

Cannock Chase District
Council

**Environmental Protection Act
1990, Part 2A: Exploratory Site
Investigation**

**Infilled Land off Greenheath
Road, Pye Green, Hednesford.
Staffordshire**

February 2011

Prepared for:

Cannock Chase Council
PO Box 28
Beecroft Road
Cannock
Staffordshire
WS11 1BG

Prepared by:

Grontmij Limited
3rd Floor, Radcliffe House
Blenheim Court
Lode Lane
Solihull
B91 2AA

T 0121 7116600

F 0121 7116749

E gareth.taylor@grontmij.co.uk

Document Control

Report Reference	Issue Date	Reason for Issue	Prepared by		Checked by	Approved by
R553/103912/V1 /2011	18/09/10	First Issue	Name	Rebecca Hearn	Gareth Taylor	Colin MacDonald
			Position	Assistant Environmental Consultant		

© Grontmij 2011 This document is a Grontmij confidential document; it may not be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise disclosed in whole or in part to any third party without our express prior written consent. It should be used by you and the permitted discloses for the purpose for which it has been submitted and for no other.

CONTENTS

1	INTRODUCTION.....	1
1.1	Terms of Reference.....	1
2	BACKGROUND INFORMATION	2
2.1	Site Setting	2
2.2	Previous Reports	3
3	INTRUSIVE INVESTIGATION	5
3.1	Scope and Methodology.....	5
3.2	Results	5
3.2.1	Ground Conditions	5
3.2.2	Adequacy of Investigation Depth	6
3.2.3	Field Evidence of Contamination	6
3.2.4	Soil Analysis Results.....	6
3.2.5	Ground Gas Monitoring.....	8
3.2.6	Safety of Water Supply Pipes	9
4	UPDATED CONCEPTUAL SITE MODEL.....	11
4.1	Introduction	11
4.2	Contaminants	11
4.3	Receptors	11
4.4	Pathways	11
5	SUMMARY AND CONCLUSION.....	14

FIGURES

Figure 2.1 – Site Location	3
----------------------------------	---

TABLES

Table 2.1 – Site Setting.....	2
Table 2.2 - Potential Pollutant Linkages	4
Table 3.1 – Soil Analysis Results Summary	8
Table 4.1 – Pollutant Linkages, Post-Site Investigation.....	12

DRAWINGS

Drawing 1: Exploratory Hole Location Plan

APPENDICES

Appendix A	Initial Desktop Study and Site Walkover Report, January 2010
Appendix B	Limitations Statement
Appendix C	Exploratory Hole Logs
Appendix D	Chemical Analysis Results
Appendix E	Gas Monitoring Data
Appendix F	Severity and Probability of Risk (after CIRIA 552)

1 INTRODUCTION

1.1 Terms of Reference

In January 2010, Grontmij Limited (Grontmij) was appointed by Cannock Chase District Council (the Council) to assist in the implementation of the Council's Part 2A Contaminated Land inspection strategy. Part 2A of the Environmental Protection Act 1990 (Part 2A) requires each local authority to inspect areas of land which it believes may constitute Part 2A Contaminated Land.

Grontmij assisted the Council to prioritise a list of sites which could constitute Part 2A contaminated land for inspection, on the basis of the Council's Part 2A Inspection Strategy. The site subject to this report, located off Greenheath Road, Pye Green, Hednesford. Staffordshire (hereafter referred to as 'the site') was identified as a priority for inspection as:

- The site comprises an area of land which appears to have been infilled with waste material
- The site is considered to be sensitive as 55 residential properties with gardens overly the inferred extent of landfill and the site is underlain by a Principal aquifer and is within a total catchment source protection zone (SPZ). Additionally, a surface water receptor is present 20m to the south-west of the inferred landfill boundary

Following the completion of a desktop study (see Appendix A) and a successful application for funding from DEFRA, Grontmij was subsequently appointed by the Council to implement a site investigation, which was undertaken in September 2010. This report presents the findings of the exploratory investigation, assesses the significance of the contaminant concentrations detected, and makes recommendations for further work.

This report is subject to the limitations presented in Appendix B.

2 BACKGROUND INFORMATION

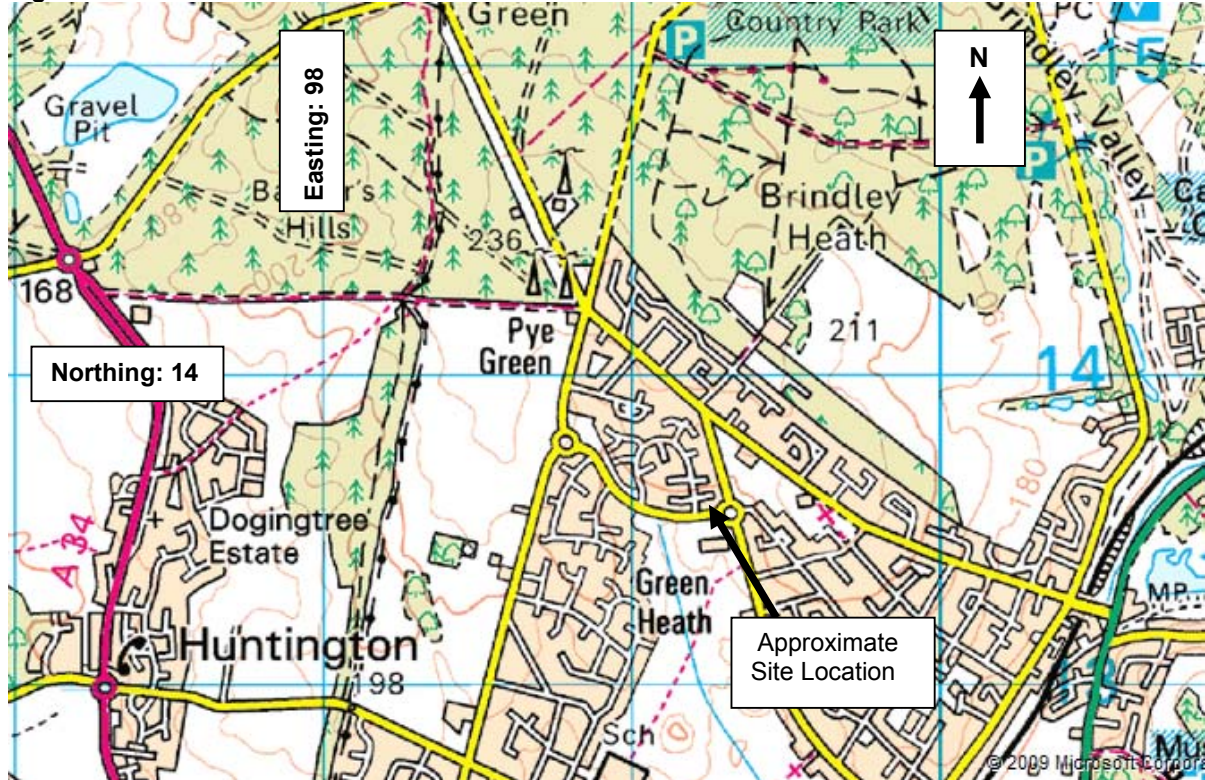
2.1 Site Setting

The site's setting and location are summarised in Table 2.1 and Figure 2.1.

Table 2.1 – Site Setting

Data	Information
Address	The site is an area off Greenheath Road, Pye Green, Wednesbury, Staffordshire. Postcode for the centre of the site is WS12 4SS .
Current site use:	Residential houses and gardens.
Grid Reference:	Located around 399427, 313656
Site Area:	Approximately 1 ha
Topography:	Generally flat.
Surrounding land use	Residential properties to the north and west. Open access land to east and south. The area is intersected with various minor highways.
Geology	British Geological Survey (BGS) 1:63,360 map sheet 154 (Lichfield) indicates Sandstone of the Bunter Sandstone Group of Triassic age. The BGS website Geoindex tool has updated the stratigraphy and refers to the geology as interbedded Sandstone and Conglomerate of the Kidderminster Formation of Triassic age. Neither resource indicates details of superficial deposits.
Hydrogeology	The Environment Agency groundwater vulnerability map 22 – South Staffordshire and East Shropshire indicates the sandstone as a major aquifer now referred to as 'Principal' aquifer. The aquifer potentially yields large amounts of water for abstraction, and is classified as the most sensitive unit in terms of groundwater vulnerability. The soil class for the area is indicated to be high (U).
Source Protection Zones (SPZs)	The Environment Agency website indicates that the site lies within Zone 2 (outer protection zone – western half of the site) and a Zone 3 (Total catchment zone – eastern half of the site) of a SPZ. Such SPZs indicate an area of groundwater around a potable abstraction borehole, within which the Environment Agency is likely to place a heightened onus on groundwater quality.
Surface Waters	An un-named stream is located approximately 20m south-west of the site.
Ecological Receptors	No ecologically sensitive sites, as listed in the Contaminated Land Regulations 2006, identified by a MAGIC search, exist on the site, a 500m search radius indicates that Cannock chase to the north of the site is designated as an SAC, SSSI and AONB
Historical Land Use	The data provided indicates that the site was formerly operated as a landfill site and was subsequently developed as residential housing. There is no information about the site's licence. The landfill site is shown on Environment Agency "What's In Your Back Yard" website and is recorded as being operational between 31 st December 1960 and 31 st December 1971.

Figure 2.1 – Site Location



Reproduced from Ordnance Survey Map under licence AL549878 with permission from the Controller of HMSO, © Crown Copyright
Plan is not to scale)

2.2 Previous Reports

Grontmij has previously completed a desktop assessment of the site, as presented as Appendix A. The assessment included the review of on-line data resources, in-house mapping and records provided by the council, and a site walkover.

The desk study report included an initial Conceptual Site Model (CSM) of potential pollutant linkages, developed in accordance with the model procedures¹ and statutory guidance². The CSM is re-presented as Table 2.2 overleaf.

¹ CLR11 Model Procedures for the Management of Land Contamination (EA & DEFRA September 2004)

² DEFRA Circular 02/2006, Environmental Protection Act 1990: Part IIA Contaminated Land., September 2006.

Table 2.2 - Potential Pollutant Linkages

No.	Receptor	Contaminant(s)	Pathway(s)	Risk of Pollutant Linkage Being Realised	Comments
Human Health					
1	Residents of properties above infilled ground – including children playing in gardens & vegetable consumption	Contaminants including (but not limited to) metals, hydrocarbons, PAHs, VOCs, SVOCs within the made ground.	Direct ingestion/dermal contact/inhalation of dust/inhalation of vapours/consumption of home-grown vegetables	Medium to high risk	Grass and/or topsoil coverage likely to mitigate risk to an extent – risk is greatest where possibly impacted soils are exposed or could be encountered, for example, when digging a vegetable patch or when children play outdoors. Properties are constructed directly above a potentially significant contamination source.
2		Methane and carbon dioxide from decomposition of deleterious elements of the made ground.	Movement into buildings, subsequent asphyxiation and explosion risk.	Medium to high risk.	Investigation and monitoring required to determine risk.
Property					
4	Subsurface services serving the buildings (principally water supply)	Contaminants including metals, hydrocarbons, PAHs, VOC, SVOCs within the made ground.	Chemical attack and tainting of water supply could occur at high contaminant concentrations / severe pH levels	Medium risk.	Risk will depend on depth and concentration of contaminants and material(s) used for water pipes.
5	Property (Structures) – sub-surface concrete	Sulphate and pH	Contact between contaminants and concrete.	Medium risk	Possible risk but could only reasonably be established if concrete class used to construct buildings can be established (unlikely) – therefore, no testing targeted this area – more relevant for any new planned buildings.
Controlled Waters					
6	Major aquifer beneath site	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground.	Leaching of chemicals to aquifers	Medium to high risk	Risk will depend upon depth and concentration of contaminants, presence/absence of confining layers between contaminants and the aquifers, leaching potential etc.
7	Surface waters (closest is stream 20m to SW)	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground.	Groundwater flow in permeable strata which are in continuity with watercourses	Medium risk	Risk depends on depth/presence of contaminated groundwater, hydraulic gradient within any impacted groundwater unit, and continuity between impacted groundwater and watercourse. .

3 INTRUSIVE INVESTIGATION

In order to further examine the potential pollutant linkages identified in Table 2.2, and following a successful application for DEFRA funding, a site investigation was undertaken on the 22nd, 24th, 28th and 30th September 2010. This section describes the site investigation undertaken and results obtained.

3.1 Scope and Methodology

The intrusive site investigation included the following:

- A consultation exercise with residents living at the site, including a mailshot and a public open evening;
- Obtaining plans of underground services and CAT-scanning proposed drilling locations, using a Radiodetection CAT1 and signal generator;
- Drilling six hand held window sample holes (WS101 – WS106) to a maximum depth of 3.0m bgl, at the locations shown on Drawing 1. The window sample holes, which were drilled by Sherwood Drilling Services, were positioned in the rear gardens of housing located above the extent of infill, as indicated on historical mapping and by anecdotal evidence. Borehole positions were selected on the basis of achieving good coverage of the site. The purpose of the window sample holes was to examine shallow and deeper soil conditions, enable the retention of samples for laboratory testing, and facilitate the installation of 50mm diameter dedicated gas monitoring wells in each borehole;
- Logging soil arisings in accordance with Eurocode 7 (BS5930:1999), and additionally noting any visual or olfactory evidence of potential contamination;
- Retaining representative soil samples of the strata encountered, which were selected on the basis of field observations of potential contamination and achieving good spatial and depth coverage of the site
- Submitting retained samples to Alcontrol Geochem in cooled coolboxes and under full chain of custody documentation, and instructing the analysis of samples, and;
- Undertaking four ground gas monitoring rounds, using a Geotechnical Instruments GA2000 gas analyser and flow pod.

3.2 Results

3.2.1 Ground Conditions

The ground conditions encountered at the site generally comprised sandy topsoil over weathered residual soils (encountered either as sand, or as sand and gravel).

Made Ground

Made Ground was only encountered in two exploratory holes – WS104 and WS106. The Made Ground was encountered to a maximum depth of 1.0m bgl (in WS104) and was predominantly granular in nature, consisting interbedded sand, gravel and occasional clay layers and pockets. The gravel content of the Made Ground was variable, including fine to coarse shale, sandstone, brick, quartz and quartzite.

Kidderminster Formation

Weathered residual soils of the solid geology, comprising silty, clayey gravelly sand, were encountered from beneath the Made Ground (where present) or from ground level, to exploratory hole termination at 3.0m bgl.

Groundwater

Groundwater ingress was encountered at 1.8m bgl during the excavation of WS104. No other groundwater entries were observed.

The above findings are discussed further in Section 4 (updated CSM). Window sampler hole logs, providing full details of the strata encountered, are included within Appendix C.

3.2.2 Adequacy of Investigation Depth

Weathered residual soils (i.e. natural ground) were proven in all six window sampler holes drilled, indicating that the full extent of infill material at the site has been encountered and assessed, and gas monitoring (Section 3.2.5) is likely to be representative of the full body of infill. There is no need to consider deeper drilling at the site.

3.2.3 Field Evidence of Contamination

The drilling arisings were inspected for visual and olfactory evidence of potential contamination. A summary of field observations recorded is presented in Table 3.1:

Table 3.1 – Field Evidence of Potential Contamination

Exploratory Hole	Visual and Olfactory Evidence of Contamination
WS104	0.0– 0.2 m bgl: shale and brick 0.5-1.0 m bgl: shale and brick
WS106	0.5 – 0.95 m bgl: shale and brick

3.2.4 Soil Analysis Results

Nine samples were submitted for laboratory analysis, under full chain of custody documentation and within chilled coolboxes, to ALcontrol Geochem of Deeside. ALcontrol is UKAS accredited and holds MCERTS accreditation for most analyses performed. The samples were selected for analysis on the basis of the observations of potential contamination made in the field, and to achieve good spatial coverage of the site.

Table 3.1 presents a summary of the analysis results. The results have been compared to screening values protective of human health, assuming the receptor is a residential property where plant uptake of contaminants occurs, and the plants are subsequently ingested by humans. The screening values used in preference comprise:

- 2009 Soil Guideline Values (SGVs) published by the Environment Agency / DEFRA, generated using the latest Contaminated Land Exposure Assessment (CLEA) model, version 1.06
- Generic Assessment Criteria (GAC) published by Land Quality Management Limited (LQM) or the Environmental Industries Commission (EIC), or calculated by Grontmij, all using CLEA 1.06
- SGVs published by the Environment Agency / DEFRA between 2002 and 2007, calculated using prior versions of the CLEA model

- For cyanide, an internal screening value, derived using RBCA, was used.

Full analytical testing results are included as Appendix D.

Table 3.1 – Soil Analysis Results Summary

Determinand	No. of Samples Tested	Minimum Value	Maximum Value	SGV / GAC (using 2.5% SOM where SOM-dependant) ¹	Locations where SGV or GAC are exceeded
Arsenic	9	4.3	9.4	32	-
Antimony	9	<0.6	1.4	<i>550</i>	-
Barium	9	35.2	180	<i>1300</i>	-
Beryllium	9	0.4	1.5	<i>51</i>	-
Boron (water-soluble)	9	<1	<1	<i>291</i>	-
Cadmium	9	0.2	0.7	<i>10</i>	-
Chromium, hexavalent	9	<0.6	<1.2	<i>4.3</i>	-
Chromium, total	9	9.9	24	<i>3000</i>	-
Copper	9	11	24	<i>2330</i>	-
Lead ²	9	10	150	<i>450</i>	-
Mercury ³	9	<0.14	0.6	<i>170</i>	-
Nickel	9	7.6	25	<i>130</i>	-
Selenium	9	<1	1.6	<i>350</i>	-
Vanadium	9	14	31	<i>75</i>	-
Zinc	9	29	107	<i>3750</i>	-
Cyanide (total) ⁴	3	<1	<1	<i>3100</i>	-
Thiocyanate	3	<1	<1	-	-
Asbestos screen	3	No fibres detected in any sample			-
Phenols	3	<0.025	<0.025	<i>290</i>	-
Total Polyaromatic Hydrocarbons (PAHs) ⁵	3	<0.12	1.41	-	-
Volatile Organic Compounds and Semi-Volatile Organic Compounds (excl above)	3	No screening values exceeded, where such screening values have been published			-

Values presented in mg/kg, correct to two significant figures (screening values presented without any rounding). **Bold values** indicate locations where observed concentrations exceed the screening value.

¹ all samples were tested for Soil Organic Matter (%SOM) content. A minimum value of 0.707% and a maximum of 5.24% were recorded, with a mean of 2.505%. It is therefore justified, to use the SGVs and GAC generated using a 2.5% SOM value in CLEA in an initial screen. *Italics values* indicate where no 2.5% value available for metals 6.0% SOM Values were used as an initial screen.

² SGV quoted was generated by DEFRA using earlier version of CLEA. A value using the latest version of CLEA is awaited

³ Testing results presented represent total mercury. SGV presented is for inorganic mercury although the most stringent of the SGVs is for elemental Mercury, the Environment Agency SGV for mercury in soil science report SC050021/Mercury SGV indicate that in cases where preliminary risk assessment has not identified a mercury issue at the site or conditions such as peaty or flooded soils then '*For general surface contamination and to simplify the assessment, the SGVs for inorganic mercury can normally be compared with chemical analysis for total mercury content because the equilibrium concentrations of elemental and methylmercury compounds are likely to be very low*'

⁴ No SGV/GAC. RBSL residential criteria used for initial screen

⁵ Testing values quoted are for total PAHs. None of the individual PAH compound screening criteria were exceeded by the laboratory analyses

3.2.5 Ground Gas Monitoring

Four initial rounds of ground gas monitoring were undertaken, using a Geotechnical Instruments GA2000 gas analyser with flow pod. A summary of the gas monitoring results is presented in Table 3.3, with full monitoring data in Appendix E:

Table 3.3 – Summary of Gas Monitoring Data

Well	Maximum Values Recorded During Monitoring Events:					Gas Screening Value ¹ (l/hr)	Situation “A” Characteristic Situation ¹
	Peak CH ₄ (%)	Steady CO ₂ (%)	Steady CO (ppm)	Steady H ₂ S (ppm)	Flow (l/hr)		
WS101	0	4.0	0	0	0.1	0.004	1
WS102	0	4.3	0	0	0.1	0.0043	1
WS103	0	2.9	0	0	0.1	0.0029	1
WS104	0.1	7.2	0	0	0.1	0.0072	2
WS105	0	4.4	0	0	0.1	0.0044	1
WS106	0	5.0	0	0	0.1	0.005	1
Atmospheric Pressure:		12/10/2010			997 (Steady)		
		26/10/2010			990 (Falling throughout the day)		
		09/11/2010			988 (Rising)		
		23/11/2010			1010 (Falling)		

Readings obtained within a 3 minute measurement period, obtained with a Geotechnical Instruments GA2000plus gas analyser.

CH₄ – methane; O₂ – oxygen; CO₂ carbon dioxide; CO – carbon monoxide;

H₂S – hydrogen sulphide; mbgl – metres below ground level mb – millibars l/hr – litres per hour.

¹CIRIA Characteristic Situation based on methodology presented in CIRIA Report C665, Assessing Risks Posed by Hazardous Gases to Buildings. Where the flow rate recorded in the field is zero or negative, a flow of 0.01 l/hr is assumed

The summary data presented above indicates that, in regard to methane and carbon dioxide, CIRIA characteristic situation CS1 should be applied to five of the six wells. This is the lowest risk category (of six) presented in CIRIA report 665, and indicates that no special gas precautions would be required in the construction of new buildings.

For WS104, CS2 arguably applies, as CIRIA665 indicates that in a CS1 situation, carbon dioxide should be “typically <5%”; the four CO₂ readings obtained were 7.2%, 6.9%, 3.0% and 2.7%. Characteristic Situation 2 requires basic gas protection measures to be installed in new buildings, including a minimum 1200g damp proof membrane.

On the balance of evidence, it is unlikely that methane and carbon dioxide pose an explosive or asphyxiation risk to the existing housing at the site, due to:

- The generally low gas concentrations and flow rates recorded
- The scarcity of made ground material beneath the site
- The lack of obvious gas-generating materials within the small amount of made ground encountered
- The fact that basic gas protection measures may have been installed at the time that the housing was constructed.

Additionally, carbon monoxide and hydrogen sulphide were not detected at concentrations in excess of the gas analyser detection limit, indicating that the toxic inhalation risk posed by these gases is negligible.

3.2.6 Safety of Water Supply Pipes

The soil quality data obtained has been screened against Water Regulations Advisory Scheme (WRAS) thresholds, above which “special consideration of the material used” for the water pipe should be given. The results of the screening exercise are presented in Table 3.4 below.

Table 3.4 – WRAS Threshold Screen

Analyte	Test Result (mg/kg)		WRAS Threshold Value (mg/kg)
	max	Mean (where max>threshold)	
Sulphate	Not analysed	-	2000
Sulphur	Not analysed	-	5000
Sulphide	Not analysed	-	250
pH	5.51-8.62	7.59	<5 or >8
Antimony	1.4	-	10
Arsenic	9.9	-	10
Cadmium	0.7	-	3
Chromium (hexavalent)	<1.2	-	25
Chromium (total)	24	-	600
Cyanide (free)	Not analysed	-	25
Cyanide (complexed)	<1	-	250
Lead	150	-	500
Mercury	0.6	-	1
Selenium	1.6	-	3
Thiocyanate	<1	-	50
Coal Tar	Not analysed	-	50
Cyclohexane extractable	Not analysed	-	50
Phenol	<0.025	-	5
Polyaromatic Hydrocarbons	1.4	-	50
Toluene extractable	Not analysed	-	50
Petroleum Hydrocarbons	Not analysed	-	50

The maximum soil pH level recorded, exceed the WRAS threshold values. The mean pH value does not exceed the WRAS threshold value.

The results of the intrusive investigation and monitoring are discussed in more detail in the following section.

4 UPDATED CONCEPTUAL SITE MODEL

4.1 Introduction

The CSM presented in the earlier Grontmij desk study report (Appendix A) was updated, using the findings of the site investigation, as presented in the following sections.

4.2 Contaminants

The “contaminants” term in the conceptual model has been evaluated by comparing the chemical analysis results obtained during the site investigation with published generic screening values (Tables 3.1, 3.2 and 3.4).

No contaminants were detected in soil at concentrations in excess of the screening values relevant for a residential site with plant uptake.

The following contaminants were detected in soil at concentrations in excess of WRAS standards, protective of water distribution pipework:

- soil pH (as site maxima)

The concentrations of methane, carbon monoxide and hydrogen sulphide gases recorded were below the detection limit of the analyser used. Low gas flow rates were recorded. Although localised, slightly elevated carbon dioxide concentrations were recorded, on the balance of available evidence (including the composition of the infill material), it is considered that ground gas poses a negligible risk to residents at the site.

4.3 Receptors

Table 4.1 indicates the receptors considered to be present at the site. The critical human receptor is the on-site resident; while off-site residents and commercial workers are also present, the concentrations of contaminants and, in the case of commercial workers, their exposure frequency and duration, is likely to be less than on-site residents, and are not considered further.

See Appendix A (desk study report) for a detailed discussion of the receptors included in the conceptual model.

4.4 Pathways

Pathways (pollutant linkages) are also examined as part of Table 4.1, overleaf.

Table 4.1 – Pollutant Linkages, Post-Site Investigation

Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability of Linkage Occuring ¹	Overall Risk ¹	Comments
Residents of properties above infilled ground – inc. children playing in gardens	Ground gases - generally low concentrations & flows encountered	Movement into buildings, subsequent asphyxiation (CO ₂ , CH ₄), explosion (CH ₄) and toxicity (CO, H ₂ S) risks	Severe	Unlikely	Low/moderate	No further assessment required (risk level of “low/moderate” is the lowest possible rating where the potential severity of the hazard is considered “severe”)
	Metals, metalloids, cyanide, TPH, VOCs and SVOCs in shallow soils (all below adopted human health screening values)	Direct ingestion/dermal contact/inhalation of dust/inhalation of vapours/consumption of home-grown vegetables	Medium	Unlikely	Low	No further assessment required
Subsurface services serving the buildings (principally water supply)	Maximum pH value recorded within made ground exceeds WRAS guideline values (mean pH is within WRAS limits)	Chemical attack and tainting of water supply could occur at severe pH levels	Medium	Low	Low / Moderate	In the absence of elevated contaminant concentrations at the site, given that the mean pH value at the site is within WRAS guidelines, and given the scarcity of made ground beneath the site, it is considered unlikely that water supply pipes will be attacked or water supply tainted by a slightly alkaline pH. No further assessment is proposed

Receptor	Contaminant(s)	Pathway(s)	Potential Severity of Linkage ¹	Probability of Linkage Occuring ¹	Overall Risk ¹	Comments
Unnamed stream 20m south west of the site	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground	Lateral migration of any impacted perched groundwater within Made Ground to watercourses	Medium	Unlikely	Low	Only a limited thickness and areal extent of made ground was identified during the investigation. Laboratory analysis of soil samples does not indicate a significant source of contamination is present. Above factors indicate that leaching to water table and migration to surface watercourse is unlikely to be significant. Additionally, only one groundwater strike encountered within 3m of ground level, i.e. true water beneath site unlikely to be in continuity with watercourse. No further assessment proposed
Principal aquifer beneath the site	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground	Vertical contaminant migration within unsaturated zone (Made Ground and superficial deposits)	Medium	Unlikely	Low	Only a limited thickness and areal extent of made ground was identified during the investigation. Laboratory analysis of soil samples does not indicate a significant source of contamination is present. Above factors indicate that leaching to water table is unlikely to be significant.. No further assessment proposed

¹ Taken from Table 6.3, CIRIA report 552 (Contaminated Land Risk Assessment – A Guide to Good Practice. Severity classified as minor, mild, medium or severe. Probability classified as unlikely, low, likely or high. Overall risk considers both the severity and probability of the linkage (very low, low, moderate, high or very high). See Appendix F for further details

5 SUMMARY AND CONCLUSION

- Review of historical mapping and EA records provided to Cannock District Council, plus anecdotal evidence obtained during public consultation, identified that land off Greenheath Road, Pye Green, Staffordshire was infilled with unknown waste material which potentially posed a risk to human health, water supply pipes and controlled waters.
- An exploratory investigation encountered infill material in only two of six exploratory holes drilled. Where present, the made ground was a maximum of 1m thick and did not contain any material that would be an obvious source of ground gases or contamination.
- Chemical analysis identified that concentrations of contaminants in Made Ground did not exceed generic human health screening criteria. It is therefore considered that land beneath the site is unlikely to pose a risk to human health.
- The pH concentration in three individual soil samples was slightly in excess of the guidelines published by WRAS. The mean pH value recorded at the site was within the WRAS guidelines. As minimal made ground was encountered, and given the absence of elevated contaminant concentrations, it is unlikely that water supply pipework will be / has been compromised. No further assessment is proposed.
- Gas monitoring has identified that the concentrations and flow rates of hazardous gases beneath the site are unlikely to pose a human health or explosion risk to the housing at the site. No further assessment in regard to gas is proposed.
- Given the absence of elevated contaminant concentrations in soil, and the lack of extensive made ground across the site, it is unlikely that significant concentrations of contaminants are leaching from the site and migrating to the stream or to the Principal aquifer below the site. No further assessment is proposed.

On the basis of the preceding assessment and the limitations listed in Appendix B, we consider that the site should not be declared contaminated land under Part 2A of the Environmental Protection Act 1990.


DRAWINGS




A	08/02/11	First Issue		PSN	GVT
No.	Date	Revision		By	Chk
Drawn:	Checked:	Approved:	Date:		
PSN	MH	GVT	08/02/11		
File Ref : 103912-004		Drawing No : 103912-004			
Original Size: 420x297 - A3		Scale: 1:1000		Rev: A	


This map is reproduced from Ordnance Survey material with the permission on behalf of the controller of her Majesty's Stationery Office (C) Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Cannock Chase District Council, Licence No. 100019754, (2009).

KEY:

 STUDY SITE BOUNDARY

 WS1 WINDOW SAMPLER

Client / Project



Title

EXPLORATORY HOLE LOCATION PLAN

Drawing Status

FOR INFORMATION



Grove House
Mansion Gate Drive
Leeds LS7 4DN

Tel: 0113 262 0000
Fax: 0113 262 0737
Web: www.grontmij.co.uk

Bristol. Cumbria. Dublin. Edinburgh. Glasgow. Leeds.
London. Peterborough. Reading. Solihull. Wrexham.

APPENDIX A

Cannock Chase District
Council

**Environmental Protection Act
1990, Part IIa: Initial Desktop
Study and Walkover**

**Infilled Land off Greenheath
Road, Pye Green, Hednesford.
Staffordshire**

January 2010

Prepared for:

Cannock Chase Council
PO Box 28
Beecroft Road
Cannock
Staffordshire
WS11 1BG

Prepared by:

Grontmij Limited
3rd Floor, Radcliffe House
Blenheim Court
Lode Lane
Solihull
B91 2AA

T 0121 7116600

F 0121 7116749

E gareth.taylor@grontmij.co.uk

Document Control

Report Reference	Issue Date	Reason for Issue	Prepared by		Checked by	Approved by
Greenheath DTS/V1/2010	22/01/10	First Issue	Signature			
			Name	Paul Wheeler	Gareth Taylor	Bryn Thomas
			Position	Geotechnical Engineer	Principal Consultant	Technical Director

© Grontmij 2010 This document is a Grontmij confidential document; it may not be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise disclosed in whole or in part to any third party without our express prior written consent. It should be used by you and the permitted discloses for the purpose for which it has been submitted and for no other.

CONTENTS

1	INTRODUCTION.....	1
1.1	Terms of Reference.....	1
1.2	Site Setting	2
1.3	Summary of available site information	4
2	PRELIMINARY CONCEPTUAL MODEL	5
2.1	Introduction	5
2.1.1	Sources of Contaminants	5
2.1.2	Receptors.....	6
2.1.3	Pathways.....	7
2.1.4	Potential Pollutant Linkages.....	7
3	CLOSING REMARKS.....	9

FIGURES

Figure 1.1 – Site Location	3
----------------------------------	---

TABLES

Table 1.1 – Site Setting.....	2
Table 2.1 - Potential Receptors.....	6
Table 2.2 - Potential Pollutant Linkages	8

DRAWINGS

Drawing 1 – Site Location

APPENDICES

Appendix A Limitations Statement

1 INTRODUCTION

1.1 Terms of Reference

In January 2010, Grontmij Limited (Grontmij) was appointed by Cannock Chase District Council (the Council) to assist in the implementation of the Council's Contaminated Land inspection strategy. Part IIa of the Environmental Protection Act 1990 (Part IIa) requires each local authority to inspect areas of land which it believes may be Part IIa Contaminated Land.

The scope of work agreed between Grontmij and the Council included:

- Prioritisation of an initial list of potentially contaminated sites for intrusive investigation work, based upon the sensitivity of each site, using existing limited desktop study data provided by the Council, and
- Production of Desktop Study reports for priority sites, to improve the understanding of the sites and inform the planning of intrusive site investigations.

This report presents the findings of an intrusive investigation at a site located in Greenheath Road, Pye Green, Hednesford.

The site comprises an area of approximately 55 residential properties with gardens over an area of approximately 1 Ha. The site is considered to be sensitive the residential properties overlying a former landfill which was operational pre-1970s, and the site is underlain by a major aquifer.

This report is subject to the limitations presented in Appendix A.

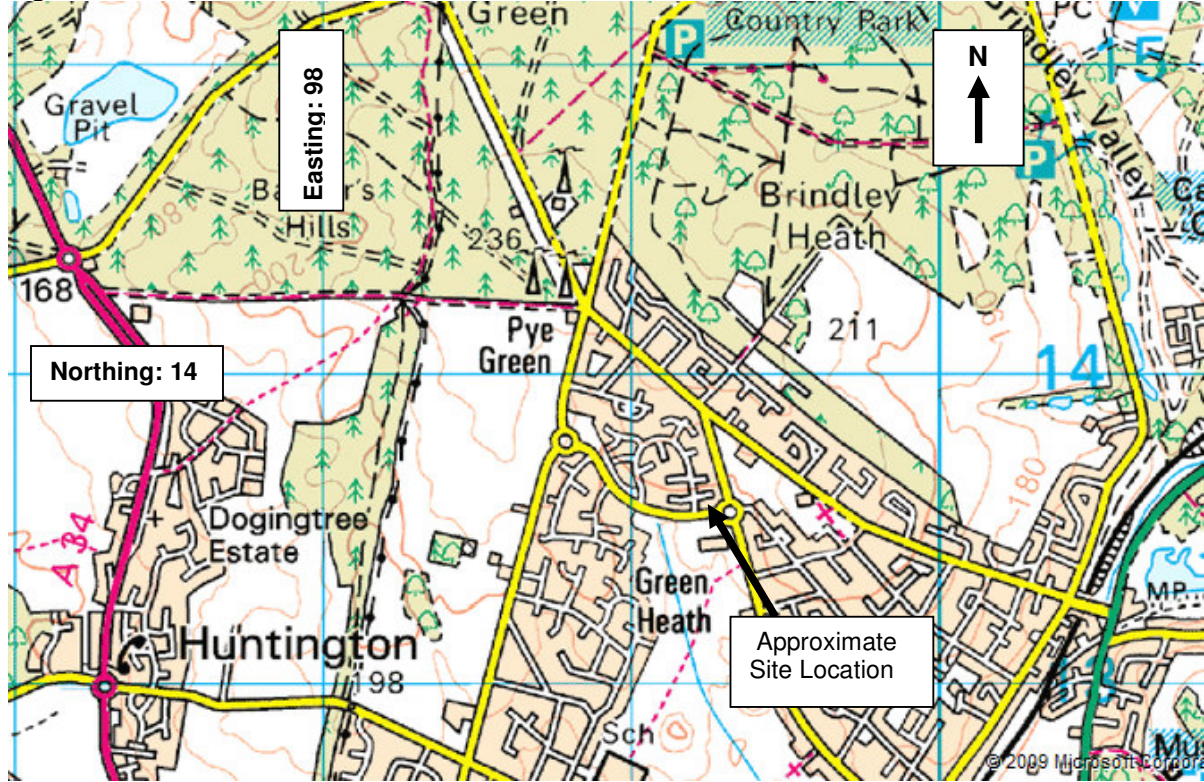
1.2 Site Setting

The site's setting and location are summarised in Table 2.1 and Figure 2.1. The site location is also shown on Drawing 1 – as delineated by a bold black border.

Table 1.1 – Site Setting

Data	Information
Address	The site is an area off Greenheath Road, Pye Green, Wednesbury, Staffordshire. Postcode for the centre of the site is WS12 4SS .
Current site use:	Residential houses and gardens.
Grid Reference:	Located around 399427, 313656
Site Area:	Approximately 1 ha
Topography:	Generally flat.
Surrounding land use	Residential properties to the north and west. Open access land to east and south. The area is intersected with various minor highways.
Geology	British Geological Survey (BGS) 1:63,360 map sheet 154 (Lichfield) indicates Sandstone of the Bunter Sandstone Group of Triassic age. The BGS website Geoindex tool has updated the stratigraphy and refers to the geology as interbedded Sandstone and Conglomerate of the Kidderminster Formation of Triassic age. Neither resource indicates details of superficial deposits.
Hydrogeology	The Environment Agency groundwater vulnerability map 22 – South Staffordshire and East Shropshire indicates the sandstone as a major aquifer. Major aquifers potentially yield large amounts of water for abstraction, and are thus the most sensitive units in terms of groundwater vulnerability. The soil class for the area is indicated to be high (U).
Source Protection Zones (SPZs)	The Environment Agency website indicates that the site lies within Zone 2 (outer protection zone – western half of the site) and a Zone 3 (Total catchment zone – eastern half of the site) of a SPZ. Such SPZs indicate an area of groundwater around a potable abstraction borehole, within which the Environment Agency is likely to place a heightened onus on groundwater quality.
Surface Waters	An un-named stream is located approximately 20m south-west of the site.
Historical Land Use	The data provided indicates that the site was formerly operated as a landfill site and was subsequently developed as residential housing. There is no information about the site's license. The landfill site is shown on Environment Agency "What's In Your Back Yard" website and is recorded as being operational between 31 st December 1960 and 31 st December 1971.

Figure 1.1 – Site Location



Reproduced from Ordnance Survey Map under licence AL549878 with permission from the Controller of HMSO, © Crown Copyright
Plan is not to scale.

1.3 Summary of available site information

At the time of writing this report no ground or site investigation information is available for the site. Cannock Chase Council has anecdotal information indicating that a dust monitoring survey was carried out on the site during previous engineering work, and dust samples for collected for metals analysis, suggesting that evidence was historically available that metal contamination is present in the ground.

2 PRELIMINARY CONCEPTUAL MODEL

2.1 Introduction

This section of the report presents a preliminary contaminated land assessment, on the basis of the available desktop data. The assessment presents an evaluation of the potential risks posed, should contaminants be present in the soil or groundwater beneath the site.

In the context of the Environmental Protection Act 1990 (EPA90), the Water Act 2003 and associated guidance^{1,2}, a preliminary (contaminated land) risk assessment should focus on whether the land at a subject site meets the statutory definition of Contaminated Land. Part IIA of the EPA90, as amended by the Water Act 2003, defines Contaminated Land as:

- *“any land which appears to the local authority in whose area it is situated to be in such condition by reason of substances in, on or under the land, that:*
- *significant harm is being caused or there is a significant possibility of significant harm being caused; or*
- *significant pollution of controlled waters is being caused or there is significant possibility of such pollution being caused*

The procedure for assessing contaminated land involves the development of a Conceptual Site Model (CSM) comprising the assessment of potential Contaminants, Pathways and Receptors.

2.1.1 Sources of Contaminants

The “contaminants” term in the conceptual model has been evaluated by inspection of existing desktop study data provided by Cannock Chase District Council, and a preliminary site walkover.

The following potential sources of contaminants have been identified:

- An infilled area of land, which could contain contaminants including (but not limited to) metals, hydrocarbons, polyaromatic hydrocarbons (PAHs), volatile and semi-volatile organic compounds (VOCs and SVOCs).
- Methane and carbon dioxide gas, from the decomposition of any deleterious material within the made ground.

¹ CLR11 Model Procedures for the Management of Land Contamination (EA & DEFRA September 2004)

² DEFRA Circular 02/2006, Environmental Protection Act 1990: Part IIA Contaminated Land., September 2006.

2.1.2 Receptors

DEFRA Circular 02/2006 defines a Receptor as:

- “either (a) a living organism, a group of organisms, an ecological system or a piece of property which (i) is in a category listed in Table A as a type of receptor, and (ii) is being, or could be, harmed, by a contaminant; or (b) controlled waters which are being, or could be, polluted by a contaminant”.

Table 2.1 lists all of the receptors to be considered by a Part IIA or PPS23³ assessment, and assesses whether the receptors are likely to be present at the site.

Table 2.1 - Potential Receptors

Receptor Type	Receptors	Present (✓/✗)	Notes
Humans	On-site residents	✓	Residential properties (houses and gardens) above indicative extent of landfill. Assumed to have vegetable patches.
	Construction staff and SI personnel.	✗	No known redevelopment proposed
	Future occupants of the site	✓	(Level of risk same as current residents so not considered further)
	Off site commercial workers or residents	✓	Possibly exposed to gases migrating off-site through permeable strata
Ecosystems	Any designated ecological system ⁴ , or living organism forming part of such a system	✗	Inspection of MAGIC website has identified that the site does not lie within, or within 250m of, an ecologically designated site.
Property (Flora and Fauna)	Crops, including timber	✗	Not present
	Produce grown domestically, or on allotments for consumption	✓	Vegetables grown in residential gardens.
	Livestock	✗	Not present
	Other owned or domesticated animals	✓	Pets in residential properties.
	Wild animals which are the subject of shooting or fishing rights	✗	Not present
Property (Buildings & Structures)	A ‘building’ means any structure, including any part below ground level, but does not include plant or machinery within a building.	✓	Residential houses (and in particular, water service pipes and foundations) above indicative extent of landfill.
Controlled Waters ¹	Territorial waters	✗	None feasibly close enough to be impacted.

³ Planning Policy Statement (PPS) 23: Planning and Pollution Control, Annex 2: Development on Land Affected by Contamination

⁴ Includes sites designated as SSSI or National Nature Reserve by the Wildlife and Countryside Act 1981, Special Area of Conservation (including candidate sites), Special Protection Area or Ramsar Site by the Conservation (Natural Habitats etc) Regulations 1994, and Local Nature Reserve by the National Parks and Access to the Countryside Act 1949.

Receptor Type	Receptors	Present (✓/✗)	Notes
	Coastal waters	✗	None feasibly close enough to be impacted.
	Inland Freshwaters	✓	Closest likely to meet definition of controlled waters ¹ is an un-named stream approximately 20m south west of the site.
	Groundwater	✓	Major aquifer beneath site.

¹ as defined in the Water Resources Act Section 104. Generally includes most surface water bodies excluding drains which discharge into sewers.

2.1.3 Pathways

DEFRA Circular 02/2006 defines a Pathway as:

- *“one or more routes or means by, or through, which a receptor: (a) is being exposed to, or affected by, a contaminant; or (b) could be exposed or affected”*

Pathways are examined as part of Table 2.2, overleaf.

2.1.4 Potential Pollutant Linkages

The pollutant linkages identified are also presented in Table 2.2.

Table 2.2 - Potential Pollutant Linkages

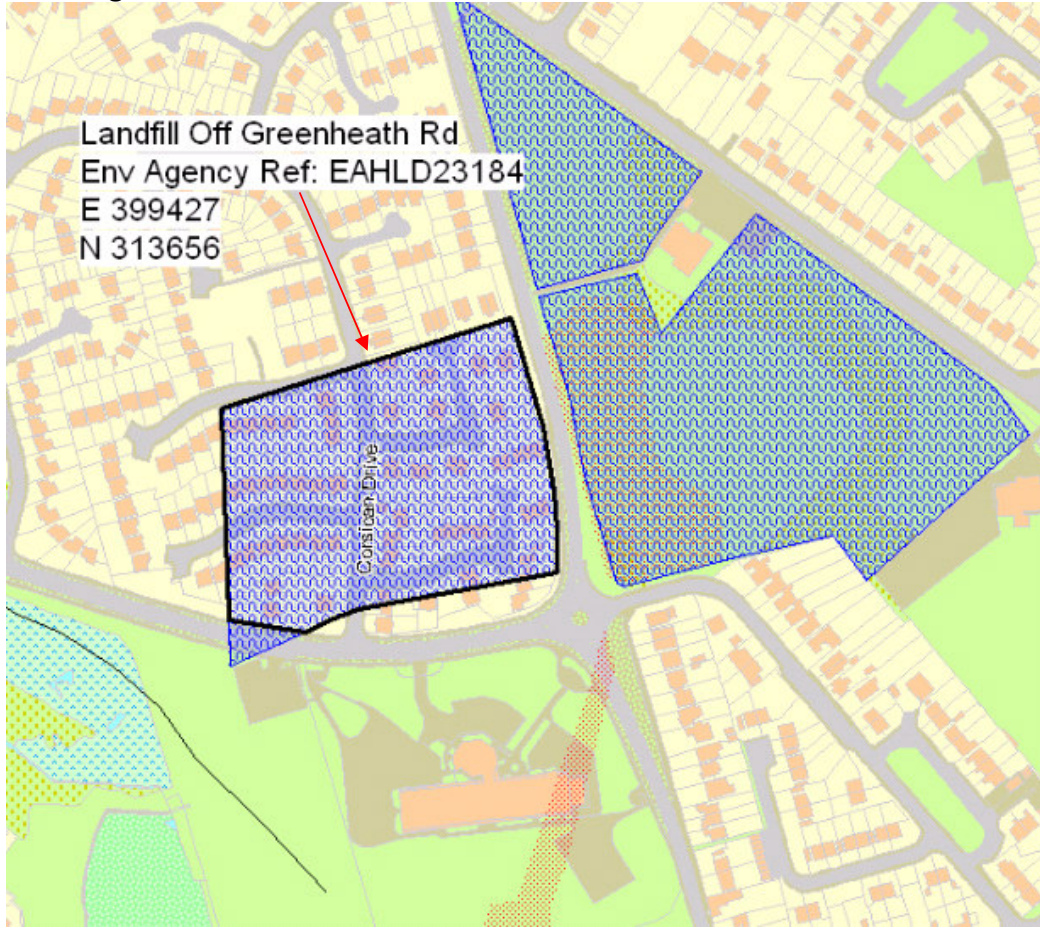
No.	Receptor	Contaminant(s)	Pathway(s)	Risk of Pollutant Linkage Being Realised	Comments
Human Health					
1	Residents of properties above infilled ground – including children playing in gardens & vegetable consumption	Contaminants including (but not limited to) metals, hydrocarbons, PAHs, VOCs, SVOCs within the made ground.	Direct ingestion/dermal contact/inhalation of dust/inhalation of vapours/consumption of home-grown vegetables	Medium to high risk	Grass and/or topsoil coverage likely to mitigate risk to an extent – risk is greatest where possibly impacted soils are exposed or could be encountered, for example, when digging a vegetable patch or when children play outdoors. Properties are constructed directly above a potentially significant contamination source.
2		Methane and carbon dioxide from decomposition of deleterious elements of the made ground.	Movement into buildings, subsequent asphyxiation and explosion risk.	Medium to high risk.	Investigation and monitoring required to determine risk.
Property					
4	Subsurface services serving the buildings (principally water supply)	Contaminants including metals, hydrocarbons, PAHs, VOC, SVOCs within the made ground.	Chemical attack and tainting of water supply could occur at high contaminant concentrations / severe pH levels	Medium risk.	Risk will depend on depth and concentration of contaminants and material(s) used for water pipes.
5	Property (Structures) – sub-surface concrete	Sulphate and pH	Contact between contaminants and concrete.	Medium risk	Possible risk but could only reasonably be established if concrete class used to construct buildings can be established (unlikely) – therefore, no testing targeted this area – more relevant for any new planned buildings.
Controlled Waters					
6	Major aquifer beneath site	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground.	Leaching of chemicals to aquifers	Medium to high risk	Risk will depend upon depth and concentration of contaminants, presence/absence of confining layers between contaminants and the aquifers, leaching potential etc. Site data needed.
7	Surface waters (closest is stream 20m to SW)	Contaminants including metals, hydrocarbons, PAHs, VOCs and SVOCs within the made ground.	Groundwater flow in permeable strata which are in continuity with watercourses	Medium risk	Risk depends on depth/presence of contaminated groundwater, hydraulic gradient within any impacted groundwater unit, and continuity between impacted groundwater and watercourse. .

3 CLOSING REMARKS

Potential pollutant linkages affecting the health of residents, controlled waters and property have been identified, and therefore an initial intrusive investigation should be carried out to examine the likelihood of pollutant linkages existing at the site.

DRAWINGS

Drawing 1 – Site Location



APPENDIX A
(of desk study report)

Appendix A: Limitations Statement

1. This report has been prepared for the exclusive use of Cannock Chase District Council and copyright subsists with Grontmij Limited. Prior written permission must be obtained to reproduce all or part of the report.
2. This report and/or opinions have been prepared for the specific purpose stated in the document. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Grontmij Limited.
3. Observations were made of the site and of structures on the site as indicated within the report.
4. Grontmij has relied upon the existing data provided by Cannock Chase District Council to be accurate, and has not taken steps to independently check the accuracy of the data provided.
5. Our interpretation of any regulatory database information (including the MAGIC, the Environment Agency and British Geological Survey websites) assumes that the data provided is accurate. A disclaimer provided by database search companies is as follows: '...the data is derived from historical sources or information available in public records or from third parties and is supplied to us without warranty by data suppliers and we cannot warrant the accuracy or completeness of the data or the reports.' We cannot therefore accept any responsibility for the accuracy of the data used in this study, only that its interpretation has been carried out with due skill, care and diligence.

APPENDIX B

Appendix B: Limitations Statement

1. This report has been prepared for the exclusive use of Cannock Chase District Council and copyright subsists with Grontmij Limited. Prior written permission must be obtained to reproduce all or part of the report.
2. This report and/or opinions have been prepared for the specific purpose stated in the document. The recommendations should not be used for other purposes or adjacent sites without further reference to Grontmij Limited.
3. Observations were made of the site and soil arisings as indicated within the report. Where access to portions of the site was unavailable or limited, Grontmij Limited renders no opinion as to the environmental status of such parts of the site.
4. Grontmij has relied upon the existing desktop study data provided by Cannock Chase District Council to be accurate, and has not taken steps to independently check the accuracy of the data provided.
5. Our interpretation of any regulatory database information (including the MAGIC and British Geological Survey websites) within an earlier report, and relied upon in this report, assumes that the data provided is accurate. A disclaimer provided by database search companies is as follows: 'the data is derived from historical sources or information available in public records or from third parties and is supplied to us without warranty by data suppliers and we cannot warrant the accuracy or completeness of the data or the reports.' We cannot therefore accept any responsibility for the accuracy of the data used in this study, only that its interpretation has been carried out with due skill, care and diligence.
6. The conclusions and recommendations submitted in this report are based in part upon the data obtained from soil samples from exploratory holes. The nature and extent of variations between the exploratory holes is inferred in the report and could only be confirmed by further investigation. If variations or other latent conditions become evident, it will be necessary to re-evaluate the recommendations of this report.
7. The generalised soil profile described in the text is intended to convey trends in sub-surface conditions. The boundaries between strata are approximate and idealised and have been developed in interpretations of widely spaced explorations and samples; actual soil transitions may be more gradual. For specific information, refer to the exploration logs.
8. Water levels and/or gas readings have been taken in the borings and/or observation wells at times and under conditions stated on the exploration logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater or gas may occur due to variations in rainfall, atmospheric pressure and other factors different from those prevailing at the time the measurements were made.
9. The conclusions and recommendations of this report are based in part upon various types of chemical analysis of soil, water or gases, and are contingent upon their validity. These data have been reviewed and interpretations made in the report. Variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time and other factors. Should additional analytical or monitoring data

become available in the future, these data should be reviewed and conclusions and recommendations presented herein modified accordingly.

10. Chemical analyses have been performed for specific parameters during the course of this study, as detailed in the text. It must be noted that additional constituents not searched for during the current study may be present in soil, groundwater and soil voids at the site.

APPENDIX C



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS101

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 22-09-10 22-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.00-0.00	ES				(0.40)	Grass over brown silty very gravelly fine to medium SAND with frequent rootlets. Gravel is subrounded to rounded, fine to coarse of quartz and quartzite. Occasional subrounded cobbles of quartzite		
0.30-0.30	ES				0.40			
0.60-0.60	ES				(0.50)	Brown and light brown silty gravelly fine to medium SAND. Gravel is subrounded to rounded, fine to coarse of quartz and quartzite. Occasional subrounded to rounded cobbles of quartzite		
					0.90			
					(0.80)	Red brown clayey slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to medium of quartzite. Cemented in places		
1.70-2.00	ES				1.70			
					(1.30)	Red brown very clayey slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to medium of quartzite and quartz		
					3.00			
						End of Hole at 3m bgl.		

Groundwater		General Remarks		Final Depth
Strike Depth: (m)	Rising to: (m)	Location: 64 Corsican Drive . No groundwater strike		3m bgl
None Encountered				

Contractor Sherwood Drilling	Method/ Plant Used Hand held window sampling	All dimensions in metres Scale 1:50 Sheet 1 of 1
-------------------------------------	--	---

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS102

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 24-09-10 24-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.00-0.00	ES					Grass over brown silty very gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to coarse of quartz and quartzite. Occasional subrounded cobbles of quartzite. Becoming red/brown with depth. Rare anular medium to coarse sandstone gravel at 0.8m		
0.30-0.30	ES				(1.00)			
0.65-0.65	ES				1.00			
1.00-1.40	ES				1.60			
					(0.40)	Red brown very silty gravelly fine to medium SAND. Gravel is subrounded to rounded, fine to coarse of quartz and quartzite. Occasional subrounded to rounded cobbles of quartzite		
				2.00				
				3.00				
					(1.00)	Red brown and orange gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to coarse of quartzite.		
					(1.00)	Red brown silty gravelly fine to medium SAND. Gravel is subrounded to rounded, fine to medium of quartzite		
						End of Hole at 3m bgl.		

Groundwater		General Remarks		Final Depth
Strike Depth: (m)	Rising to: (m)	Location: 7 Burleigh Close. No groundwater strike		3m bgl
None Encountered				

Contractor Sherwood Drilling	Method/ Plant Used Hand held window sampling	All dimensions in metres Scale 1:50 Sheet 1 of 1
-------------------------------------	--	---

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS103

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 28-09-10 28-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA			Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	
0.00-0.00	ES				0.20	Grass over brown clayey fine to medium SAND with frequent rootlets.	
0.30-0.30	ES				(0.70)	Red brown slightly silty very gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to coarse of quartz and quartzite. Occasional subrounded to rounded cobbles of quartzite	
0.60-0.60	ES				0.90		
1.50-2.00	ES				(0.60)	Red brown very clayey gravelly fine to medium SAND. Gravel is subrounded to rounded, fine to coarse of quartzite and quartz. Rare angular fine and medium gravel of coal below 0.95m	
					(0.70)	Light blue/grey slightly clayey SAND and GRAVEL. Sand is fine to coarse, Gravel is subrounded to rounded, fine to coarse of quartzite and quartz	
					(0.80)	Red brown very clayey slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded, fine to coarse of quartzite and quartz	
					3.00	End of Hole at 3m bgl.	

Groundwater		General Remarks		Final Depth
Strike Depth: (m)	Rising to: (m)	Location: 85 Corsican Drive . No groundwater strike		3m bgl
None Encountered				

Contractor Sherwood Drilling	Method/ Plant Used Hand held window sampling	All dimensions in metres Scale 1:50 Sheet 1 of 1
-------------------------------------	---	---

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS104

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 28-09-10 28-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.00-0.00	ES				0.20	MADE GROUND; Grass over dark brown very clayey slightly gravelly fine SAND with rootlets. Gravel is angular to subangular fine to coarse of shale, sandstone and brick		
0.30-0.30	ES				0.50			
0.65-0.65	ES				(0.50)	MADE GROUND; red brown slightly silty gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite with occasional subrounded cobbles of quartzite		
1.30-1.60	ES				1.00			
					(1.70)	MADE GROUND; Brown and red/brown very clayey gravelly fine to medium SAND. Gravel is angular, fine to coarse of shale, brick and sandstone and subrounded to rounded fine to coarse of quartzite Red brown silty slightly gravelly fine SAND. Gravel is subrounded to rounded fine to coarse of quartzite		
					2.70			
					3.00	Light grey SAND and GRAVEL. Sand is fine to coarse Gravel is subrounded to rounded fine to coarse of quartzite		
End of Hole at 3m bgl.								

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11

Groundwater Strike Depth: (m) Rising to: (m) Groundwater Remarks		General Remarks Location: 8 Conifer Close .Groundwater strike 1.8m		Final Depth 3m bgl
None Encountered				
Contractor Sherwood Drilling		Method/ Plant Used Hand held window sampling		All dimensions in metres Scale 1:50 Sheet 1 of 1



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS105

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 30-09-10 30-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.00-0.00	ES				0.05	Grass over brown silty fine SAND with rootlet		
0.30-0.30	ES				(2.25)	Red brown very gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite		
0.60-0.60	ES							
2.30-2.70	ES				2.30 (0.40) 2.70	Orange brown gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to medium of quartzite		
					3.00	Red brown very silty gravelly fine SAND gravel is subrounded, fine to coarse of quartzite		
							End of Hole at 3m bgl.	

Groundwater Strike Depth: (m) Rising to: (m) Groundwater Remarks None Encountered		General Remarks Location: 75 Corsican Drive . No groundwater strike	Final Depth 3m bgl
--	--	---	-------------------------------------

Contractor Sherwood Drilling	Method/ Plant Used Hand held window sampling	All dimensions in metres Scale 1:50 Sheet 1 of 1
-------------------------------------	--	---

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11



WINDOW SAMPLE LOG

WINDOW SAMPLE No
WS106

Project Greenheath Road		Client Cannock Chase DC		Logged By
Job No 103912	Date 30-09-10 30-09-10	Ground Level (m)	Co-ordinates	Checked By

SAMPLES & TESTS			Water	STRATA				Instrument Backfill
Depth	Type	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
0.00-0.00	ES						MADE GROUND; Grass over dark brown silty slightly gravelly fine to medium SAND with rootlets. Gravel is subrounded to rounded fine to coarse of quartzite	
0.30-0.30	ES				(0.50)	0.50		
0.60-0.60	ES				(0.45)	0.95	MADE GROUND; Red brown silty sandy angular fine to coarse GRAVEL of shale, sandstone and brick with occasional subrounded fine to coarse quartzite. Sand is fine to coarse	
1.00-1.50	ES				(0.55)	1.50	Light brown yellow very silty slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartz and quartzite	
					(0.70)	2.20	Grey, orange, red and brown very silty slightly gravelly fine to medium SAND. Gravel is Subrounded fine to medium of quartzite	
					(0.80)	3.00	Red brown very silty SAND and GRAVEL. Sand is fine to coarse. Gravel is subrounded fine to medium of quartzite	
End of Hole at 3m bgl.								

Groundwater		General Remarks		Final Depth
Strike Depth: (m)	Rising to: (m)	Location: 66 Corsican Drive . No groundwater strike		3m bgl
None Encountered				

Contractor Sherwood Drilling	Method/ Plant Used Hand held window sampling	All dimensions in metres Scale 1:50 Sheet 1 of 1
-------------------------------------	--	---

GRONTMIJ WINDOW SAMPLE LOG 2006 103912 GREENHEATH.GPJ AGS3 ALL GDT 2/7/11

APPENDIX D



Grontmij
Radcliffe House
3rd Floor
Blenheim Court, Lode lane
Solihull
West Midlands
B912AA

Attention: Gareth Taylor

CERTIFICATE OF ANALYSIS

Date: 18 October 2010
Customer: H_GRONTMIJ_SOL-30
Sample Delivery Group (SDG): 100927-71
Your Reference:
Location: Greenheath
Report No.: 99820

We received 8 samples on Saturday September 25, 2010 and 3 of these samples were scheduled for analysis which was completed on Tuesday October 12, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

Iain Swinton

Operations Director - Land UK & Ireland



SDG:	100927-71	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No:	99820

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2148405	WS101		0.60	22/09/2010
2148294	WS102			24/09/2010
2148335	WS102		0.30	24/09/2010

Only received samples which have had analysis scheduled will be shown on the following pages.

SDG: 100927-71
Job: H_GRONTMIJ_SOL-30
Client Reference:
Location: Greenheath

Customer: Grontmij
Attention: Gareth Taylor
Order No.:
Report No: 99820

SOLID

Results Legend	Lab Sample No(s)		2148294	2148335	2148405
	Customer Sample Ref.		WS102	WS102	WS101
	AGS Ref.				
	Depth (m)			0.30	0.60
	Container		250g Amber Jar	400g Tub 250g Amber Jar	400g Tub 250g Amber Jar
Asbestos Containing Material Screen	All	NDPs: 0 Tests: 1		X	
Boron Water Soluble	All	NDPs: 0 Tests: 3	X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1		X	
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3	X	X	X
Metals by iCap-OES (Soil)	Antimony	NDPs: 0 Tests: 1		X	
	Arsenic	NDPs: 0 Tests: 3	X	X	X
	Barium	NDPs: 0 Tests: 3	X	X	X
	Beryllium	NDPs: 0 Tests: 3	X	X	X
	Cadmium	NDPs: 0 Tests: 3	X	X	X
	Chromium	NDPs: 0 Tests: 3	X	X	X
	Copper	NDPs: 0 Tests: 3	X	X	X
	Lead	NDPs: 0 Tests: 3	X	X	X
	Mercury	NDPs: 0 Tests: 3	X	X	X
	Nickel	NDPs: 0 Tests: 3	X	X	X
	Selenium	NDPs: 0 Tests: 3	X	X	X
Vanadium	NDPs: 0 Tests: 3	X	X	X	

SDG:	100927-71	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No.:	99820

SOLID

Results Legend	Lab Sample No(s)		
	2148294	2148335	2148405
X Test	Customer Sample Ref.		
N No Determination Possible	WS102	WS102	WS101
	AGS Ref.		
	Depth (m)		
		0.30	0.60
	Container		
	250g Amber Jar	250g Amber Jar	250g Amber Jar
	400g Tub	400g Tub	400g Tub
Metals by iCap-OES (Soil)	Zinc	NDPs: 0 Tests: 3	X X X
PAH by GCMS	All	NDPs: 0 Tests: 1	X
pH	All	NDPs: 0 Tests: 3	X X X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 1	X
Sample description	All	NDPs: 0 Tests: 3	X X X
Total Organic Carbon	All	NDPs: 0 Tests: 3	X X X

Sample Descriptions**Grain Sizes**

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2		
2148294	WS102		Dark Brown	Sand	0.1 - 2 mm	Vegetation	Stones		
2148335	WS102	0.30	Dark Brown	Sand	0.1 - 2 mm	Stones	N/A		
2148405	WS101	0.60	Light Brown	Sand	0.1 - 2 mm	Stones	None		

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

SDG:	100927-71	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No:	99820

SDG 100927-71
 Job: H_GRONTMIJ_SOL-30
 Client Reference:
 Location: Greenheath

Customer: Grontmij
 Attention: Gareth Taylor
 Order No.:
 Report No: 99820

Test Completion Dates

Lab Sample No(s)	2148294	2148335	2148405
Customer Sample Ref.	WS102	WS102	WS101
AGS Ref.			
Depth		0.30	0.60
Type	SOLID	SOLID	SOLID
Asbestos Containing Material Screen		08/10/2010	
Boron Water Soluble	11/10/2010	12/10/2010	11/10/2010
Cyanide Comp/Free/Total/Thiocyanate		12/10/2010	
Hexavalent Chromium (s)	11/10/2010	11/10/2010	11/10/2010
Metals by iCap-OES (Soil)	12/10/2010	12/10/2010	12/10/2010
PAH by GCMS		12/10/2010	
pH	12/10/2010	12/10/2010	12/10/2010
Phenols by HPLC (S)		12/10/2010	
Sample description	08/10/2010	08/10/2010	08/10/2010
Total Organic Carbon	11/10/2010	12/10/2010	11/10/2010

SDG: 100927-71
Job: H_GRONTMIJ_SOL-30
Client Reference:
Location: Greenheath

Customer: Grontmij
Attention: Gareth Taylor
Order No.:
Report No.: 99820

Results Legend		Customer Sample Ref.	WS101	WS102	WS102			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.60		0.30			
M	mCERTS accredited.		Soil/Solid	Soil/Solid	Soil/Solid			
aq	Aqueous / settled sample.		22/09/2010	24/09/2010	24/09/2010			
diss.filt	Dissolved / filtered sample.		25/09/2010	25/09/2010	25/09/2010			
tot.unfilt	Total / unfiltered sample.		100927-71	100927-71	100927-71			
*	subcontracted test.		2148405	2148294	2148335			
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.							
Component	LOD/Units	Method						
Asbestos Containing Material Screen	-	TM001			No ACM Detected			
Phenols, Total monohydric	<0.025 mg/kg	TM062 (S)			<0.025	M		
Soil Organic Matter (SOM)	<0.35 %	TM132	0.707	1.74	5.34	#		
pH	1 pH Units	TM133	7.91	7.43	7.21	M		
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<1.2	<0.6	#		
Cyanide, Total	<1 mg/kg	TM153			<1	M		
Thiocyanate	<1 mg/kg	TM153			<1	M		
Antimony	<0.6 mg/kg	TM181			1.43	#		
Arsenic	<0.6 mg/kg	TM181	5.47	5.55	4.34	M		
Barium	<0.6 mg/kg	TM181	39	65	35.2	#		
Beryllium	<0.01 mg/kg	TM181	0.375	0.54	0.398			
Cadmium	<0.02 mg/kg	TM181	0.177	0.402	0.254	M		
Chromium	<0.9 mg/kg	TM181	10.3	13.7	9.9	M		
Copper	<1.4 mg/kg	TM181	10.7	19.7	13	M		
Lead	<0.7 mg/kg	TM181	10.1	23.1	13.4	M		
Mercury	<0.14 mg/kg	TM181	0.497	0.495	0.528	M		
Nickel	<0.2 mg/kg	TM181	8.67	10.6	8.46	M		
Selenium	<1 mg/kg	TM181	<1	<1	<1	#		
Vanadium	<0.2 mg/kg	TM181	14.9	22	13.6	#		
Zinc	<1.9 mg/kg	TM181	28.6	57.6	41.4	M		
Boron, water soluble	<1 mg/kg	TM222	<1	<1	<1	M		

SDG 100927-71
 Job: H_GRONTMIJ_SOL-30
 Client Reference:
 Location: Greenheath

Customer: Grontmij
 Attention: Gareth Taylor
 Order No.:
 Report No: 99820

PAH by GCMS

Results Legend		Customer Sample Ref.	WS102						
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.30 Soil/Solid 24/09/2010 25/09/2010 100927-71 2148335						
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
diss.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	subcontracted test.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.								
Component	LOD/Units			Method					
Naphthalene-d8 % recovery**	%			TM218	97.5				
Acenaphthene-d10 % recovery**	%			TM218	95.1				
Phenanthrene-d10 % recovery**	%	TM218	96.5						
Chrysene-d12 % recovery**	%	TM218	89.7						
Perylene-d12 % recovery**	%	TM218	96.2						
Naphthalene	<9 µg/kg	TM218	<9				M		
Acenaphthylene	<12 µg/kg	TM218	<12				M		
Acenaphthene	<8 µg/kg	TM218	<8				M		
Fluorene	<10 µg/kg	TM218	<10				M		
Phenanthrene	<15 µg/kg	TM218	<15				M		
Anthracene	<16 µg/kg	TM218	<16				M		
Fluoranthene	<17 µg/kg	TM218	<17				M		
Pyrene	<15 µg/kg	TM218	<15				M		
Benzo(a)anthracene	<14 µg/kg	TM218	<14				M		
Chrysene	<10 µg/kg	TM218	<10				M		
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15				M		
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14				M		
Benzo(a)pyrene	<15 µg/kg	TM218	<15				M		
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18				M		
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23				M		
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24				M		
Polyaromatic hydrocarbons, Total USEPA 16	<118 µg/kg	TM218	<118				M		

Table of Results - Appendix

SDG Number : 100927-71

Client : H_GRONTMIJ_SOL

Client Ref :

REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM001	In - house Method	Determination of asbestos containing material by screening on solids		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the 'Skalar SANS+ System' Segmented Flow Analyser		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

APPENDIX

APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:
NRA Leach tests, flash point, ammonium as NH₄ by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C₄ – C₁₀ range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOXTHERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOXTHERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOXTHERM	HPLC
Phenols by GCMS	WET	DCM	SOXTHERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

Identification of Asbestos in Bulk Materials

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Visual Estimation Of Fibre Content.

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.

The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Asbestos Type

Common Name

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Grontmij
Radcliffe House
3rd Floor
Blenheim Court, Lode lane
Solihull
West Midlands
B912AA

Attention: Gareth Taylor

CERTIFICATE OF ANALYSIS

Date: 18 October 2010
Customer: H_GRONTMIJ_SOL-30
Sample Delivery Group (SDG): 101004-32
Your Reference:
Location: Greenheath
Report No.: 100325

We received 16 samples on Saturday October 02, 2010 and 6 of these samples were scheduled for analysis which was completed on Wednesday October 13, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

Iain Swinton

Operations Director - Land UK & Ireland



SDG:	101004-32	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No.:	100325

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2181223	WS103			28/09/2010
2181248	WS103		0.30	28/09/2010
2181277	WS103		0.60	28/09/2010
2181315	WS103		1.50 - 2.00	28/09/2010
2181522	WS104			28/09/2010
2181539	WS104		0.30	28/09/2010
2181555	WS104		0.65	28/09/2010
2181576	WS104		1.30 - 1.60	28/09/2010
2181340	WS105			30/09/2010
2181366	WS105		0.30	30/09/2010
2181382	WS105		0.60	30/09/2010
2181402	WS105		2.30 - 2.70	30/09/2010
2181429	WS106			30/09/2010
2181451	WS106		0.30	30/09/2010
2181480	WS106		0.60	30/09/2010
2181498	WS106		1.00 - 1.50	30/09/2010

Only received samples which have had analysis scheduled will be shown on the following pages.

SDG: 101004-32
 Job: H_GRONTMIJ_SOL-30
 Client Reference:
 Location: Greenheath

Customer: Grontmij
 Attention: Gareth Taylor
 Order No.:
 Report No: 100325

SOLID

Results Legend	Lab Sample No(s)		2181223	2181382	2181451	2181480	2181522	2181539
	Customer Sample Ref.		WS103	WS105	WS106	WS106	WS104	WS104
	AGS Ref.							
	Depth (m)			0.60	0.30	0.60		0.30
	Container		250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub
Asbestos Containing Material Screen	All	NDPs: 0 Tests: 2				X		X
Boron Water Soluble	All	NDPs: 0 Tests: 6	X	X	X	X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2				X		X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X
Metals by iCap-OES (Soil)	Antimony	NDPs: 0 Tests: 2				X		X
	Arsenic	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Barium	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Beryllium	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Cadmium	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Chromium	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Copper	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Lead	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Mercury	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Nickel	NDPs: 0 Tests: 6	X	X	X	X	X	X
	Selenium	NDPs: 0 Tests: 6	X	X	X	X	X	X
Vanadium	NDPs: 0 Tests: 6	X	X	X	X	X	X	

SDG:	101004-32	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No.:	100325

SOLID

Results Legend	Lab Sample No(s)					
	2181223	2181382	2181451	2181480	2181522	2181539
X Test	Customer Sample Ref.					
N No Determination Possible	WS103	WS105	WS106	WS106	WS104	WS104
	AGS Ref.					
	Depth (m)					
		0.60	0.30	0.60		0.30
	Container					
	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub	250g Amber Jar 400g Tub
Metals by iCap-OES (Soil)	Zinc	NDPs: 0 Tests: 6		X	X	X
PAH by GCMS	All	NDPs: 0 Tests: 2		X	X	
pH	All	NDPs: 0 Tests: 6		X	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2		X		X
Sample description	All	NDPs: 0 Tests: 6		X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 6		X	X	X

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
2181223	WS103		Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	Vegetation
2181382	WS105	0.60	Dark Brown	Sand	0.1 - 2 mm	Stones	N/A
2181451	WS106	0.30	Dark Brown	Sand	0.1 - 2 mm	Stones	Vegetation
2181480	WS106	0.60	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	None
2181522	WS104		Dark Brown	Sand	0.1 - 2 mm	Stones	N/A
2181539	WS104	0.30	Dark Brown	Sandy Loam	0.1 - 2 mm	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

SDG:	101004-32	Customer:	Grontmij
Job:	H_GRONTMIJ_SOL-30	Attention:	Gareth Taylor
Client Reference:		Order No.:	
Location:	Greenheath	Report No:	100325

SDG: 101004-32
 Job: H_GRONTMIJ_SOL-30
 Client Reference:
 Location: Greenheath

Customer: Grontmij
 Attention: Gareth Taylor
 Order No.:
 Report No: 100325

Test Completion Dates

Lab Sample No(s)	2181223	2181382	2181451	2181480	2181522	2181539
Customer Sample Ref.	WS103	WS105	WS106	WS106	WS104	WS104
AGS Ref.						
Depth		0.60	0.30	0.60		0.30
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Asbestos Containing Material Screen				11/10/2010		11/10/2010
Boron Water Soluble	13/10/2010	11/10/2010	11/10/2010	13/10/2010	11/10/2010	13/10/2010
Cyanide Comp/Free/Total/Thiocyanate				12/10/2010		12/10/2010
Hexavalent Chromium (s)	13/10/2010	11/10/2010	11/10/2010	13/10/2010	11/10/2010	13/10/2010
Metals by iCap-OES (Soil)	13/10/2010	12/10/2010	12/10/2010	14/10/2010	12/10/2010	14/10/2010
PAH by GCMS				12/10/2010		12/10/2010
pH	12/10/2010	13/10/2010	12/10/2010	13/10/2010	12/10/2010	13/10/2010
Phenols by HPLC (S)				12/10/2010		12/10/2010
Sample description	11/10/2010	08/10/2010	08/10/2010	11/10/2010	08/10/2010	11/10/2010
Total Organic Carbon	13/10/2010	11/10/2010	11/10/2010	13/10/2010	11/10/2010	13/10/2010

SDG: 101004-32
Job: H_GRONTMIJ_SOL-30
Client Reference:
Location: Greenheath

Customer: Grontmij
Attention: Gareth Taylor
Order No.:
Report No.: 100325

Results Legend		Customer Sample Ref.	WS103	WS104	WS104	WS105	WS106	WS106
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Date Received SDG Ref Lab Sample No.(s) AGS Reference			0.30	0.60	0.30	0.60
M	mCERTS accredited.		Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
aq	Aqueous / settled sample.		28/09/2010	28/09/2010	28/09/2010	30/09/2010	30/09/2010	30/09/2010
diss.filt	Dissolved / filtered sample.		02/10/2010	02/10/2010	02/10/2010	02/10/2010	02/10/2010	02/10/2010
tot.unfilt	Total / unfiltered sample.		101004-32	101004-32	101004-32	101004-32	101004-32	101004-32
*	subcontracted test.		2181223	2181522	2181539	2181382	2181451	2181480
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.							
Component	LOD/Units	Method						
Asbestos Containing Material Screen	-	TM001			No ACM Detected		No ACM Detected	
Phenols, Total monohydric	<0.025 mg/kg	TM062 (S)			<0.025		<0.025	
Soil Organic Matter (SOM)	<0.35 %	TM132	4.55	3	1.88	0.724	3.45	1.16
pH	1 pH Units	TM133	7.14	7.91	8.56	8.62	5.51	8.06
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6	<0.6	<0.6	<1.2	<0.6
Cyanide, Total	<1 mg/kg	TM153			<1			<1
Thiocyanate	<1 mg/kg	TM153			<1			<1
Antimony	<0.6 mg/kg	TM181			0.892			<0.6
Arsenic	<0.6 mg/kg	TM181	9.89	7.3	5.85	5.89	7.44	9.34
Barium	<0.6 mg/kg	TM181	89.8	89.1	65.4	45.8	44.1	180
Beryllium	<0.01 mg/kg	TM181	0.994	0.837	0.737	0.591	0.407	1.49
Cadmium	<0.02 mg/kg	TM181	0.685	0.626	0.433	0.432	0.515	0.682
Chromium	<0.9 mg/kg	TM181	14.9	12.5	11.6	11.7	9.88	24.3
Copper	<1.4 mg/kg	TM181	24.1	24	14.2	18.6	19.7	21
Lead	<0.7 mg/kg	TM181	75.3	51.7	20.1	11.4	44.1	150
Mercury	<0.14 mg/kg	TM181	0.339	0.561	<0.14	0.402	0.554	<0.14
Nickel	<0.2 mg/kg	TM181	13.6	13.2	10.2	9.02	7.6	24.5
Selenium	<1 mg/kg	TM181	<1	<1	<1	<1	<1	1.56
Vanadium	<0.2 mg/kg	TM181	18.5	17.5	13.9	15.3	13.7	31.3
Zinc	<1.9 mg/kg	TM181	107	99	61	44.5	79.2	90.2
Boron, water soluble	<1 mg/kg	TM222	<1	<1	<1	<1	<1	<1

SDG: 101004-32
 Job: H_GRONTMIJ_SOL-30
 Client Reference:
 Location: Greenheath

Customer: Grontmij
 Attention: Gareth Taylor
 Order No.:
 Report No: 100325

PAH by GCMS

Results Legend		Customer Sample Ref.	WS104	WS106			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Date Received SDG Ref Lab Sample No.(s) AGS Reference					
M	mCERTS accredited.						
aq	Aqueous / settled sample.			0.60			
diss.filt	Dissolved / filtered sample.			Soil/Solid	Soil/Solid		
tot.unfilt	Total / unfiltered sample.			28/09/2010	30/09/2010		
*	subcontracted test.			02/10/2010	02/10/2010		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.			101004-32	101004-32		
				2181522	2181480		
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	100	94.7			
Acenaphthene-d10 % recovery**	%	TM218	98.1	93			
Phenanthrene-d10 % recovery**	%	TM218	99.7	97.2			
Chrysene-d12 % recovery**	%	TM218	94.1	86.3			
Perylene-d12 % recovery**	%	TM218	103	88			
Naphthalene	<9 µg/kg	TM218	<9	<9			
Acenaphthylene	<12 µg/kg	TM218	<12	<12			
Acenaphthene	<8 µg/kg	TM218	<8	<8			
Fluorene	<10 µg/kg	TM218	<10	<10			
Phenanthrene	<15 µg/kg	TM218	61.5	<15			
Anthracene	<16 µg/kg	TM218	19.7	<16			
Fluoranthene	<17 µg/kg	TM218	181	<17			
Pyrene	<15 µg/kg	TM218	165	<15			
Benzo(a)anthracene	<14 µg/kg	TM218	123	<14			
Chrysene	<10 µg/kg	TM218	120	<10			
Benzo(b)fluoranthene	<15 µg/kg	TM218	213	<15			
Benzo(k)fluoranthene	<14 µg/kg	TM218	71.4	<14			
Benzo(a)pyrene	<15 µg/kg	TM218	162	<15			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	116	<18			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	30.5	<23			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	151	<24			
Polyaromatic hydrocarbons, Total USEPA 16	<118 µg/kg	TM218	1410	<118			

Table of Results - Appendix

SDG Number : 101004-32

Client : H_GRONTMIJ_SOL

Client Ref :

REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM001	In - house Method	Determination of asbestos containing material by screening on solids		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the 'Skalar SANS+ System' Segmented Flow Analyser		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

APPENDIX

APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:
NRA Leach tests, flash point, ammonium as NH₄ by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C₄ – C₁₀ range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOXTHERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOXTHERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOXTHERM	HPLC
Phenols by GCMS	WET	DCM	SOXTHERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

Identification of Asbestos in Bulk Materials

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Visual Estimation Of Fibre Content.

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.

The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Asbestos Type

Common Name

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

APPENDIX E

TABLE 1 - GAS MONITORING DATA																			
Site: Greenheath																	Job No. 103912		
Monitoring Well Sampling & Testing Record																			
BH	Date	Pipe Internal Diameter mm	Monitored By	Gas												Weather			
				Rel. Pressure (mb)	Flow l/h	CH ₄ % v/v	CH ₄ GSV	CO ₂ % v/v	CO ₂ GSV	O ₂ % v/v	CO ppm	H ₂ S ppm	PID CF ppm	HEX %	LEL %	Gas Analyser	Atmospheric Pressure mbar	Conditions @ Monitoring	Ambient Temp °C
WS101	12/10/2010			0.45	0.1	0	0	4	0.004	13.8	0	0	NM	NM	0	GA2000	997		
WS101	26/10/2010			NM	0.1	0	0	3.1	0.0031	15.1	0	0	NM	NM	NM	GA2000	990		
WS101	09/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		
WS101	23/11/2010			NM	0.1	0	0	2.3	0.0023	18.0	0	0	NM	NM	0	GA2000	NM		
							0												
WS102	12/10/2010			0.30	0.1	0	0	0.2	0.0002	16.1	0	0	NM	NM	0	GA2000	997		
WS102	26/10/2010			NM	0.1	0	0	4.3	0.0043	13.8	0	0	NM	NM	NM	GA2000	990		
WS102	09/11/2010			NM	0.1	0	0	2.2	0.0022	18.2	0	0	NM	NM	0	GA2000	NM		
WS102	23/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		
WS103	12/10/2010			0.44	0.1	0	0	2.9	0.0029	4.8	0	0	NM	NM	0	GA2000	996		
WS103	26/10/2010			NM	0	0	0	2.6	0	4.7	0	0	NM	NM	NM	GA2000	990		
WS103	09/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		
WS103	23/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		
WS104	12/10/2010			0.44	0	0	0	7.2	0	16.2	0	0	NM	NM	0	GA2000	996		
WS104	26/10/2010			NM	0	0	0	6.9	0	10.5	0	0	NM	NM	NM	GA2000	990		
WS104	09/11/2010			NM	0.1	0	0	3	0.003	18.9	0	0	NM	NM	NM	GA2000	NM		
WS104	23/11/2010			NM	0.1	0.1	0.0001	2.7	0.0027	18.8	0	0	NM	NM	6.8	GA2000	NM		
							0		0										
WS105	12/10/2010			NM	0	0	0	4.4	0	16.2	0	0	NM	NM	0	GA2000	997		
WS105	26/10/2010			NM	0	0	0	2.5	0	13.4	0	0	NM	NM	NM	GA2000	990		
WS105	09/11/2010			NM	-0.1	0	0	2.9	-0.0029	18.0	0	0	NM	NM	NM	GA2000	NM		
WS105	23/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		
WS106	12/10/2010			0.45	0.1		0	5	0.005	8.4	0	0	NM	NM	0	GA2000	997		
WS106	26/10/2010			NM	0.1	0	0	2.5	0.0025	13.5	0	0	NM	NM	NM	GA2000	990		
WS106	09/11/2010			NM	0.1	0	0	4.9	0.0049	10.1	0	0	NM	NM	0	GA2000	NM		
WS106	23/11/2010			NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	GA2000	NM		

APPENDIX F

Appendix F: Severity and Probability of Risk in Conceptual Site Models (after CIRIA552, Tables 6.3 to 6.5)

This report draws on guidance presented in CIRIA report 552, "Contaminated Land Risk Assessment, A Guide for Good Practice", wherein the "severity" term in the Conceptual Site Model is classified with reference to the sensitivity of the hazard and the receptor, as follows:

Situation	Severity Category	Description	Examples
ACUTE PROBLEM	Severe	Acute risk to human health likely to result in "significant harm" as defined in EPA90, catastrophic damage to buildings or property, acute risk of major pollution of controlled waters, acute risk of harm to ecosystems (as defined in Contaminated Land Regulations 2006)	High cyanide concentrations at the surface of a recreation area Major spillage into controlled waters Explosion, causing building collapse
SIGNIFICANT HARM TO SENSITIVE RECEPTOR	Medium	Chronic risk to human health likely to result in "significant harm" as defined in EPA90, chronic pollution of sensitive controlled waters, significant change at a sensitive ecosystems or species, significant damage to buildings or structures	Contaminant concentrations at a site in excess of SGVs, GAC or similar screening values Leaching of contaminants to sensitive aquifer Death of a species within a nature reserve
SIGNIFICANT HARM TO LESS SENSITIVE RECEPTOR	Mild	Pollution of non-sensitive waters, significant damage to buildings, structures, services or crops, damage to sensitive buildings, structures, services or the environment, which nonetheless result in "significant harm"	Pollution to (former) non-aquifer or to non-controlled surface watercourse. Damage to building rendering it unsafe to occupy (e.g. foundation or structural damage)
NON-SIGNIFICANT HARM	Minor	Harm, not necessarily resulting in "significant harm" but probably requiring expenditure to resolve or financial loss. Non-permanent risks to human health that are easily mitigated, e.g. by wearing PPE. Easily-repairable damage to structures or services	Contaminant concentrations requiring the wearing of PPE during site work, but no other long-term mitigation. Discolouration of concrete

The likelihood of an event (probability) takes into account both the presence of hazard and receptor and the integrity of the pathway between hazard and receptor, and is assessed as follows:

Category	There is a pollution linkage and:
High	Event is likely in the short term and almost inevitable over the long term. Or, there is evidence of actual harm at/to the receptor
Likely	Event is possible in the short term and likely over the long term
Low	Event is unlikely in the short term and possible over the long term
Unlikely	Event is unlikely, even in the long term

Potential severity and probability have been assessed in the following matrix, to give an overall risk rating:

	Severity			
Probability	Severe	Medium	Mild	Minor
High	Very high	High	Moderate	Low/moderate
Likely	High	Moderate	Low/moderate	Low
Low	Moderate	Low/moderate	Low	Very low
Unlikely	Low/moderate	Low	Very low	Very low

The above risk categories are likely to result in the following actions:

- Very high: urgent intervention / investigation needed, remediation likely to be required
- High: urgent intervention / investigation needed, remediation possibly required in short term and probably required in long term
- Moderate: investigation needed to clarify and refine risk; remediation may be required over the long term
- Low: it is possible that harm could arise to a receptor, but if realised, such harm is likely to be, at worst, mild
- Very low: it is possible that harm could arise to a receptor, but if realised, such harm is unlikely to be severe