from 1 January 2003 our policy for the retention of paper based laboratory records and analysis reports will be 3 years.

The work was carried out in accordance with Environmental Services Group Standard Terms and Conditions of Contract.

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

Yours sincerely

for TES Bretby

J Elstub
Project Co-ordinator
01283 554500

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

TES Report No. EFS/073443M (Ver. 1)

Ground Risk Management
Geotechnical, Structural and
Mining Consultants
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Site: Mill Hill Lane

The 8 samples described in this report were logged for analysis by TES Bretby on 27-Jul-2007.
The analysis was completed by: 20-Aug-2007

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by TES Bretby Laboratories.

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Table of GRO Results (Page 3)
Table of TPH (Si) banding (std) (Page 4)
GC-FID Chromatograms (Pages 5 to 20)
Table of Report Notes (Page 21)

On behalf of
TES Bretby :
J Elstub

Project Co-ordinator

Date of Issue: 20-Aug-2007

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105°C unless otherwise stated. (except QC samples)
TES Bretby accepts no responsibility for any sampling not carried out by our personnel.

Sample Descriptions

Client : Ground Risk Management

Site : Mill Hill Lane

Report Number : S07_3443M

Lab ID Number	Client ID	Description
CL/0720568	WS16 3.5	Brown SAND
CL/0720569	WS17 2.0	Brown CLAY
CL/0720570	WS17 3.5	Brown SAND
CL/0720571	WS17 4.0	Brown SAND
CL/0720572	WS18 3.5	Brown SAND
CL/0720573	WS16 0.5	Brown CLAY
CL/0720574	WS17 0.5 (NVM)	Brown MADE GROUND
CL/0720575	WS18 0.5	Brown CLAY

Units :		%	mg/kg	mg/kg	%													
Method Codes :		TMSS	TPHFIDUS	GROHSA	SSL													
Method Reporting Limits :		0.2	10.0	0.1	0.1													
Accreditation Code:		U			N													
TES ID Number CL/	Client Sample Description	Tot.Moisture @ 105C	TPH by GCFID (AR/SI)	GRO (AA)	Organic Matter %													
0720573	WS16 0.5	21.8	Req	Req	1.5													
0720568	WS16 3.5	15.7	Req	Req	0.1													
0720574	WS17 0.5 (NVM)	20.7	Req	Req	4													
0720569	WS17 2.0	19.7	Req	Req	0.5													
0720570	WS17 3.5	12.3	Req	Req	0.2													
0720571	WS17 4.0	13.3	Req	Req	0.1													
0720575	WS18 0.5	23.3	Req	Req	1													
0720572	WS18 3.5	13.8	Req	Req	0.1													

TES Bretby

PO Box 100, Bretby Business Park,

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Client Name	**Ground Risk Management**
Contact	Mr C Kirby

Mill Hill Lane

Soils Sample Analysis

Date Printed	20-Aug-07
Report Number	EFS/073443M
Table Number	1

TES Bretby

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: Ground Risk Management: Mill Hill Lane
Job Number: S07_3443
Directory: 0816HSA.GC6
Method: Headspace GCFID
Accreditation Code: N

Matrix: Soil
Date Booked in: 27-Jul-07
Date extracted: 16-Aug-07
Date Analysed: 17-Aug-07

			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
*	CL0720568	WS16 3.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2	<0.2	<0.2	<0.2
*	CL0720569	WS17 2.0	<0.01	<0.01	0.020	0.039	0.039	<0.2	<0.2	<0.2	35.3	35.5
*	CL0720570	WS17 3.5	<0.029	<0.029	<0.029	<0.029	<0.029	<0.6	<0.6	<0.6	<0.6	<0.6
*	CL0720571	WS17 4.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2	<0.2	<0.2	<0.2
*	CL0720572	WS18 3.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2	<0.2	<0.2	<0.2
*	CL0720573	WS16 0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.3	<0.3	<0.3	<0.3	<0.3
*	CL0720574	WS17 0.5 (NVM)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.3	<0.3	<0.3	<0.3	<0.3
*	CL0720575	WS18 0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<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.
Xylenes have been deducted from the C8-C10 band to give the aliphatic fraction, however aromatic compounds may still be contributing to this fraction.

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: Ground Risk Management : Mill Hill Lane
Job Number: S07_3443
QC Batch Number: 72279
Directory: D:\TES\DATA\Y2007\0806TPH_GC7\050B9601.D
Method: Ultra Sonic

Separation: Silica gel
Eluents: Hexane, DCM

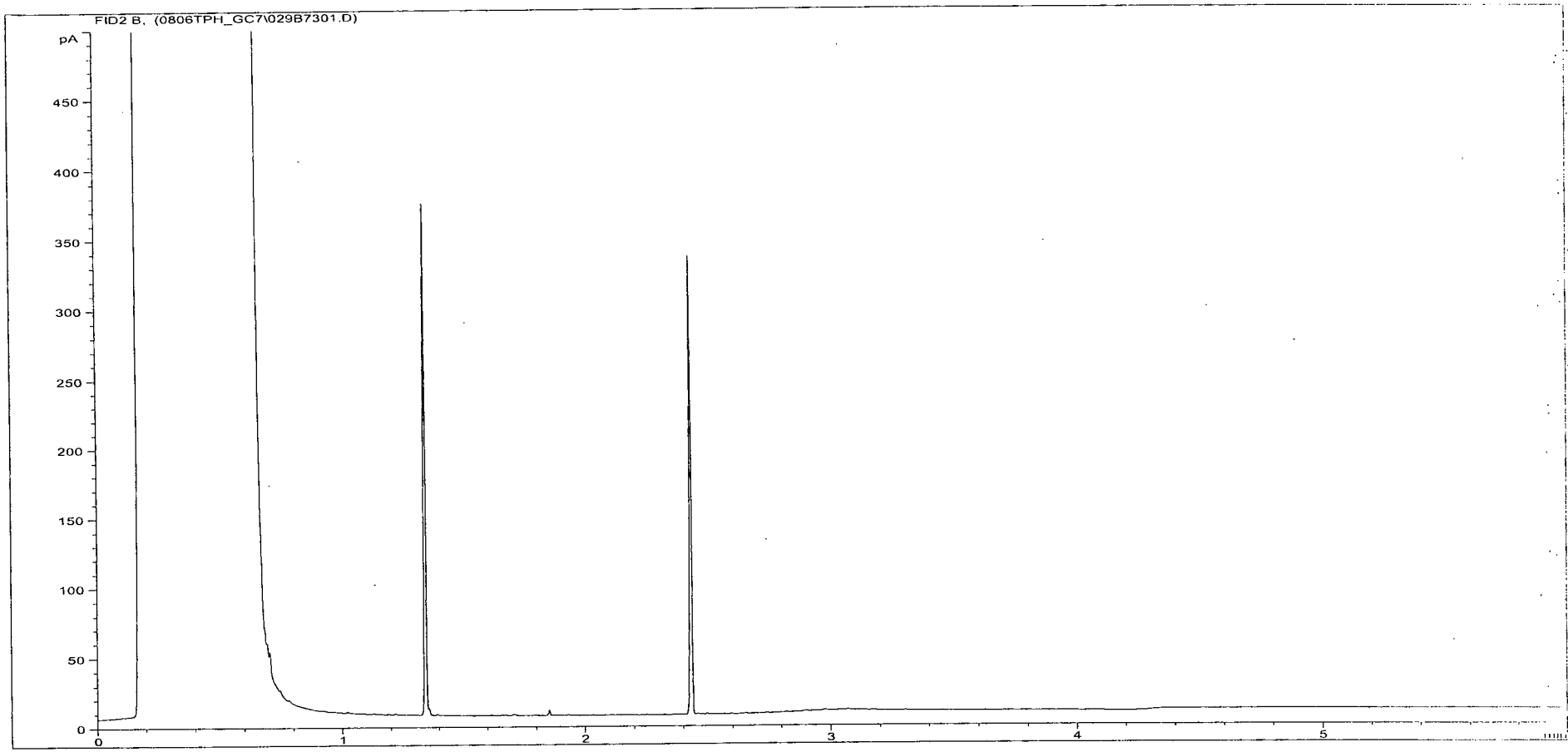
Matrix: Soil
Date Booked in 27-Jul-07
Date Extracted 03-Aug-07
Date Analysed 07-Aug-07

This sample data is not accredited.

		Concentration, (mg/kg) - as dry weight.									
		>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35	
Sample ID	**Client ID**	**Aliphatics**	**Aromatics**	**Aliphatics**	**Aromatics**	**Aliphatics**	**Aromatics**	**Aliphatics**	**Aromatics**	**Aliphatics**	**Aromatics**
CL0720568	WS16 3.5	<5	<5	<5	<5	<5	<5	<5	<5	<10.39	<10.39
CL0720569	WS17 2.0	111.3	<5	690	200	1110	588	118.8	115.1	<10.91	18.8
CL0720570	WS17 3.5	<5	<5	<5	<5	<5	<5	<5	<5	<9.99	<9.99
CL0720571	WS17 4.0	<5	<5	<5	<5	<5	<5	<5	<5	<10.10	<10.10
CL0720572	WS18 3.5	<5	<5	<5	<5	<5	<5	<5	<5	<10.16	<10.16
CL0720573	WS16 0.5	<5	<5	<5	<5	<5	<5	<5	<5	<11.20	<11.20
CL0720574	WS17 0.5 (NVM)	<5	<5	<5	<5	<5	<5	<5	<5	<11.05	17.9
CL0720575	WS18 0.5	<5	<5	<5	<5	<5	<5	<5	<5	<11.42	<11.42

Results corrected to dry weight at 105°C where appr opriate, In accordance with the MCERTS standard.

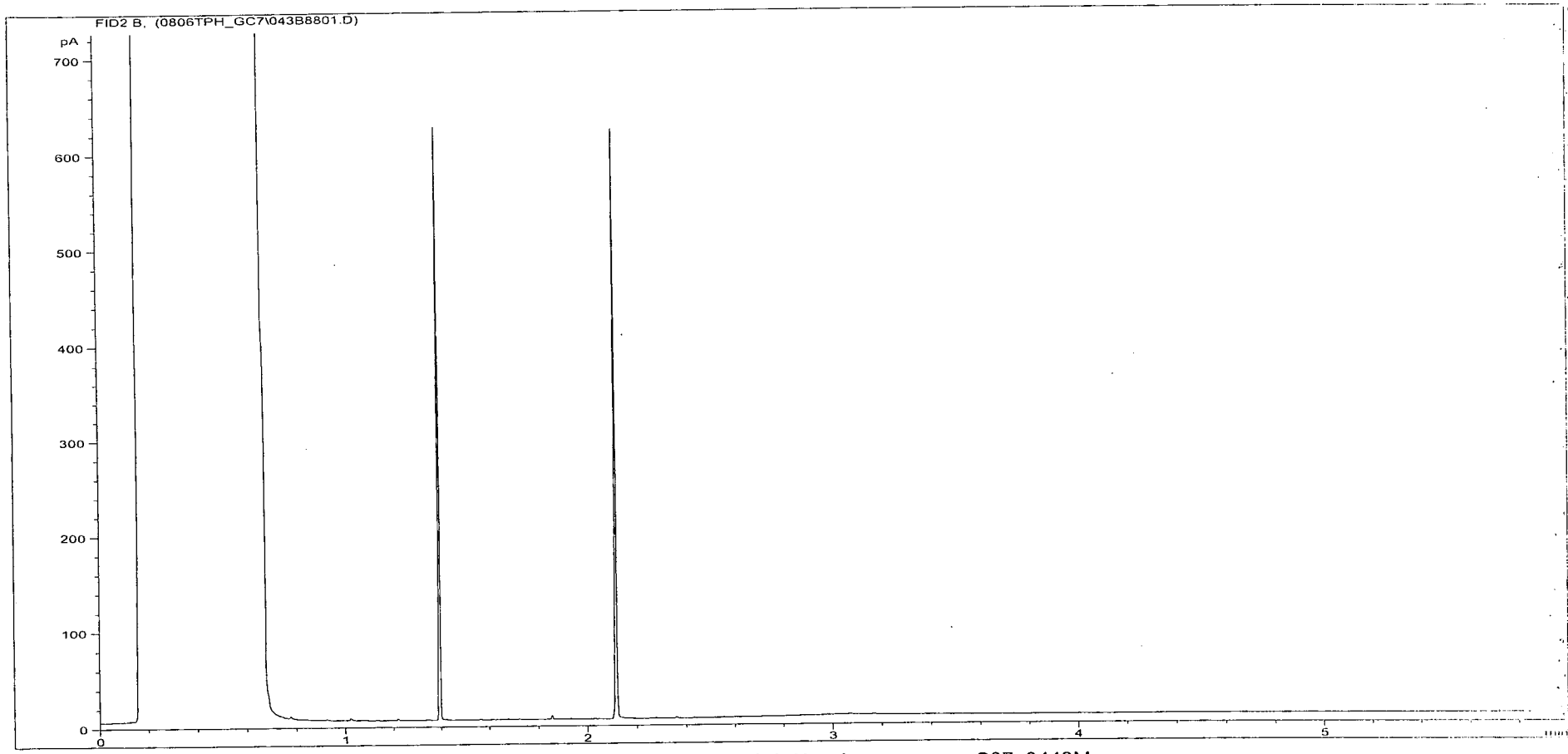
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720568ALI	**Job Number:**	S07_3443M
Multiplier:	14.44	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS16 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\029B7301.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

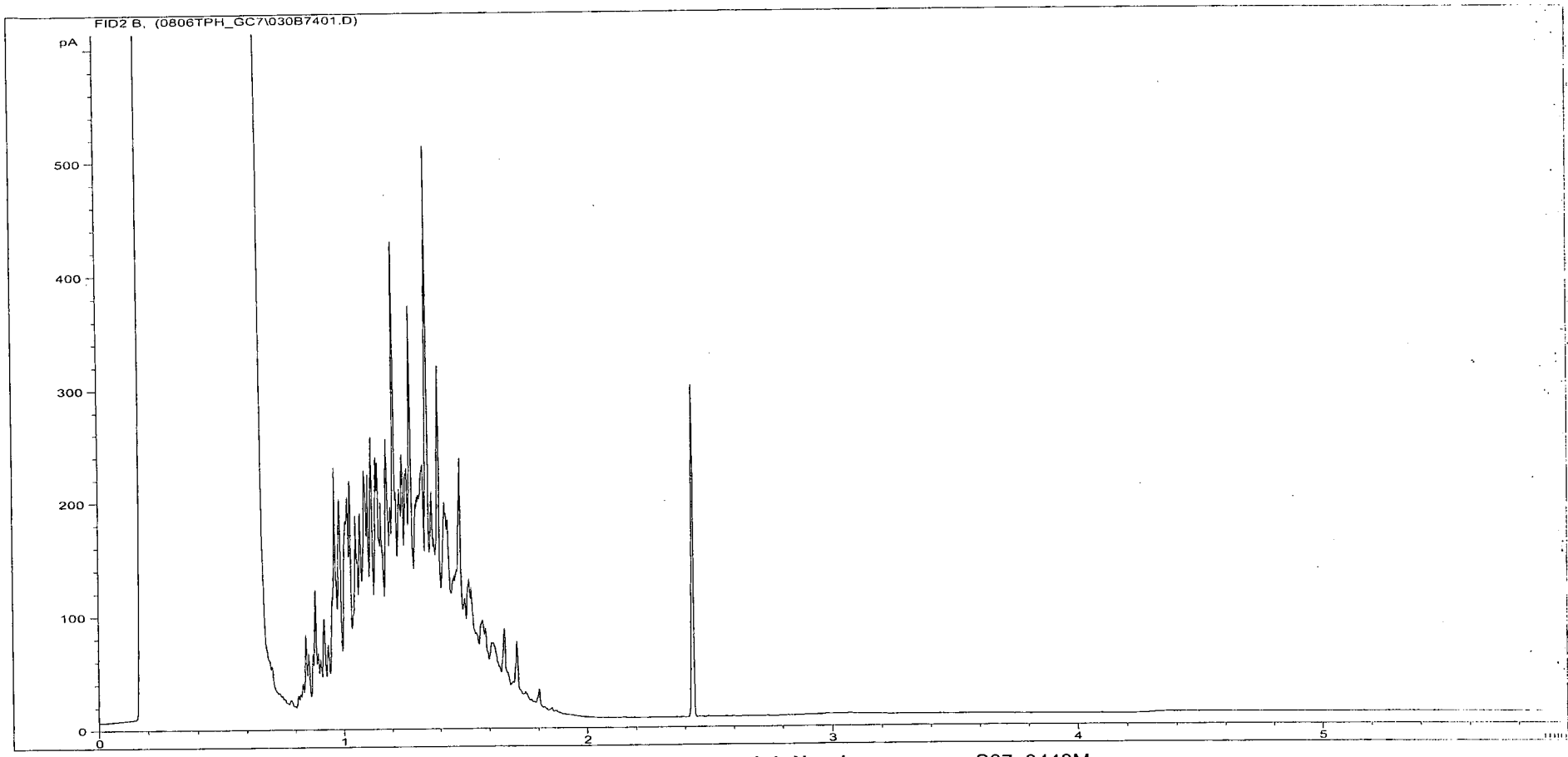
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720568ARO	**Job Number:**	S07_3443M
Multiplier:	11.02	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS16 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\043B8801.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

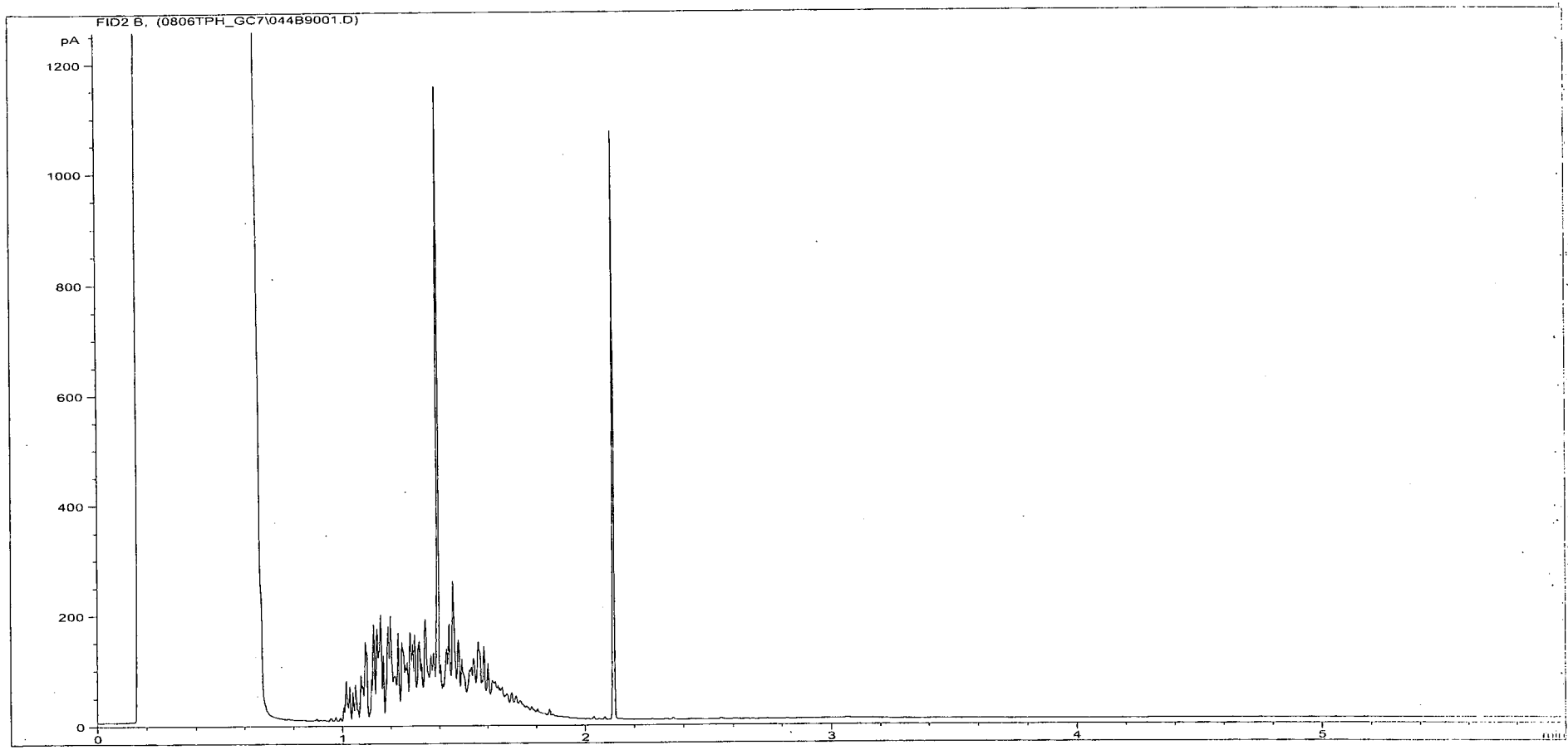
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720569ALI	**Job Number:**	S07_3443M
Multiplier:	13.68	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 2.0
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\030B7401.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

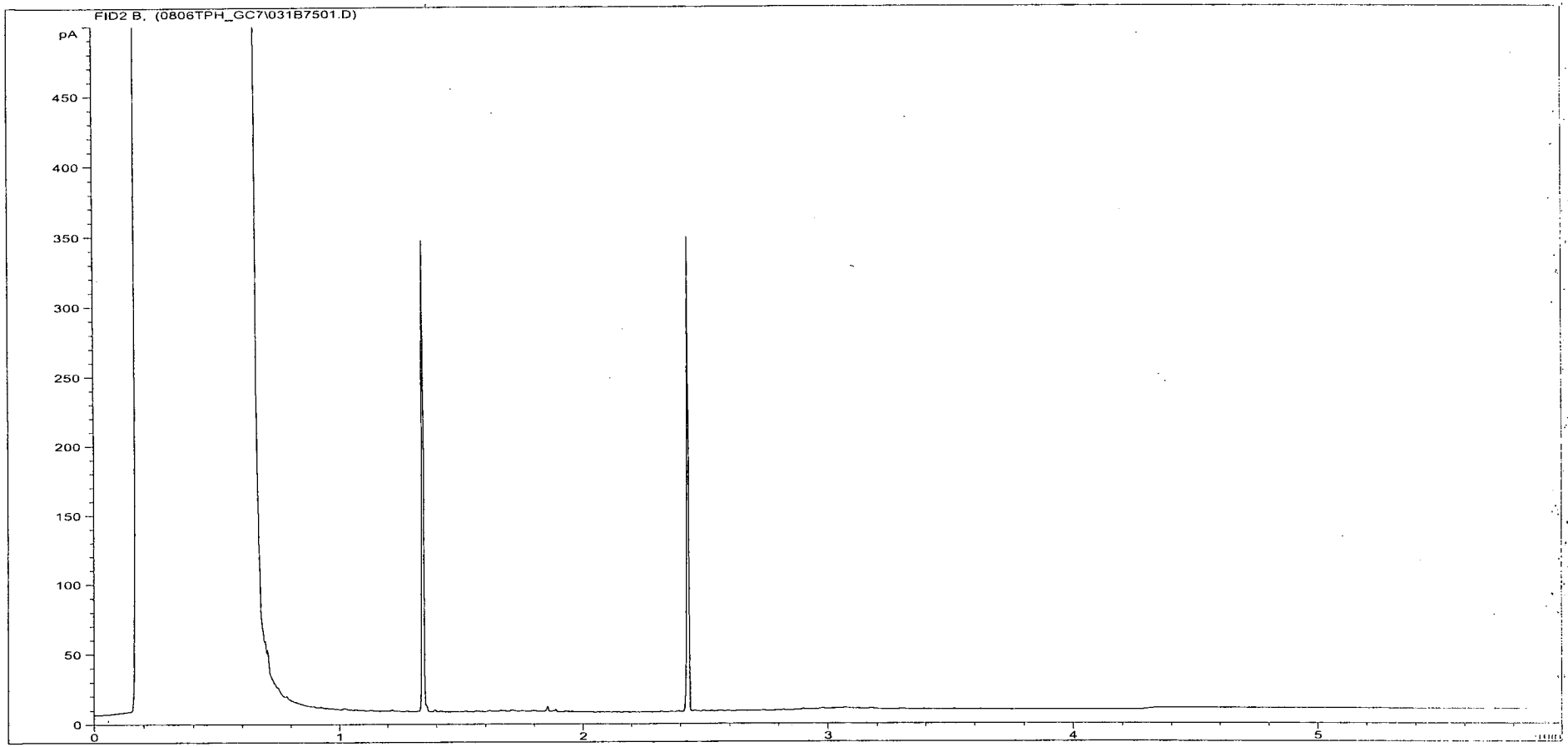
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720569ARO	**Job Number:**	S07_3443M
Multiplier:	11.02	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 2.0
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\044B9001.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

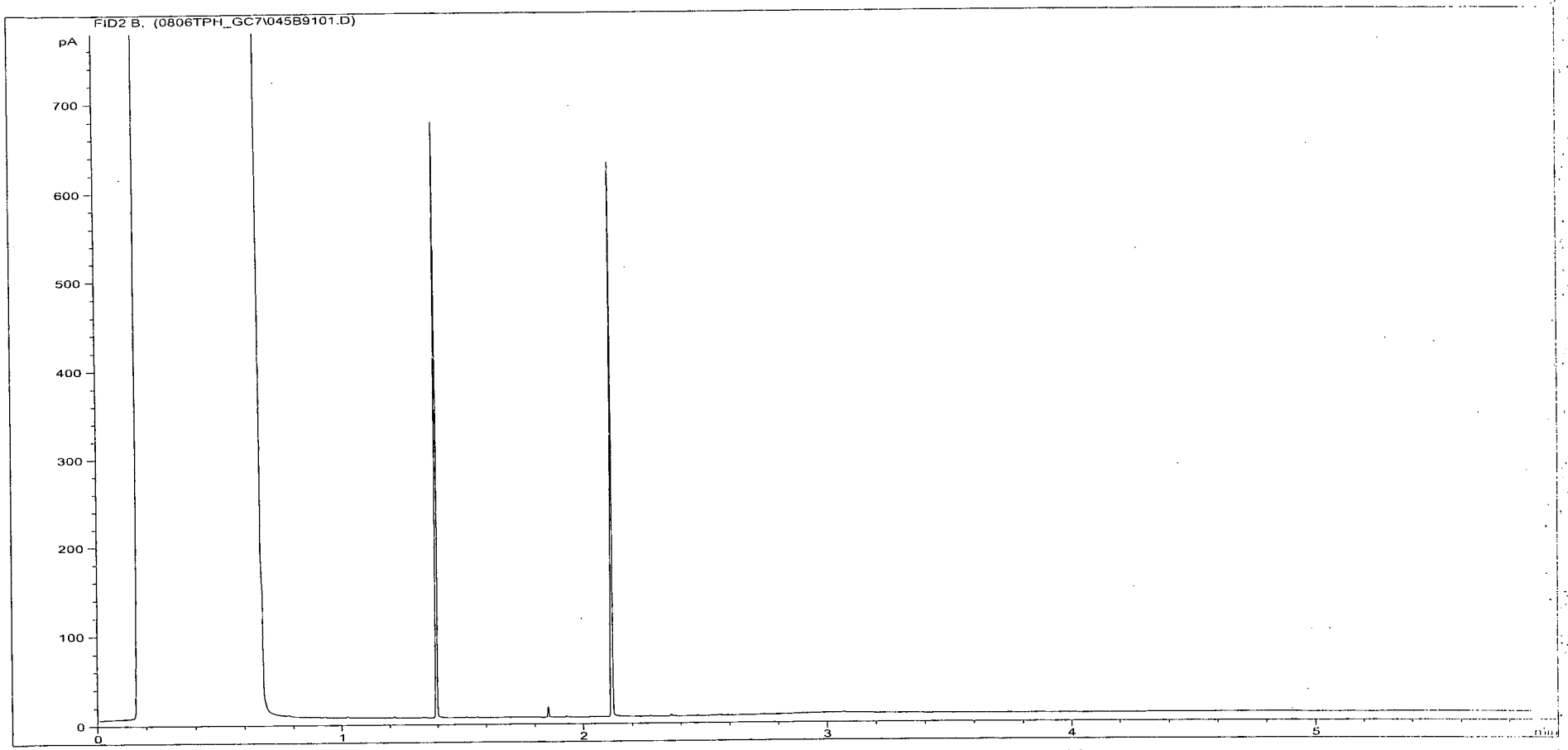
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720570ALI	**Job Number:**	S07_3443M
Multiplier:	14.44	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\031B7501.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

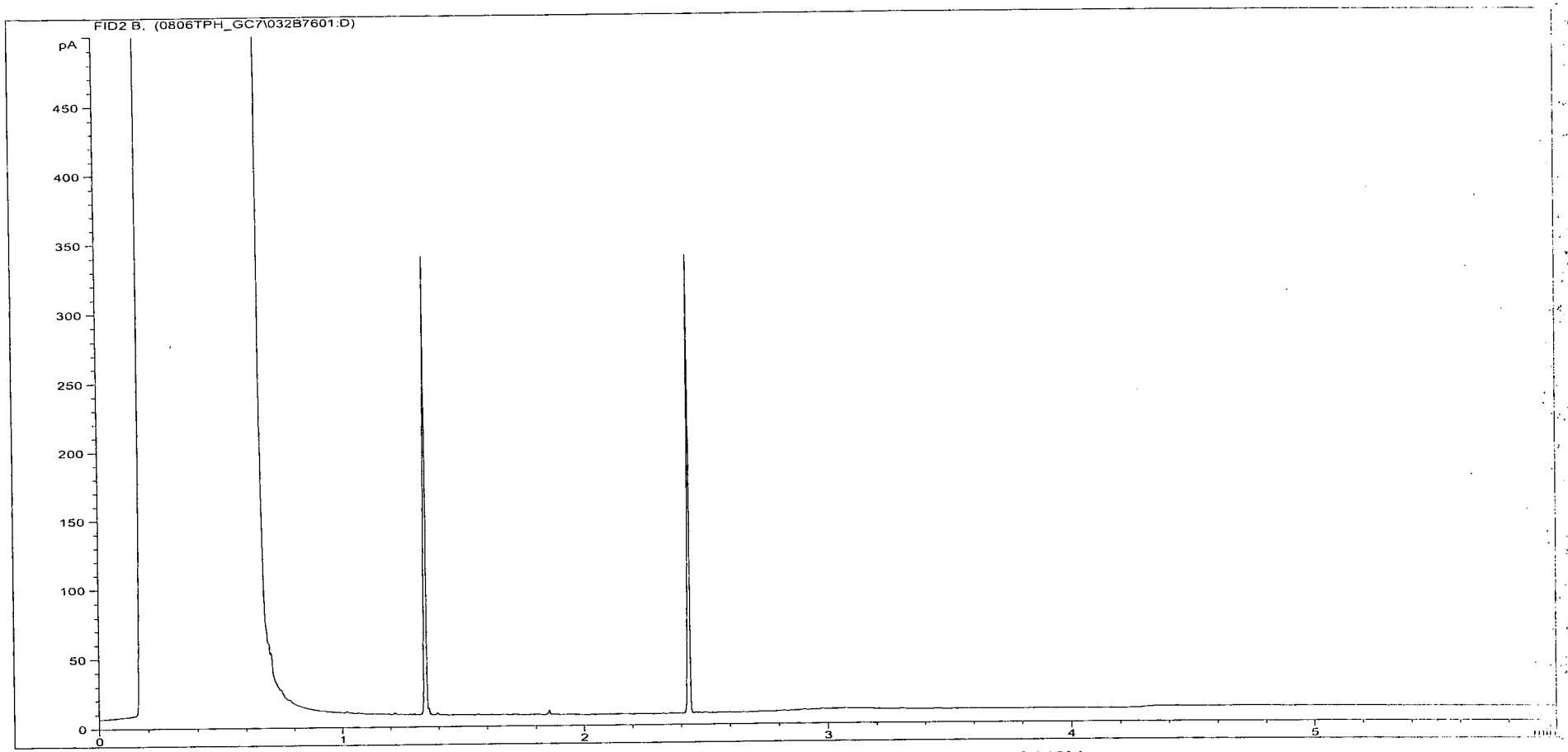
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720570ARO	**Job Number:**	S07_3443M
Multiplier:	10.64	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\045B9101.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

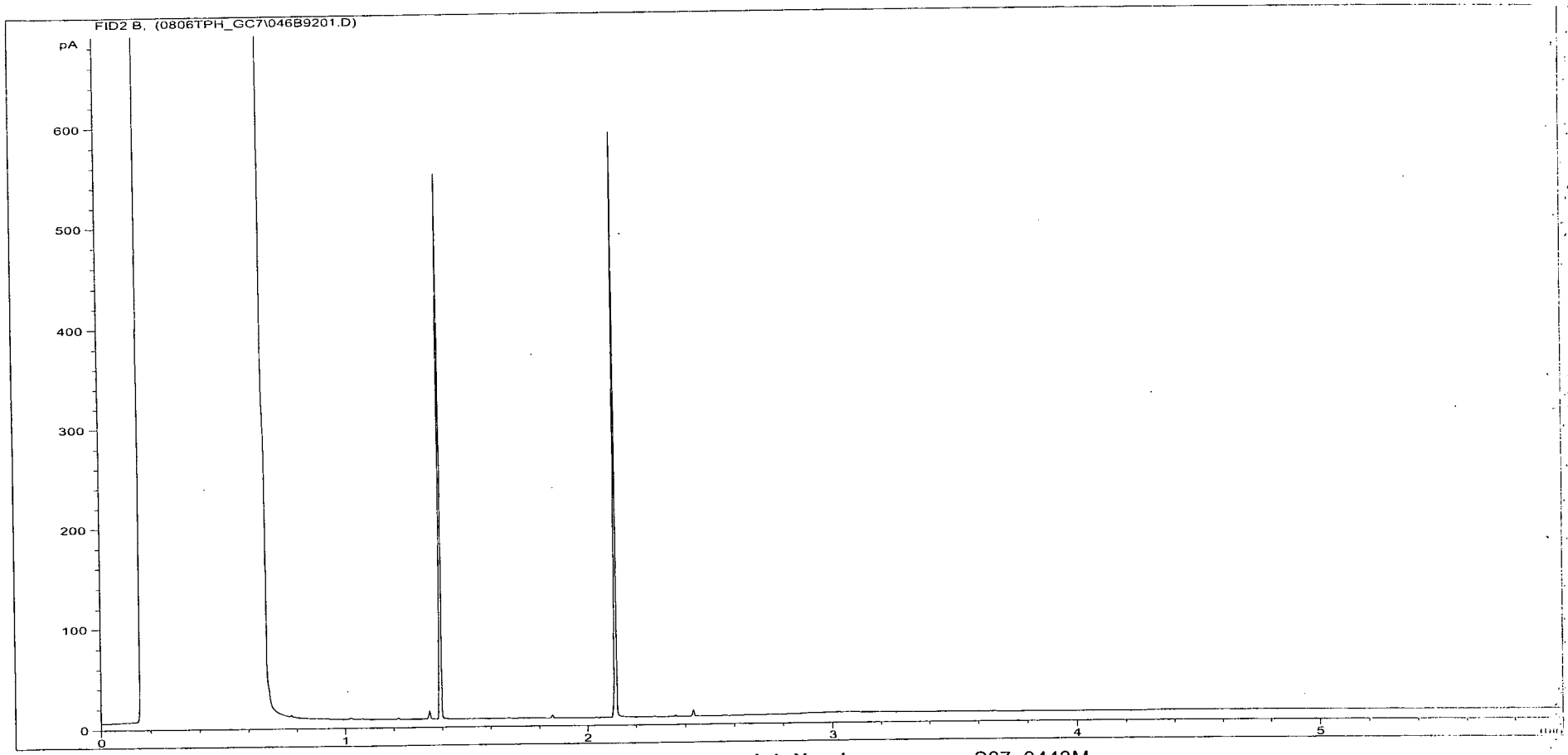
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720571ALI	**Job Number:**	S07_3443M
Multiplier:	13.68	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 4.0
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\032B7601.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

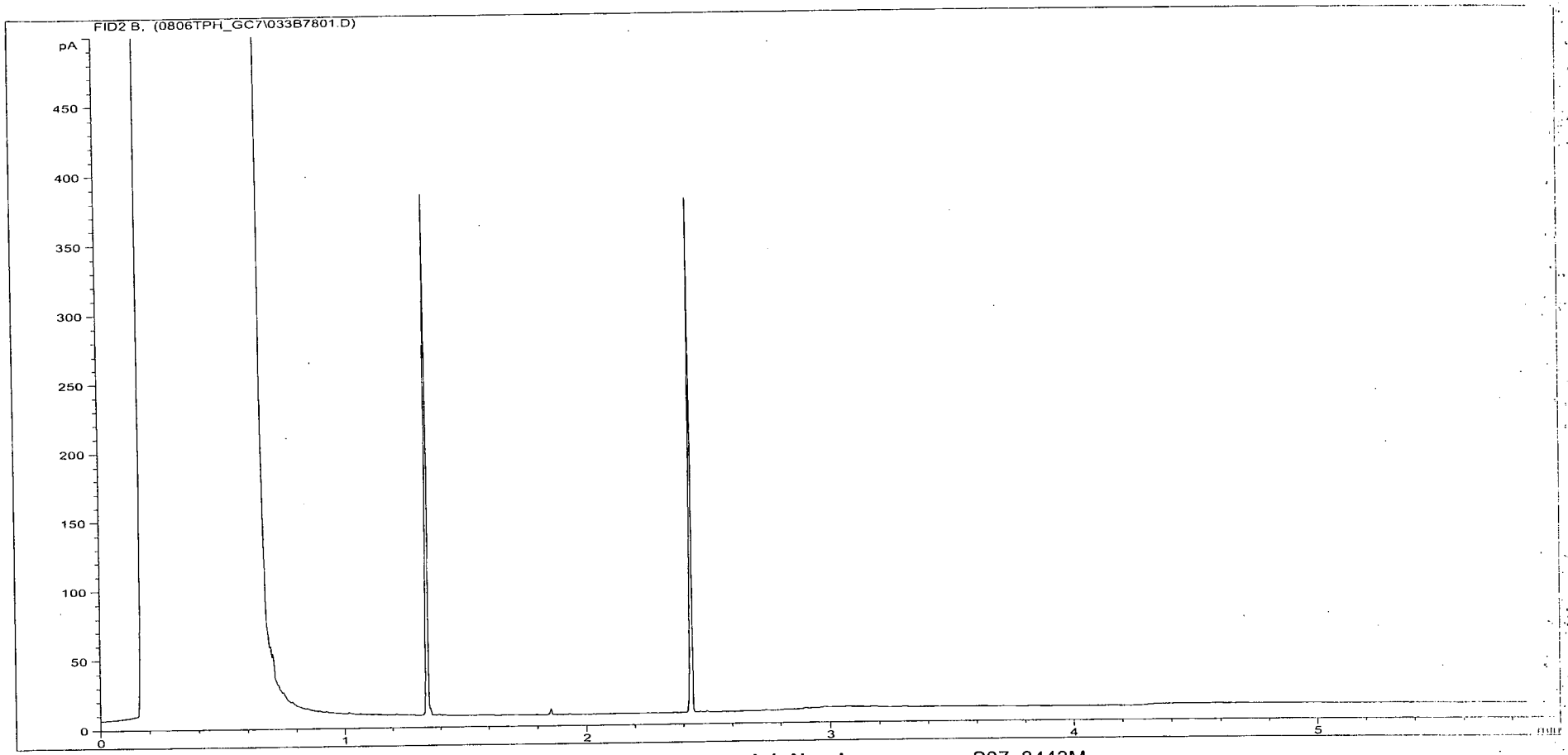
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720571ARO	**Job Number:**	S07_3443M
Multiplier:	11.02	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 4.0
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\046B9201.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

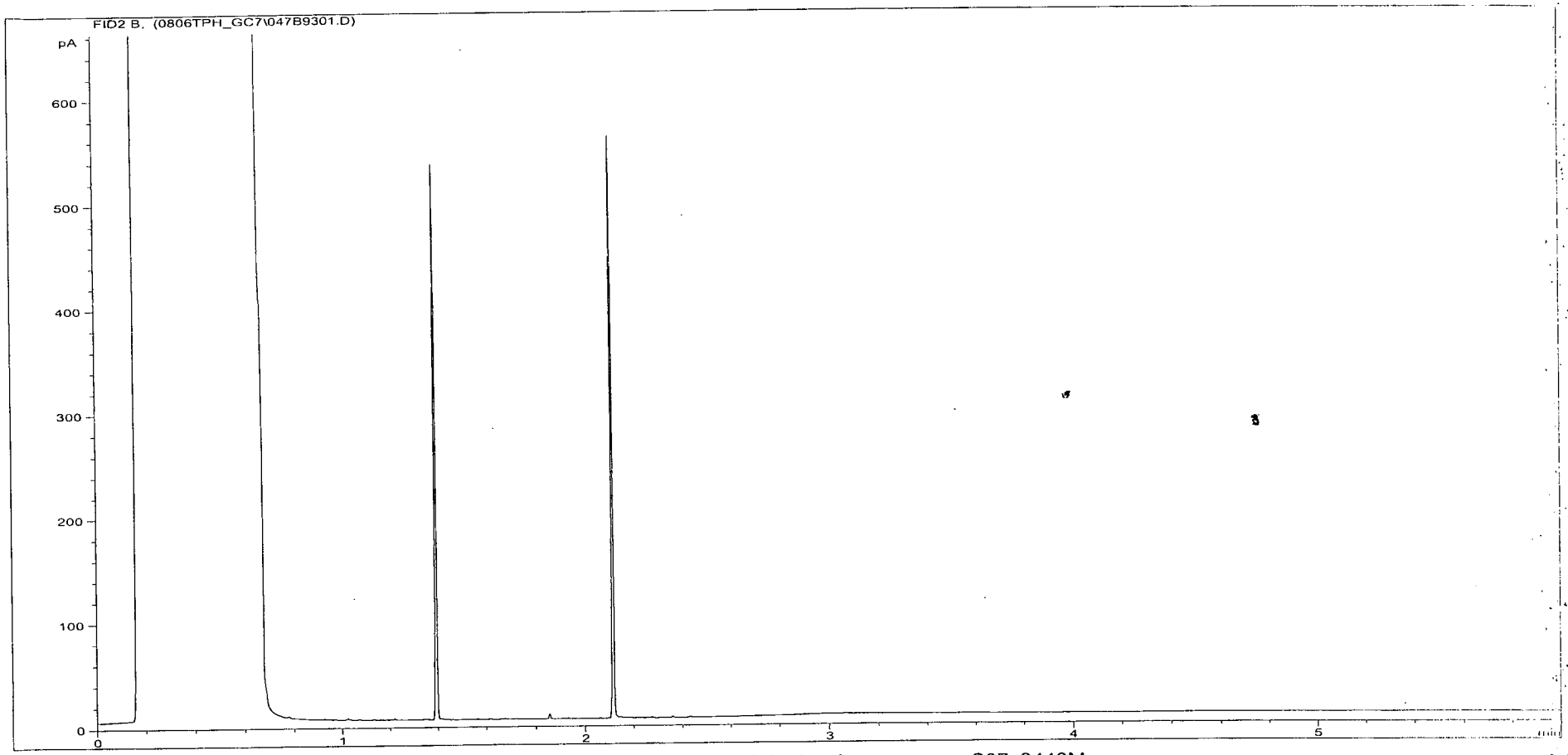
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720572ALI	**Job Number:**	S07_3443M
Multiplier:	12.92	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS18 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\033B7801.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

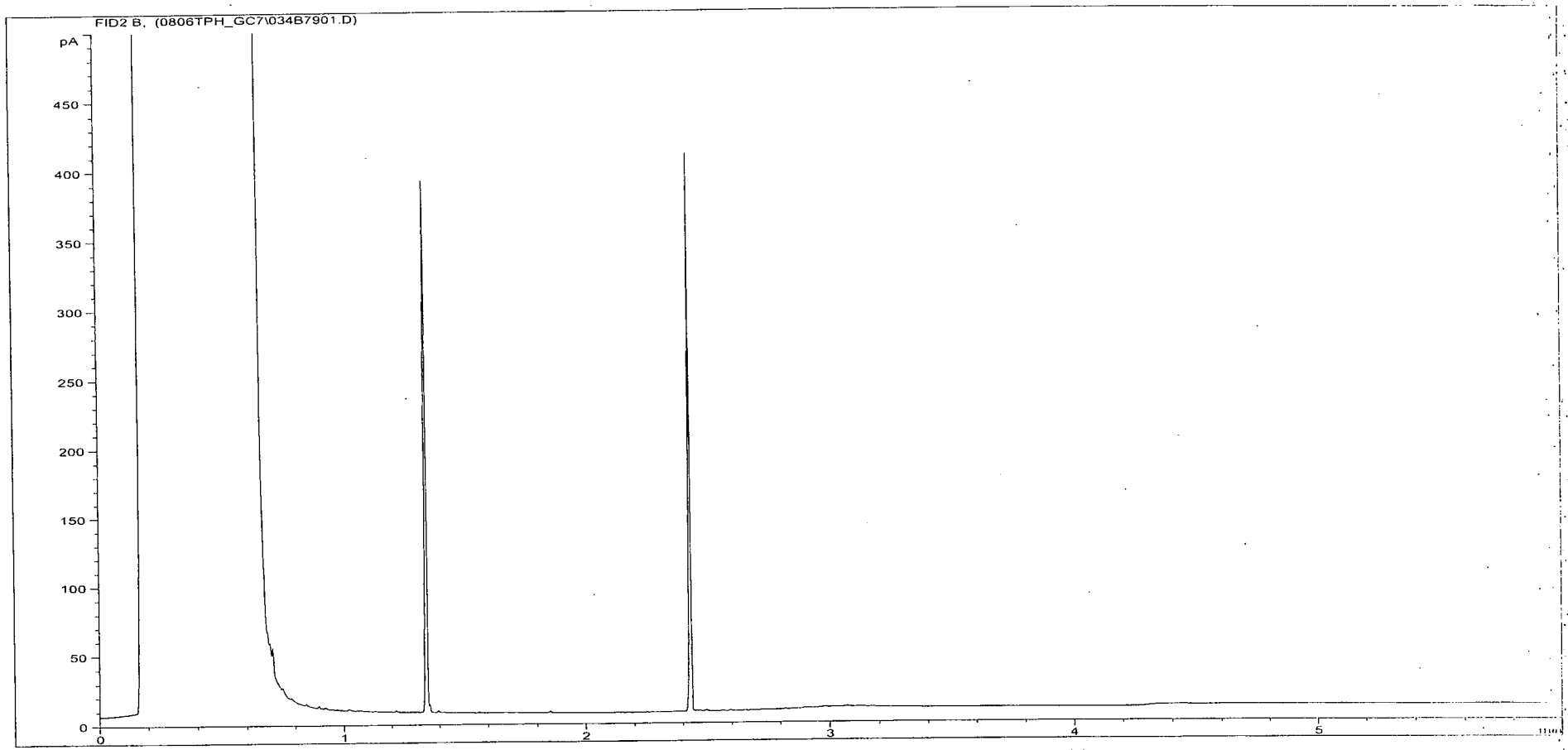
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720572ARO	**Job Number:**	S07_3443M
Multiplier:	9.86	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS18 3.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\047B9301.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

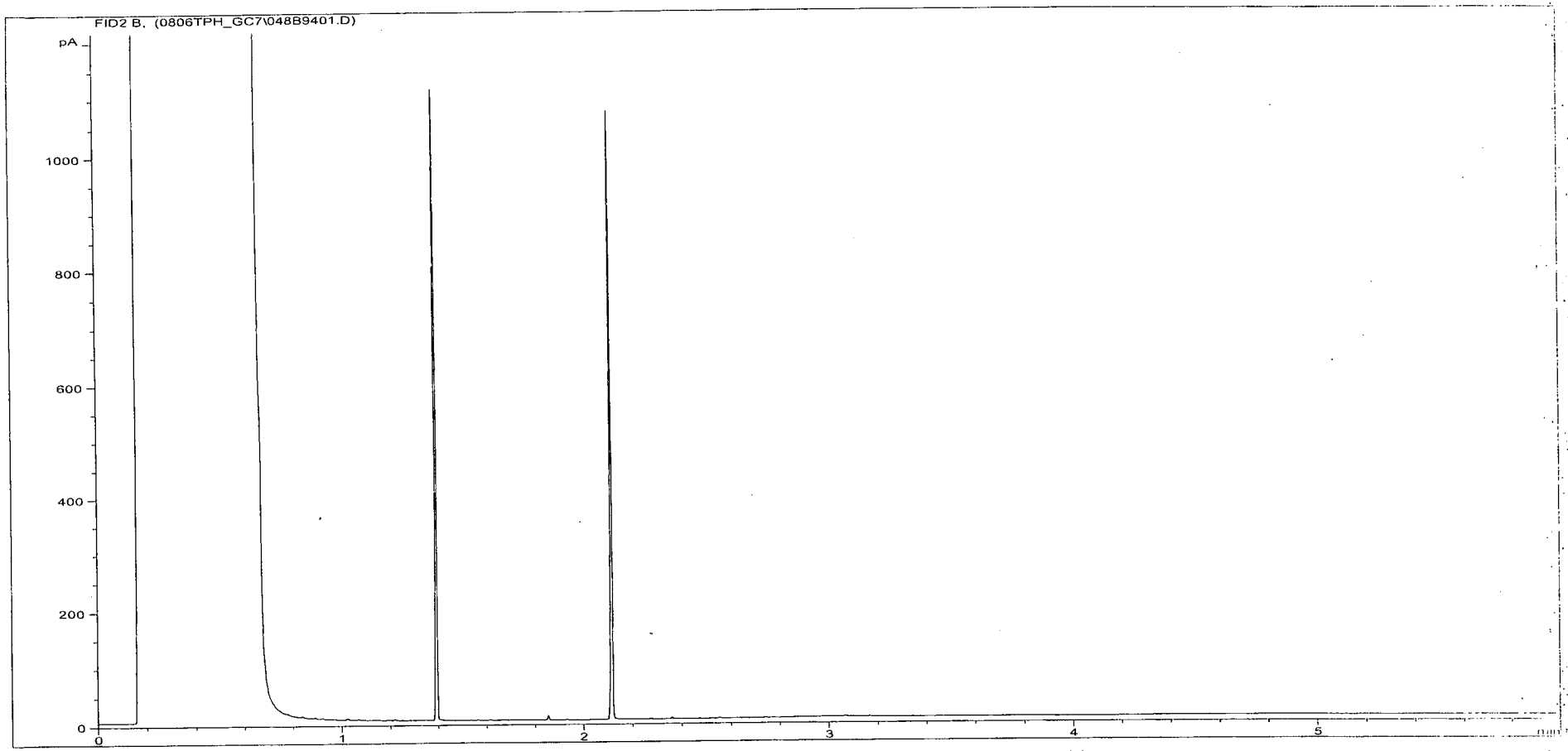
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720573ALI	**Job Number:**	S07_3443M
Multiplier:	14.44	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS16 0.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\034B7901.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

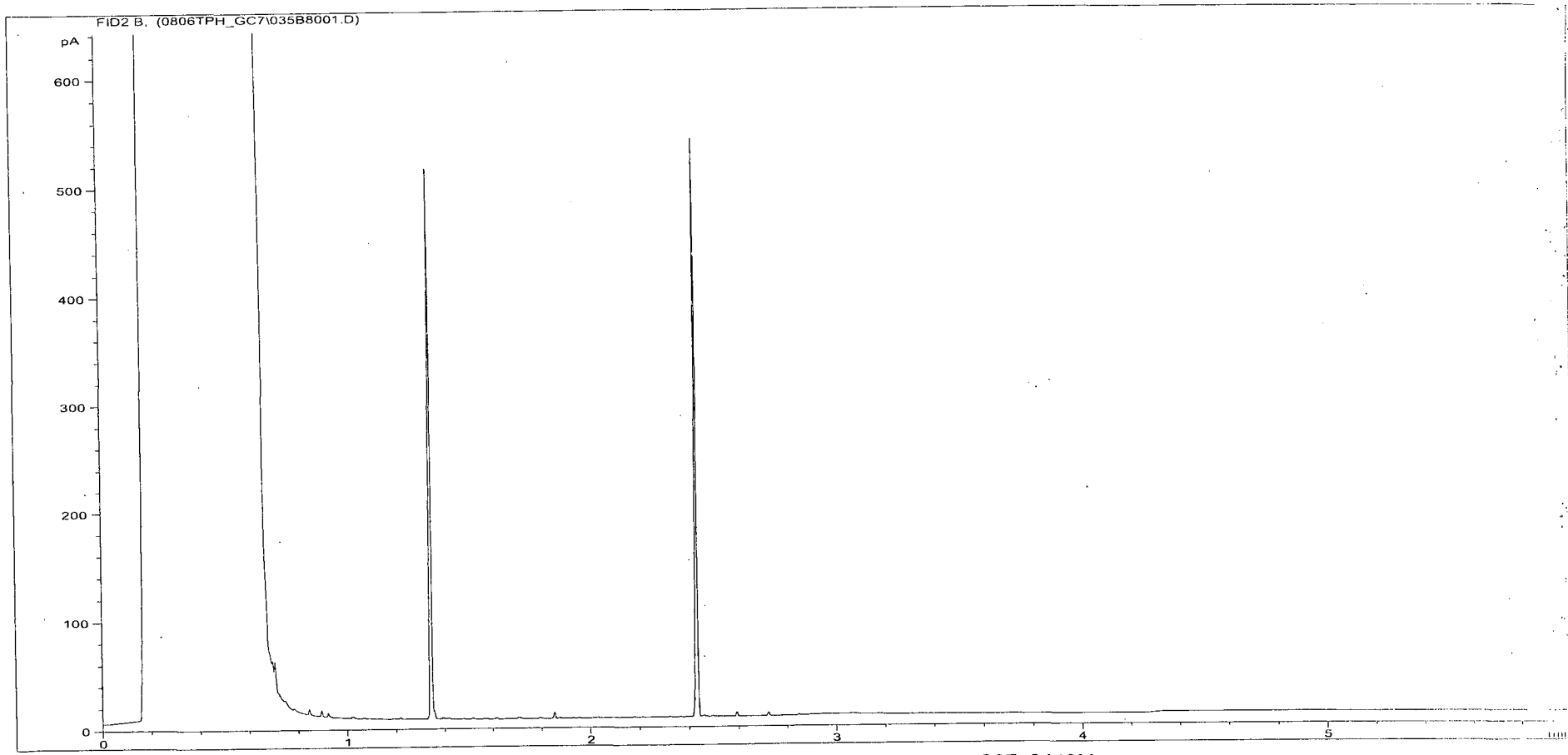
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720573ARO	**Job Number:**	S07_3443M
Multiplier:	10.64	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS16 0.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\048B9401.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

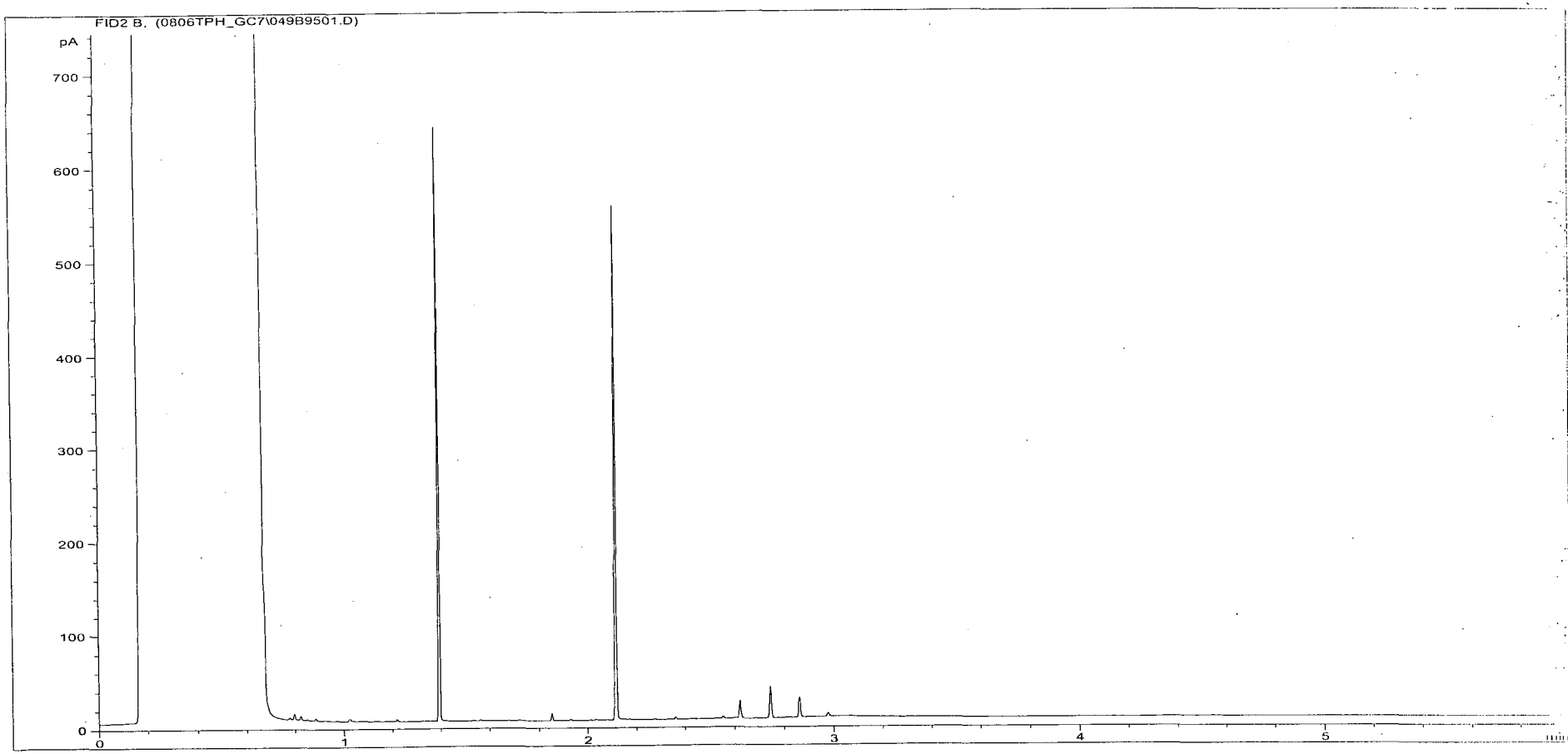
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720574ALI	**Job Number:**	S07_3443M
Multiplier:	12.92	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 0.5 (NVM)
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\035B8001.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

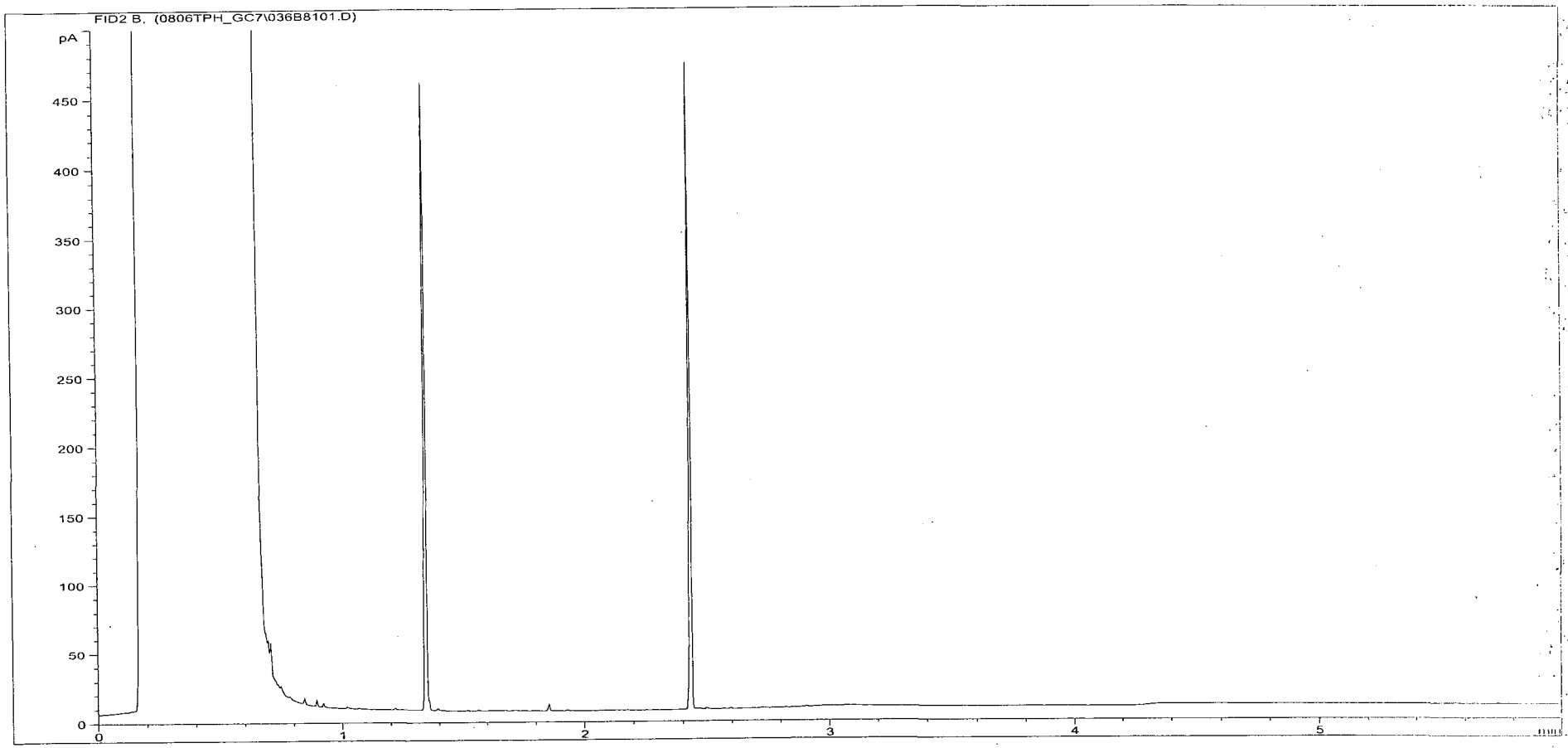
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720574ARO	**Job Number:**	S07_3443M
Multiplier:	9.52	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS17 0.5 (NVM)
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\049B9501.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

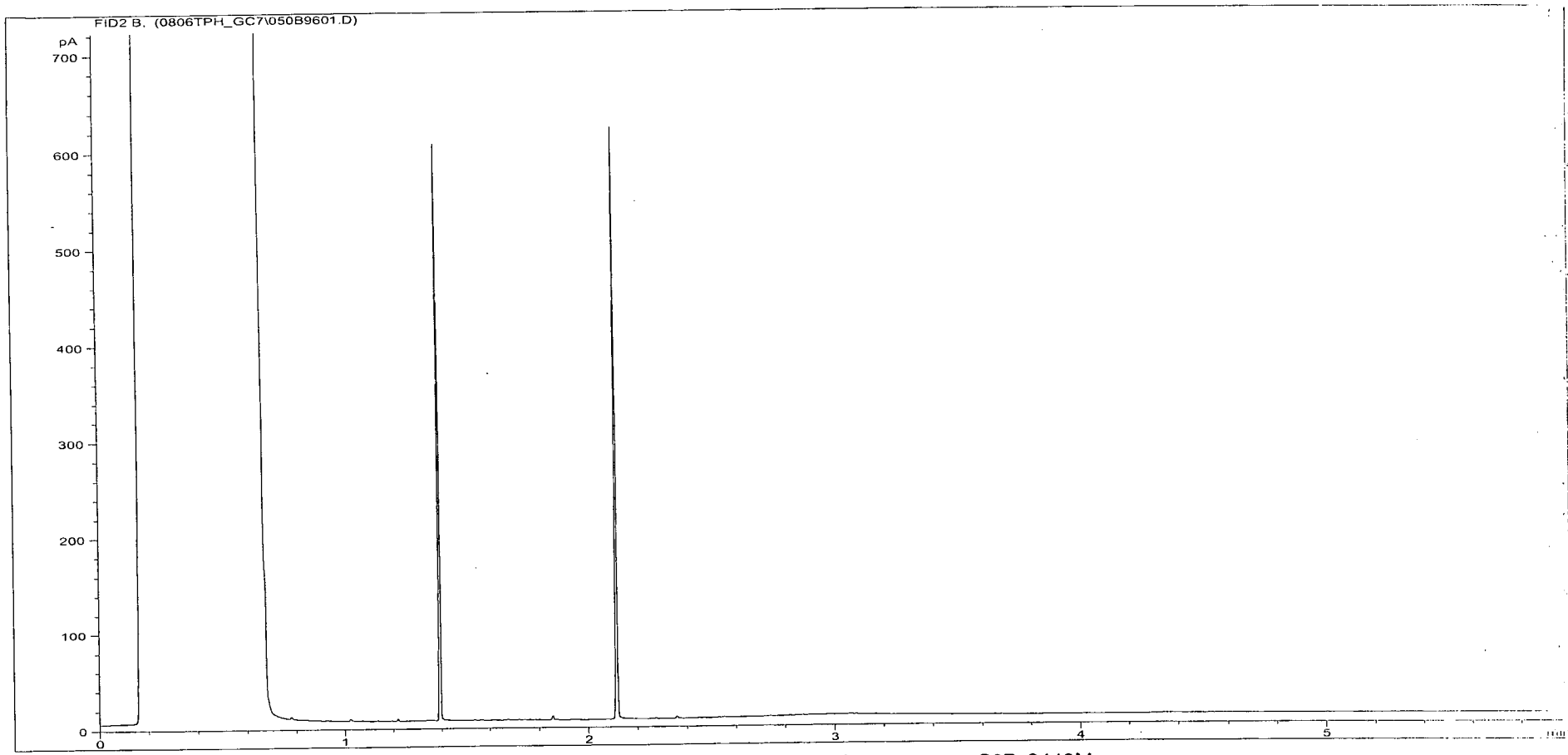
Petroleum Hydrocarbons (C8 to C40) by GC/FID Aliphatics Fraction.



Sample ID:	CL0720575ALI	**Job Number:**	S07_3443M
Multiplier:	13.68	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS18 0.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\036B8101.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID Aromatics Fraction.



Sample ID:	CL0720575ARO	**Job Number:**	S07_3443M
Multiplier:	10.64	**Client:**	Ground Risk Management
Dilution:	1	**Site:**	Mill Hill Lane
Acquisition Method:	MAX_RUNF.M	**Client Sample Ref:**	WS18 0.5
Acquisition Date/Time:	07-Aug-07		
Datafile:	D:\TES\DATA\Y2007\0806TPH_GC7\050B9601.D		

Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Report Notes

Soil/Solid analysis specific:
Results expressed as mg/kg on an air dried basis unless stated otherwise
S04 analysis not conducted in accordance with BS1377 unless otherwise stated
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample

Water analysis specific:
Results expressed as mg/l unless stated otherwise

Oil analysis specific:
Results expressed as mg/kg unless stated otherwise
S.G. expressed as g/cm^3@ 15°C

Filter analysis specific:
Results expressed as mg on filter unless stated otherwise

VOC analysis specific:
Explanatory notes for data flagging
U = undetected above reporting limit
J = concentration at instrument was below lowest calibration standard
E = concentration at instrument was above top calibration standard
B = compound was detected in method blank

Gas (Tedlar bag) analysis specific:
Results expressed as ug/l unless stated otherwise

Air (Carbon tube) analysis specific:
Results expressed as ug on tube unless stated otherwise

Asbestos analysis specific:
CH denotes Chrysotile
CR denotes Crocidolite
AM denotes Amosite
NADIS denotes No Asbestos Detected in Sample
NBFO denotes No Bulk fibres Observed

General notes:
^ this analysis was subcontracted to another laboratory
$ Within laboratory tolerances
$$ unable to analyse due to nature of sample
¥ Results for guidance only, possible interference
& Blank corrected
I.S insufficient sample for analysis
Intf Unable to analyse due to interferences
N.D Not determined
N.R Not recorded
N.Det Not detected
Req Analysis Requested, see attached sheets for results
Þ Raised detection limit due to nature of sample
* denotes that all accreditation has been removed by the laboratory for this result.
‡ denotes that Mcerts accreditation has been removed by the laboratory for this result.
Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected.

If you require further details of the circumstances leading to the removal of the accreditation from any data item please do not hesitate to contact the laboratory

END OF REPORT

Results corrected to dry weight at 105°C where appropriate, in accordance with the MCERTS standard.